TU Delft

Delft University of Technology

Smart Grid standards policy in context

A discursive-institutionalist analysis of government intervention in the European Union and the United States

Muto, M.S.

DOI
10.4233/uuid:b265aa7e-fb37-42b9-9104-c00f5d3e0453

Publication date
2024

Document Version
Final published version

Citation (APA)
Muto, M. S. (2024). *Smart Grid standards policy in context: A discursive-institutionalist analysis of government intervention in the European Union and the United States*. [Dissertation (TU Delft), Delft University of Technology]. https://doi.org/10.4233/uuid:b265aa7e-fb37-42b9-9104-c00f5d3e0453

Important note
To cite this publication, please use the final published version (if applicable).
Please check the document version above.

Copyright
Other than for strictly personal use, it is not permitted to download, forward or distribute the text or part of it, without the consent of the author(s) and/or copyright holder(s), unless the work is under an open content license such as Creative Commons.

Takedown policy
Please contact us and provide details if you believe this document breaches copyrights.
We will remove access to the work immediately and investigate your claim.

This work is downloaded from Delft University of Technology.
For technical reasons the number of authors shown on this cover page is limited to a maximum of 10.

Smart Grid standards policy in context

A discursive-institutionalist analysis of government intervention in the European Union and the United States

Sachiko Muto

Smart Grid standards policy in context

A discursive-institutionalist analysis of government intervention in the European Union and the United States

Dissertation

for the purpose of obtaining the degree of doctor

at Delft University of Technology

by the authority of the Rector Magnificus Prof.dr.ir. T.H.J.J. van der Hagen;

Chair of the Board for Doctorates

to be defended publicly on

Friday 1 March 2024 at 10:00 o'clock

by

My Sachiko MUTO

Master of Science in European Politics and Policy, London School of Economics and Political Science, United Kingdom

born in Copenhagen, Denmark

This dissertation has been approved by the promotors.

Composition of the doctoral committee:

Rector Magnificus	chairperson, Delft University of Technology
Prof.dr.ir. P.M. Herder	Delft University of Technology, promotor
Prof.mr.dr. J.A. de Bruijn	Delft University of Technology, promotor

Independent members:

Prof.d.ir. Z. Lukszo	Delft University of Technology
Prof.dr.ir. H.J. de Vries	Erasmus University Rotterdam
Prof.dr. E. Subrahmaniam	Carnegie Mellon University, USA
Prof.dr. M. van der Steen	Erasmus University Rotterdam
Prof.dr. M.B. Veenswijk	Vrije Universiteit Amsterdam
Prof.dr.ir. M.F.W.H.A. Janssen	Delft University of Technology, reserve member

Abstract

Starting around 2005 and for several years, the creation of a "Smart Grid" became a key element in the quest of policymakers to operationalize the goal of "sustainable development". In official discourse, the Smart Grid promised improved energy security and a way to support the realization of ambitious targets on reduced carbon emissions and increased use of renewable resources. Additionally, the Smart Grid was presented with the lure of "green innovation" and jobs.

The imperative of realizing these vision(s) of the Smart Grid put unprecedented focus on the world of ICT standardization. Without an agreed set of interoperability standards, promising pilot projects would not scale in a meaningful way, and the European Union (EU) and the United States (US) federal government departed from established practice within this policy domain and intervened to *encourage*, *coordinate* and *accelerate* standardization activities.

This thesis explores how such a policy of intervention was constructed in EU and US official policy texts. It does this by building a conceptual framework with elements from discourse theory and neo-institutionalism that aims to understand the factors of policy change in a highly technical area in the absence of crisis or repeated policy failure. How is the need to develop an agreed set of ICT interoperability standards understood as a policy problem, and how is intervention in the standardization process legitimated? What does the policy response to the challenge of Smart Grid standardization say regarding current understandings about the proper role of government and the potential for industry self-organization in policy areas relating to new technologies?

In pursuing the above questions, this thesis contributes to our understanding of a field that is under-developed yet of growing importance. As our societies are increasingly attempting to solve important challenges through the large-scale application of ICTs (Smart Transport, Smart Homes, Smart Cities), we need a better understanding of policy alternatives that go beyond the typical dichotomy of legislation versus self-regulation.

Acknowledgements

C'est le temps que tu as perdu pour ta rose qui fait la rose si importante.

Antoine de Saint-Exupéry

I extend my heartfelt thanks to those who have played pivotal roles during this journey. First and foremost, I express my deepest gratitude to my esteemed promotors, Paulien Herder and Hans de Bruijn. Their intellectual curiosity, academic rigor, and seemingly boundless patience and support have been instrumental in guiding me through this process. I am also indebted to Tineke Egyedi, whose supervision during the initial stages of this project was invaluable. A special mention goes to my colleague Taline Jadaan at RISE Research Institutes of Sweden, whose generosity and encouragement allowed me to finally bring this work to completion.

I recognize how lucky I am to have parents and sisters on whom I can always count on for support. Thank you also to Haruhi Muto for her belief in me.

I am grateful for my friends, including Helena Malikova, Robert Schröder, and the late Pieter Hintjens, who never ceased to remind me about the thesis and, at times, annoyingly impelled me to keep going.

Finally, my deepest appreciation goes to my husband, Arnaud. Without his unwavering support, I would not be writing these words. His presence and encouragement have been essential throughout this journey, and for that, I am forever thankful.

Contents

List of Tables

Summary

Introduction: Smart grid standards – the challenge of policy intervention

During a period of heightened focus on "Smart Grids", starting around 2005 and culminating in the period 2007-2014, policymakers in the European Union (EU) and the United States (US) put extraordinary pressure on industry to deliver a set of interoperability standards by 2012. The effort was described as "unprecedented" (NIST, 2010) and "not business as usual" (JWG, 2011).

Insights drawn from the systems engineering literature (Maier, 1998; Haberfellner et al, 2019) show that the lack of a single authority which has "control" over complex system-of-systems (such as smart grid) – and hence the need to rely on voluntary collaboration – is an important factor preventing the development of holistic and system-independent solutions and standards (see table 1). The challenge is not merely technical but stems from the fact that actors have different preferences and that agreeing on a single solution implies trade-offs (Schütz et al, 2020).

Yet while standardization in more heavily regulated sectors have seen varying degrees of government intervention, governments have generally been reluctant to intervene in the ICT standardization field because it has been seen as important to ensure that innovation is not hampered by premature standards-setting or lock-in to inferior technology. The various policy measures introduced to accelerate smart grid standardization were presented as an exception to the rule of bottom-up, industry-led standardization.

In approaching the policy intervention to accelerate the development and uptake of smart grid standards as an "emblematic" case (Hajer, 1995), this thesis ultimately aims at better understanding of how policy can support the development and uptake of standards. The digital transformation of society has arguably raised the stakes of ICT standardization to the point that it can no longer be seen as a purely vertical concern. The deployment of new technologies is changing traditional industries, and in concepts like smart mobility and smart energy there are expectations that they can be leveraged

to improve the lives of citizens and aid in sustainable transitions. Yet without standards, promising pilot projects in these areas will fail to deliver at scale.

Table 1: From massively interconnected systems to complex systems of systems: challenges and implications for standardization

Economic/ Managerial characteristics	**Massively interconnected systems (monolithic)** Independent systems designed as stand-alone and self-sufficient	**Complex systems of systems (collaborative)** Distributed "systems of systems": multiple autonomous and independent subsystems	**Resulting Challenge**	**Implication for standardization**
Ownership	A single authority is responsible for the entire system acquisition and development	Each constituent has its own local "owner". Liberalized markets and unbundling means owners do not always control development	Multiple independent actors	**Agreement becomes increasingly problematic**
Stakeholders	Clear set of stakeholders	Multiple layers of stakeholders including different sectors with different cultures and expectations	Cultural heterogeneity	
Goals and priorities	Designed and developed to meet common objectives	The objectives of constituent parts may not align with those of the overall system.	Multiple, possibly competing goals	
Governance	Directed – system owner has authority to impose decisions on constituent parts	Collaborative – relies on voluntary action of the participants	System cannot rely on coercive powers of a single authority: incentives need to be built in.	

Understanding policy intervention through a discursive-institutional approach

The central question guiding the research in this thesis is: *How was the need to develop Smart Grid standards constructed as a policy problem in the EU and the US, and what consequences did this have for policy intervention in this area?*

At the heart of this inquiry lies an intriguing tension or dilemma: by taking policy action to bring about progress on smart grid standardization, governments intervened in a process which they insisted should normally be delegated to industry. The search for answers to this tension is a core concern which has guided this thesis to focus empirically on the *discourse* of policy intervention: how was a departure from existing policy *legitimated*?

Significantly, discourse theorists like Norman Fairclough (1992, 2003) have suggested that the in-depth study of documents that describe departures from established arrangements – by exploring both what is taken for granted and what needs to be explained, and how tensions and contradictions are negotiated – can reveal important insight about policy change and stability. In the last several decades, a growing number or political scientists interested in policy change have also turned to ideas and discourse to theorize about policy change (cf. Goldstein & Keohane, 1993; Steinmo & Thelen, 1992; M. Weir, 2006).

Consequently, in order to answer the main research question, and with the overarching aim of achieving deeper understanding through a form of theoretical triangulation (Sovacool & Hess, 2017), the conceptual framework developed in this this thesis draws from both discourse theory and from various complementary strands of neo-institutionalist theory to understand the constraints and opportunities for policy change. The approach aligns with a school of policy studies that have been termed the "argumentative turn" (Fischer & Forester, 1993), which builds on the premise that "public policy is made of language" (Majone, 1989, p. 1). However, as Hajer emphasizes, discourse analysis in this approach "is not to be counterposed with institutional analysis but is rather a different way of looking at institutions that is meant to shed new light on the functioning of those institutions and how political change in institutional

arrangements comes about" (Hajer, 1995, p. 264). Discourse analysis concerns not only what is being said or written by policy actors, but also includes the context – institutionalized patterns of interactions among actors and the governmental structures that frame those political interactions – which "co-determines what can be said meaningfully" (Hajer, 1995, p. 2).

Justifying government intervention in standardization – contrasting storylines

The empirical investigation in this thesis takes the form of two case studies presented in chapters 3 and 4. Critical discourse analysis was employed to explore how public policy response to the Smart Grid standardization challenge was constructed in the US and in the EU. What emerges as a significant finding is that EU and US official policy discourses, though appearing similar at the outset, differed quite significantly in several aspects.

Interestingly, and contrary to what might be expected based on the existing literature on standardization and public policy, the US federal government appears to have adopted a more explicitly interventionist stance than the European Commission, both in its discursive and non-discursive action. This policy of intervention was legitimated by drawing on the discourses of economics of standards and antitrust literature, by emphasizing the exceptional nature of the Smart Grid standardization challenge, by frequently referring to the Smart Grid project as a national project of historical proportions, and by emphasizing the need to "future-proof" the significant amounts of public investment made. Several efforts were also made to widen the appeal beyond expert audiences.

By comparison, and despite calling the challenge "not business as usual", the EU policy discourse on Smart Grid standardization signalled less of a need for change from existing practice. The policy response was built on the notion that the existing standardization system functioned and that it served the EU well in the past. The challenge posed by the need to agree on a set of interoperability standards was seen as both urgent and of great complexity and scope and therefore warranted some coordination effort by the Commission. However, given that the challenge to achieve interoperability was framed primarily as a technical issue this was seen mainly a matter of coordination to bring

different sectors together in the process – and not about intervening directly to ensure a balance of interests or achieving specific outcomes. The size of public investments did not feature in the policy discourse; rather the focus was on the relationship between standards and innovation and on standards being needed for industry to invest in new technology. The notion of trade-offs and competing interests were left out of flagship policy documents, although traces could be found in documents that served as input to the policy process.

Table 2: Comparing discourses - key similarities and contrasts

Storyline element	**US discourse**	**EU discourse**
Why are standards needed?	Standards are **crucial and urgent** for smart grid development	Standards are **crucial and urgent** for smart grid development
Why is government intervention necessary?	**Competing interests**: behavior of private actors does not always benefit the overall society	**Coordination challenge**: diverse communities need to be brought together
What is the role of government?	**Stronger role:** the government can act as an **"honest broker"**	**Limited role:** The government can **encourage dialogue** and coordination
Who is impacted?	**Society as a whole**: including industry, public sector organizations, and consumers	**Mainly industry** which needs standards to invest in new technology
What are relevant audiences?	Communication is made to a **wider set of audiences**, using non-technical language and more developed arguments	Communication is with **existing (expert) stakeholders**; the need for standards is communicated without supporting arguments
Is there a challenge to institutional arrangements?	Smart grid standardization requires some policy innovation but there is **no basic challenge to the system**.	Smart grid standardization requires some policy innovation but there is **no basic challenge to the system.**

There were also important similarities between the cases. In neither case is there a fundamental challenge to the existing system. A majority of the policy statements in the documents analyzed focus on the increased scale and complexity of smart grid standardization and, especially in the US, on the urgency and potential impact of the required effort. The policy discourse engaged more rarely with the notion of diverging interests and how they can complicate agreement as highlighted in table 1. When it did do so, as in the US case, the focus was quite narrowly on anti-competitive behavior and not related to the wider issue of valid disparate interests which must nevertheless be contended with in order to make progress on standards.

Contrasting storylines - consequences for policy intervention

Discourse theorist such as Fairclough has emphasized that discourse is "constitutive" of reality because the way that a problem is defined has implications for what sort of intervention can be presented as a logical solution (Howarth, 2012). While emphasizing its general support for industry-led standardization, the US discourse created a storyline that specifically legitimized intervention in smart grid standardization. This was achieved by emphasizing the exceptional nature of the Smart Grid standardization challenge, by frequently referring to the Smart Grid project as a national project of historical proportions, and by emphasizing the need to "future-proof" the significant amounts of public investment made. Explicit references to antitrust literature introduced the notion that industry behavior could be at odds with the public interest, thereby opening for the specific role that NIST could play: that of an "honest broker".

In contrast, the way that the challenge of smart grid standardization was characterized in the EU put more restrictive limits on the type of intervention that could be presented as logical. The status quo of favoring industry-led standardization was based on the notion that industry held the necessary technical expertise. Thus framing the smart grid standardization challenge in terms of technical complexity meant that the Commission's role could mainly involve the bringing together of different sectors together in the process. Because the storyline presented the scenario as win-win, there was no notion of needing to intervene directly to ensure a balance of interests or achieving specific outcomes. The size of public investments did not feature in the policy discourse and as

a result were seen as needing to come when industry players and technology were ready. Consultation targeted existing stakeholders and policy arrangements.

The initial setup of the policy intervention created policy feedback that both reflected the problem definition and subsequently reinforced it. Having been assigned the role of coordinating the standardization effort, NIST had an interest in justifying the political aspects of its role and the need for an 'honest broker' from the public sector. The ESOs on the other hand, with mostly industry participation, had an interest in continuing to present the problem as one of a purely technical nature, keeping the social learning process as low-profile (Béland, 2006)

Table 3: Impact of institutional and policy legacies, policy feedback, and policy style

Neo-institutional concept	**US**	**EU**
Institutional legacy	**NIST is federal agency for standardization** founded in 1901	**No EU-level agency** for standardization
	Lower level of institutionalization of standardization as a policy domain: - Policy documents favor bottom-up standards - Government agencies interact with a multitude of SDOs	**Higher level of institutionalization** of standardization as policy domain: - Formalized system set down in European legislation - The three ESOs are given a formal role as European standardization bodies
Policy legacy	Overall policy favoring **bottom-up and industry-led**	Government-led policy in traditional sectors but favoring **bottom-up and industry led in ICT.**
Policy feedback	Initial decision contributed to continued **broader societal focus justifying government role.**	Initial decision contributed to continued **narrow industry focus justifying delegation to experts.**
Policy style	**Relatively open** to outside ideas and academic influence.	**Relatively closed** and corporatist**.** Consultation with limited group of experts.

Making sense of contrasting narratives – considering discourse through the lens of neo-institutionalist theory

In chapter 5, concepts drawn from historic institutionalism were employed to bring additional insights – not in the form of an analysis of formal institutions, but rather as a different conceptual lens through which to consider the interplay between institutions, ideas, and actors identified in chapters 3 and 4. Several of the concepts contribute to our understanding of a more interventionist policy in the US.

Two exogenous factors made the development of Smart Grid standards more salient in the US, and might be said to have combined to create a window of opportunity (Kingdon, 1995) for policy change. The first of these factors was the urgent need to update the basic functioning of the grid, which was quite outdated and which had experienced highly publicized blackouts. The Energy Independence and Security Act of 2007 reflected this urgency and it gave NIST a clear mandate and, perhaps more significantly funding, to develop a set of interoperability standards. In contrast, despite uneven development, the starting point in the EU was less defined by a sense of crisis. The focus instead was to stimulate innovation through the funding of pilot projects and to highlight best practice. Modernizing the grid was more about meeting ambitious goals for the use of renewable energy than about the basic provision of electricity.

Because of a lower level of institutionalization of the standardization system in the US there a need to establish a basic policy position on standardization. While NIST had not taken a very active role in ICT standardization before given the role to coordinate the smart grid standards, it certainly mattered that it was an established government agency with significant institutional capacity and an additional budget allocated to this effort. In comparison, the authority of Joint Working Group of the ESOs had a weaker basis. It was given a similar but more limited role, and no additional funding. These initial setups also produced policy feedback that had important consequences for the way that the problem continued to be defined. NIST had an interest in justifying the political aspects of its role and the need for an 'honest broker' from the public sector. The ESOs on the other hand, with mostly industry participation, had an interest in continuing to present the problem as one of a purely technical nature.

Table 4: Impact of exogenous factors

Exogenous factors	**US**	**EU**
Smart Grid saliency level	High	Medium
Impetus for making progress on smart grid	- Highly publicized blackouts blamed on outdated grid - Standards linked to security aspects of the grid	- Focused on the "smart" elements of the grid and the use of renewable resources. - Effect on consumers less direct.
The timing and impact of the global financial crisis	- Process already funded and underway and NIST - Recovery funding accelerated investments in smart grid and put more focus on the standardization effort	- Policy decisions took place as the crisis was unfolding - Commission delegated responsibility to save cost - Budgets to ESOs were cut

Secondly, the timing of the financial crisis of 2008 impacted the US and the EU in different, even opposing ways. In the US, EISA was already in place with a decision to step up activity on Smart Grid and a budget agreed for NIST to coordinate the development of standards. In the wake of the crisis, the American Recovery and Reinvestment Act (ARRA), signed in to law by President Obama in February 2009, allocated $4.5 billion of public funding to Smart Grid projects. ARRA put increased pressure on the development of standardization because of the fear that public funding would be invested in equipment that could soon become obsolete. The need to justify sizeable public investment in the modernization in the Grid became a part of a larger narrative where the White House needed to justify stimulus spending, thereby raising the profile of the standardization effort.

In the EU, the Smart Grid standardization effort was a few years behind. The financial crisis resulted in a cut in budgets across the board, including for standardization. As a result, the European Commission attempted to promote and encourage standardization through new forms of partnerships with industry, not just on Smart Grid, but also in other areas such as Cloud computing. Because of the reduction in resources, this work

was done with limited public investment, with most of the work delegated to industry representatives and the Commission taking a less active role.

Conclusion and wider implications

The implications of the findings of this thesis go beyond the mere discovery of intriguing and counterintuitive storylines. Discourse analysis exposes the underlying mindset and taken-for-granted assumptions of policymakers, which has a significant bearing on policy responses and on eventual outcomes. A key insight is therefore that, despite some interesting and unexpected differences between the US and the EU, the policy discourse in both cases largely failed to engage with an inherent challenge in standardization which is linked to the reliance on voluntary collaboration in a market characterized by increased heterogeneity and diverse interests (see table 1). Policy responses in neither the EU nor the US foresaw difficulties other than those relating to complexity and scope in reaching agreement and, as a consequence, contained no strategies or mechanisms for what action to take when efforts stalled.

Ultimately, by not envisioning how to move forward when there are legitimate diverging interests, the storylines that emerged did not solve the paradox presented at the start of this inquiry: if policy intervention in standardization is seen to work well as an industry-led, voluntary process, how is government intervention to bring about Smart Grid standards justified? Put differently, the focus on increased technical complexity did not provide an effective argument for government intervention because technical complexity was the rationale for delegating standards to industry in the first place. Arguably, there can be a clear role for government only with a qualitative shift away from the idea that the standardization process equals a well-functioning market, and towards a focus on the need for leadership and making difficult choices in a market characterized by competing interests.

Interestingly, the US discourse was more interventionist and with the "NIST-as-an-honest-broker" discourse came closer to providing a clear role for government intervention. However, this construct came into conflict with a dominant a macro-discourse that since the failure of communism has tended to discourage government

intervention in market processes, especially in the sectors that have developed since the 1990s (until recently, the EU has been more willing to intervene in more traditional sectors). While recently we have seen a new "appetite" for regulation of the tech sector, most initiatives have focused on more salient issues such as privacy and consumer protection. The B2B nature of standardization has kept it away from political focus.

It has been said that the mere mention of standards will cause the eyes of most people to glaze over. Only by becoming attached to more high-profile issues can we expect more engagement of policymakers with standards and the possibility of changing inherited assumptions. This opportunity existed during a period with regards to smart grid, but the focus has now moved on. Theoretical insight from both discourse theory and historical institutionalism suggests that for change to happen, a new and compelling storyline needs to be ready for the next time a window of opportunity opens. Such a policy narrative needs to go beyond the "government versus market" trope to imagine how government mandated interoperability standards can coexist with a competitive marketplace.

In shedding light on how a limited understanding of the dynamics and interests involved in standardization contributed to a failure of the Smart Grid standardization effort, the findings of this thesis also have an impact far beyond the comparative case study carried out in this thesis. A feature of the modern information society is that the achievement of important societal objectives hinge on a voluntary industry coming together to agree and implement standards. Policies that only foresee win-win scenarios would seem doomed to fail.

Samenvatting

Inleiding: Smart grid standaarden – de uitdaging van beleidsinterventie

Tijdens een periode van verhoogde aandacht voor "Smart Grids", die begon rond 2005 en culmineerde in de periode 2007-2014, oefenden beleidsmakers in de Europese Unie (EU) en de Verenigde Staten (VS) buitengewone druk uit op de industrie om tegen 2012 een reeks interoperabiliteitsstandaarden te leveren. De inspanning werd beschreven als "ongekend" (NIST, 2010) en "niet business as usual" (JWG, 2011).

Inzichten uit de systems engineering literatuur (Maier, 1998; Haberfellner et al, 2019) tonen aan dat het ontbreken van een enkele autoriteit die "controle" heeft over complexe systeem-van-systemen (zoals smart grid) – en dus de noodzaak om te vertrouwen op vrijwillige samenwerking – een belangrijke factor is die de ontwikkeling van holistische en systeemonafhankelijke oplossingen en standaarden verhindert (zie tabel 1). De uitdaging is niet alleen technisch, maar komt voort uit het feit dat actoren verschillende voorkeuren hebben en dat het overeenkomen van een enkele oplossing compromissen impliceert (Schütz et al, 2020).

Hoewel standaardisatie in zwaarder gereguleerde sectoren verschillende gradaties van overheidsingrijpen heeft gekend, zijn overheden over het algemeen terughoudend geweest om in te grijpen op het gebied van ICT-standaardisatie, omdat het als belangrijk wordt beschouwd om ervoor te zorgen dat innovatie niet wordt belemmerd door voortijdige standaardisatie of lock-in aan inferieure technologie. De verschillende beleidsmaatregelen die werden geïntroduceerd om de standaardisatie van slimme netwerken te versnellen, werden gepresenteerd als een uitzondering op de regel van bottom-up, door de industrie geleide standaardisatie.

Tabel 1: Van grootschalige onderling verbonden systemen naar complexe systemen-van-systemen: uitdagingen en implicaties voor standaardisatie

Economisch / Managerial kenmerken	**Grootschalige onderling verbonden systemen (monolithisch)** Onafhankelijke systemen ontworpen als stand-alone en zelfvoorzienend	**Complexe systemen van systemen (collaboratief)** Gedistribueerde "systemen van systemen": meerdere autonome en onafhankelijke subsystemen	**Resulterende uitdaging**	**Implicaties voor standaardisatie**
Eigendom	Eén instantie is verantwoordelijk voor de gehele aanschaf en ontwikkeling van het systeem	Elke kiezer heeft zijn eigen lokale "eigenaar". Geliberaliseerde markten en ontvlechting betekenen dat eigenaren niet altijd controle hebben over de ontwikkeling	Meerdere onafhankelijke actoren	Overeenstemming **wordt steeds problematischer**
Belanghebbenden	Duidelijke set van stakeholders	Meerdere lagen van belanghebbenden, waaronder verschillende sectoren met verschillende culturen en verwachtingen	Culturele heterogeniteit	
Doelen en prioriteiten	Ontworpen en ontwikkeld om gemeenschappelijke doelstellingen te bereiken	De doelstellingen van de samenstellende delen mogen niet in overeenstemming zijn met die van het totale systeem.	Meerdere, mogelijk concurrerende doelen	
Governance	Gericht - de eigenaar van het systeem heeft de bevoegdheid om beslissingen op te leggen aan samenstellende delen	Samenwerken – is afhankelijk van vrijwillige actie van de deelnemers	Het systeem kan niet steunen op dwangbevoegdheden van één enkele autoriteit: er moeten prikkels worden ingebouwd.	

Door de beleidsinterventie om de ontwikkeling en acceptatie van smart grid-standaarden te versnellen als een "emblematisch" geval te benaderen (Hajer, 1995), beoogt dit proefschrift uiteindelijk een beter begrip te kweken van hoe beleid de ontwikkeling en acceptatie van standaarden kan ondersteunen. De digitale transformatie van de samenleving heeft de inzet van ICT-standaardisatie aantoonbaar zo hoog op de agenda gezet dat het niet langer als een puur verticale zorg kan worden gezien. De inzet van nieuwe technologieën verandert traditionele industrieën, en in concepten als slimme mobiliteit en slimme energie zijn er verwachtingen dat ze kunnen worden gebruikt om het leven van burgers te verbeteren en te helpen bij duurzame transities. Maar zonder standaarden zullen veelbelovende proefprojecten op deze gebieden niet op grote schaal resultaten opleveren.

Inzicht in beleidsinterventie door middel van een discursief-institutionele benadering

De centrale vraag die het onderzoek in dit proefschrift begeleidt, is: *Hoe werd de noodzaak om Smart Grid-standaarden te ontwikkelen geconstrueerd als een beleidsprobleem in de EU en de VS, en welke gevolgen had dit voor beleidsinterventie op dit gebied?*

De kern van dit onderzoek ligt in een intrigerende paradox of spanning: door beleidsmaatregelen te nemen om vooruitgang te boeken op het gebied van standaardisatie van slimme netwerken, hebben regeringen ingegrepen in een proces waarvan zij volhielden dat het normaal gesproken aan de industrie zou moeten worden gedelegeerd. Het zoeken naar antwoorden op deze paradox heeft dit proefschrift ertoe gebracht zich empirisch te richten op het discours van beleidsinterventie: hoe werd een afwijking van bestaand beleid *gelegitimeerd*?

Veelbetekenend is dat discourstheoretici als Norman Fairclough (1992, 2003) hebben gesuggereerd dat de diepgaande studie van documenten die afwijkingen van gevestigde regelingen beschrijven - door zowel te onderzoeken wat als vanzelfsprekend wordt beschouwd als wat moet worden uitgelegd, en hoe spanningen en tegenstellingen worden onderhandeld - belangrijke inzichten kan onthullen over beleidsverandering en stabiliteit. Van maatschappelijke verandering wordt gezegd dat ze tot stand komt door

discursieve pogingen om deze tegenstellingen op te lossen – en dit proces "laat sporen na in teksten in de vorm van het gelijktijdig voorkomen van tegenstrijdige of inconsistente elementen" (Fairclough, 1992: 96).

Om de hoofdvraag te beantwoorden, en met het overkoepelende doel om door middel van een vorm van theoretische triangulatie tot dieper inzicht te komen (Sovacool & Hess, 2017), is het conceptuele kader dat in dit proefschrift is ontwikkeld, gebaseerd op zowel de discourstheorie als uit verschillende complementaire onderdelen van de neo-institutionalistische theorie om de beperkingen en kansen voor beleidsverandering te begrijpen. De aanpak is consistent met een reeks beleidsstudies die bekend staat als de "argumentatieve wending" (Fischer & Forester, 1993), waarin wordt gesteld dat "de openbare orde bestaat uit taal" (Majone, 1989, p. 1). Discoursanalyse in deze benadering moet echter niet tegenover institutionele analyse worden gezet, maar is eerder een andere manier van kijken naar instituties die bedoeld is om nieuw licht te werpen op het functioneren van die instituties en hoe politieke veranderingen in institutionele regelingen tot stand komen. Daarom houdt discoursanalyse niet alleen rekening met wat er wordt gezegd of geschreven door beleidsactoren, maar omvat het ook de context - geïnstitutionaliseerde patronen van interacties tussen actoren en de overheidsstructuren die die politieke interacties framen - die "mede bepaalt wat zinvol kan worden gezegd" (Hajer, 1995, p. 2).

Overheidsingrijpen in standaardisatie rechtvaardigen – contrasterende verhaallijnen

Het empirisch onderzoek in dit proefschrift neemt de vorm aan van twee casestudy's die in hoofdstuk 3 en 4 worden gepresenteerd. Kritische discoursanalyse werd gebruikt om te onderzoeken hoe de reactie van het overheidsbeleid op de smart grid-standaardisatie-uitdaging in de VS en in de EU werd geconstrueerd. Wat als een belangrijke bevinding naar voren komt, is dat de officiële beleidsdiscoursen van de EU en de VS, hoewel ze in het begin vergelijkbaar leken, op verschillende aspecten behoorlijk verschilden.

In tegenstelling tot wat zou kunnen worden verwacht op basis van de bestaande literatuur over standaardisatie en overheidsbeleid, lijkt de Amerikaanse federale

regering een explicieter interventionistisch standpunt te hebben ingenomen dan de Europese Commissie, zowel in haar discursieve als niet-discursieve actie. Dit interventiebeleid werd gelegitimeerd door gebruik te maken van de discoursen van de economie van standaarden en antitrustliteratuur, door de nadruk te leggen op de uitzonderlijke aard van de uitdaging van de smart grid-standaardisatie, door het smart grid-project vaak te noemen als een nationaal project van historische proporties, en door de noodzaak te benadrukken om de aanzienlijke bedragen aan overheidsinvesteringen "toekomstbestendig" te maken. Er werden ook verschillende pogingen gedaan om de aantrekkingskracht te verbreden tot buiten het deskundige publiek.

Ter vergelijking, en ondanks het feit dat de uitdaging "niet business as usual" werd genoemd,signaleerde het EU-beleidsdiscours over standaardisatie van smart grids minder behoefte aan verandering ten opzichte van de bestaande praktijk. De beleidsreactie was gebaseerd op de gedachte dat het bestaande standaardisatiesysteem functioneerde en dat het de EU in het verleden goed van pas kwam. De uitdaging die de noodzaak met zich meebracht om overeenstemming te bereiken over een reeks interoperabiliteitsstandaarden werd als urgent en van grote complexiteit en reikwijdte beschouwd en rechtvaardigde daarom enige coördinatie-inspanning van de Commissie. Aangezien de uitdaging om interoperabiliteit tot stand te brengen echter voornamelijk als een technische kwestie werd beschouwd, werd dit voornamelijk gezien als een kwestie van coördinatie om verschillende sectoren in het proces samen te brengen – en niet om rechtstreeks in te grijpen om een evenwicht tussen belangen te waarborgen of specifieke resultaten te bereiken. De omvang van de overheidsinvesteringen kwam niet voor in het beleidsdiscours; De nadruk lag veeleer op de relatie tussen standaarden en innovatie en op standaarden die nodig zijn voor de industrie om in nieuwe technologie te investeren. Een gevolg van deze framing van het discours was dat standaarden - hoewel erkend als dringend nodig - werden gezien als noodzakelijk om te komen wanneer industriële spelers en technologie klaar waren, en dit was grotendeels aan de standaardisatiegemeenschap om te bepalen. De raadpleging was gericht op bestaande belanghebbenden en beleidsafspraken en de verhaallijn werd

gekaderd in win-wintermen, waarbij het in het belang van alle betrokkenen werd gezien om zo snel mogelijk overeenstemming te bereiken over standaarden. De notie van trade-offs en concurrerende belangen werd weggelaten uit belangrijkebeleidsdocumenten, hoewel sporen te vinden waren in documenten die als input dienden voor het beleidsproces.

Tabel 2: Discoursen vergelijken - belangrijkste overeenkomsten en contrasten

Verhaallijn element	**Amerikaans discours**	**EU-discours**
Waarom zijn standaarden nodig?	Standaarden zijn **cruciaal en urgent** voor de ontwikkeling van slimme netwerken	Standaarden zijn **cruciaal en urgent** voor de ontwikkeling van slimme netwerken
Waarom is overheidsingrijpen nodig?	**Tegenstrijdige belangen**: gedrag van private actoren komt de samenleving als geheel niet altijd ten goede	**Coördinatie-uitdaging**: diverse gemeenschappen moeten worden samengebracht
Wat is de rol van de overheid?	**Sterkere rol:** de overheid kan optreden als ' **eerlijke bemiddelaar'**	**Beperkte rol:** De overheid kan **dialoog** en coördinatie stimuleren
Wie heeft er last van?	**De samenleving als geheel**: met inbegrip van de industrie, organisaties in de publieke sector en consumenten	**Vooral industrie** die standaarden nodig heeft om te investeren in nieuwe technologie
Wat zijn relevante doelgroepen?	Communicatie wordt gemaakt voor een **breder publiek,** met behulp van niet-technische taal en meer ontwikkelde argumenten	Er wordt gecommuniceerd met **bestaande (deskundige) stakeholders**; de behoefte aan standaarden wordt gecommuniceerd zonder onderbouwing van argumenten
Is er een uitdaging voor institutionele arrangementen?	Standaardisatie van slimme netwerken vereist enige beleidsinnovatie, maar er is **geen fundamentele uitdaging voor het systeem**.	Standaardisatie van slimme netwerken vereist enige beleidsinnovatie, maar er is **geen fundamentele uitdaging voor het systeem.**

Er waren ook belangrijke overeenkomsten tussen de casestudies. In geen van beide casestudies is er sprake van een fundamentele uitdaging voor het bestaande systeem.

Een meerderheid van de beleidsverklaringen in de geanalyseerde documenten richt zich op de toegenomen schaal en complexiteit van smart grid-standaardisatie en, vooral in de VS, op de urgentie en potentiële impact van de vereiste inspanning. Het beleidsdiscours hield zich minder bezig met de notie van uiteenlopende belangen en hoe deze overeenstemming kunnen bemoeilijken, zoals aangegeven in tabel 1. Toen zij dat wel deed, zoals in het geval van de VS, lag de nadruk vrij beperkt op concurrentieverstorend gedrag en niet op de bredere kwestie van legitieme uiteenlopende belangen die niettemin moeten worden bestreden om vooruitgang te boeken op het gebied van standaarden.

Betekenis geven aan contrasterende verhalen – het discours beschouwen door de lens van de neo-institutionalistische theorie

In hoofdstuk 5 werden concepten uit het historisch institutionalisme gebruikt om aanvullende inzichten te brengen - niet in de vorm van een analyse van formele instellingen, maar eerder als een andere conceptuele lens om de wisselwerking tussen instituties, ideeën en actoren te beschouwen die in de hoofdstukken 3 en 4 zijn geïdentificeerd. Verschillende van de concepten dragen bij aan ons begrip van een meer interventionistisch beleid in de VS.

Vanwege een lager niveau van institutionalisering van het standaardisatiesysteem in de VS is er behoefte aan een fundamenteel beleidsstandpunt over standaardisatie. Hoewel NIST geen zeer actieve rol had gespeeld in ICT-standaardisatie voordat het de rol kreeg om de smart grid-normen te coördineren, was het zeker van belang dat het een gevestigde overheidsinstantie was met een aanzienlijke institutionele capaciteit en een extra budget dat aan deze inspanning was toegewezen. Ter vergelijking: de autoriteit van de gezamenlijke werkgroep van de ENO's had een zwakkere basis. Het kreeg een vergelijkbare, maar beperktere rol en geen extra financiering. Deze eerste aanpakken leverden ook beleidsfeedback op die belangrijke gevolgen had voor de manier waarop het probleem verder werd gedefinieerd. NIST had er belang bij om de politieke aspecten van zijn rol te rechtvaardigen en de behoefte aan een 'eerlijke makelaar' uit de publieke sector. De ENO's daarentegen, die voornamelijk door de industrie werden betrokken,

hadden er belang bij het probleem te blijven presenteren als een probleem van zuiver technische aard.

Tabel 3: Impact van institutionele en beleidserfenissen, beleidsfeedback en beleidsstijl

Neo-institutioneel concept	**VS**	**EU**
Institutionele erfenis	**NIST is federaal agentschap voor standaardisatie** opgericht in 1901	**Geen standaardisatiebureau op EU-niveau**
	Lager niveau van institutionalisering van standaardisatie als beleidsdomein: - Beleidsdocumenten geven de voorkeur aan bottom-up normen - Overheidsinstanties werken samen met een groot aantal SDO's	**Hoger niveau van institutionalisering van** standaardisatie als beleidsdomein: - Geformaliseerd systeem vastgelegd in Europese wetgeving - De drie ENO's krijgen een formele rol als Europese standaardisatie-instellingen
Erfenis van het beleid	Algemeen beleid ten gunste van **bottom-up en door de industrie geleide**	Overheidsgestuurd beleid in traditionele sectoren, maar ten gunste van **bottom-up en industrie geleid in ICT.**
Feedback over beleid	De aanvankelijke beslissing droeg bij aan een blijvende **bredere maatschappelijke focus die de rol van de overheid rechtvaardigde.**	De aanvankelijke beslissing droeg bij tot de **aanhoudende beperkte focus van de industrie die delegatie aan deskundigen rechtvaardigde.**
Beleidsstijl	**Relatief open voor** ideeën van buitenaf en academische invloed.	**Relatief gesloten** en corporatistisch**.** Overleg met een beperkte groep deskundigen.

Twee exogene factoren maakten de ontwikkeling van Smart Grid-standaarden in de VS saillanter en zouden kunnen worden gecombineerd om een kans te creëren (Kingdon, 1995) voor beleidsverandering. De eerste van deze factoren was de dringende noodzaak om de basiswerking van het net te actualiseren, dat behoorlijk verouderd was en dat

veel publiciteit had gekregen met black-outs. De Energy Independence and Security Act van 2007 weerspiegelde deze urgentie en gaf NIST een duidelijk mandaat en, misschien nog belangrijker, financiering om een reeks interoperabiliteitsstandaarden te ontwikkelen. Ondanks de ongelijke ontwikkeling werd het uitgangspunt in de EU daarentegen minder bepaald door een gevoel van crisis. In plaats daarvan lag de nadruk op het stimuleren van innovatie door de financiering van proefprojecten en het onder de aandacht brengen van «best practices». Het moderniseren van het net ging meer over het behalen van ambitieuze doelen voor het gebruik van hernieuwbare energie dan over de basisvoorziening van elektriciteit.

Tabel 4: Invloed van exogene factoren

Exogene factoren		**VS**	**EU**
Smart Grid-zichtbaarheid		Hoog	Gemiddeld
Impuls om vooruitgang te boeken op het gebied van smart grid		Veelbesproken black-outs die worden toegeschreven aan verouderd netwerk Standaarden gekoppeld aan veiligheidsaspecten van het net	Gericht op de "slimme" elementen van het net en het gebruik van hernieuwbare bronnen. Minder direct effect op de consument.
De timing en impact van de wereldwijde financiële crisis		Proces reeds gefinancierd en aan de gang en NIST Herstelfinanciering versnelde investeringen in slimme netwerken en legde meer nadruk op de standaardisatie-inspanning	Beleidsbeslissingen vonden plaats terwijl de crisis zich ontvouwde De Commissie heeft de verantwoordelijkheid gedelegeerd om kosten te besparen Er werd bezuinigd op de budgetten voor ENO's

Ten tweede heeft de timing van de financiële crisis van 2008 de VS en de EU op verschillende, zelfs tegengestelde manieren beïnvloed. In de VS was EISA al van kracht met een besluit om de activiteiten op Smart Grid op te voeren en een budget

overeengekomen voor NIST om de ontwikkeling van standaarden te coördineren. In de nasleep van de crisis wees de American Recovery and Reinvestment Act (ARRA), ondertekend door president Obama in februari 2009, $ 4,5 miljard aan overheidsfinanciering toe aan Smart Grid-projecten. ARRA zette de ontwikkeling van standaardisatie steeds meer onder druk vanwege de angst dat overheidsgeld zou worden geïnvesteerd in apparatuur die snel verouderd zou kunnen raken. De noodzaak om aanzienlijke overheidsinvesteringen in de modernisering van het Grid te rechtvaardigen, werd een onderdeel van een groter verhaal waarbij het Witte Huis stimuleringsuitgaven moest rechtvaardigen, waardoor het profiel van de standaardisatie-inspanning werd verhoogd.

In de EU liepen de inspanningen voor de standaardisatie van slimme netwerken een paar jaar achter. De financiële crisis heeft geleid tot een bezuiniging op de budgetten over de hele linie, ook voor standaardisatie. Als gevolg hiervan heeft de Europese Commissie geprobeerd standaardisatie te bevorderen en aan te moedigen door middel van nieuwe vormen van partnerschappen met de industrie, niet alleen op het gebied van smart grid, maar ook op andere gebieden zoals cloud computing. Vanwege de vermindering van de middelen werd dit werk gedaan met beperkte overheidsinvesteringen, waarbij het grootste deel van het werk werd gedelegeerd aan vertegenwoordigers van de industrie en de Commissie een minder actieve rol speelde.

Conclusie en bredere implicaties

De implicaties van de bevindingen van dit proefschrift gaan verder dan de ontdekking van intrigerende en contra-intuïtieve verhaallijnen. Discoursanalyse legt de onderliggende denkwijze en vanzelfsprekende aannames van beleidsmakers bloot, wat een belangrijke invloed heeft op beleidsreacties en op uiteindelijke resultaten. Een belangrijk inzicht is daarom dat, ondanks enkele interessante en onverwachte verschillen tussen de VS en de EU, het beleidsdiscours in beide gevallen grotendeels niet is ingegaan op een inherente uitdaging in standaardisatie die verband houdt met het vertrouwen op vrijwillige samenwerking in een markt die wordt gekenmerkt door toegenomen heterogeniteit en diverse belangen (zie tabel 1). De beleidsreacties in de

EU noch in de VS voorzagen andere moeilijkheden dan die welke verband hielden met de complexiteit en de reikwijdte bij het bereiken van overeenstemming en bevatten bijgevolg geen strategieën of mechanismen voor de maatregelen die moesten worden genomen wanneer de inspanningen vastliepen.

Uiteindelijk, door niet voor te stellen hoe verder te gaan wanneer er legitieme uiteenlopende belangen zijn, hebben de verhaallijnen die naar voren kwamen de paradox die aan het begin van dit onderzoek werd gepresenteerd niet opgelost: als beleidsinterventie in standaardisatie goed wordt gezien als een door de industrie geleid, vrijwillig proces, hoe is overheidsingrijpen om Smart Grid-standaarden tot stand te brengen gerechtvaardigd? Anders gezegd, de focus op toegenomen technische complexiteit bood geen effectief argument voor overheidsingrijpen, omdat technische complexiteit in de eerste plaats de reden was om standaarden aan de industrie te delegeren. Ongetwijfeld kan er alleen een duidelijke rol voor de overheid zijn met een kwalitatieve verschuiving van het idee dat het standaardisatieproces gelijk staat aan een goed functionerende markt, en naar een focus op de behoefte aan leiderschap en het maken van moeilijke keuzes in een markt die wordt gekenmerkt door concurrerende belangen.

Interessant is dat het Amerikaanse discours meer interventionistisch was en met het "NIST-as-an-honest-broker" discours dichter bij het bieden van een duidelijke rol voor overheidsinterventie kwam. Deze constructie kwam echter in conflict met een dominant macro-discours dat sinds het falen van het communisme de neiging heeft om overheidsingrijpen in marktprocessen te ontmoedigen, vooral in de sectoren die zich sinds de jaren 1990 hebben ontwikkeld (tot voor kort was de EU meer bereid om in te grijpen in meer traditionele sectoren). Hoewel we onlangs een nieuwe "aandacht" hebben gezien voor regulering van de technologiesector, hebben de meeste initiatieven zich gericht op meer opvallende kwesties zoals privacy en consumentenbescherming. Het B2B-karakter van standaardisatie heeft het weggehouden van politieke focus.

Veel mensen, en ook beleidsmakers, zullen je glazig aankijken bij het noemen van het woord standaarden. Alleen door standaarden te verbinden aan meer spraakmakende

kwesties, kunnen we meer betrokkenheid van beleidsmakers verwachten. Deze mogelijkheid bestond gedurende een beperkte periode voor standaarden voor smartgrids, maar de focus is inmiddels verschoven. Theoretisch inzicht uit zowel de discourstheorie als het historisch institutionalisme suggereert dat voor verandering een nieuw en meeslepend narratief klaar moet zijn voor de volgende keer dat een window of opportunity zich opent. Een dergelijk beleidsverhaal moet verder gaan dan het sleetse "overheid versus markt" thema zodat men zich ook daadwerkelijk kan voorstellen hoe door de overheid opgelegde interoperabiliteitsstandaarden naast een concurrerende markt kunnen bestaan.

Door licht te werpen op hoe een beperkt begrip van de dynamiek en belangen die betrokken zijn bij standaardisatie heeft bijgedragen aan een mislukking van de Smart Grid-standaardisatie-inspanning, hebben de bevindingen van dit proefschrift ook een impact die veel verder gaat dan de vergelijkende casestudy die in dit proefschrift wordt uitgevoerd. Een kenmerk van de moderne informatiemaatschappij is dat de verwezenlijking van belangrijke maatschappelijke doelstellingen afhangt van een vrijwillige industrie die samenkomt om standaarden overeen te komen en toe te passen. Beleid dat alleen win-winscenario's voorziet, lijkt gedoemd te mislukken.

1 The challenge of Smart Grid standards – "unprecedented" and "not business as usual"

"Data and technology standards represent one of the most important but least discussed elements of today's digital landscape." (Atlantic Council, 2021)

As politicians know only too well but social scientists too often forget, public policy is made of language. (Majone, 1989: 1)

Starting around 2005 and for a period of several years, the creation of a "Smart Grid" became a key element in the quest of policymakers to operationalize the goal of "sustainable development". At a *technical* level the Smart Grid refers to the modernization of the electric grid through the integration of information and communications technology into transmission and distribution networks. As a *visionary* project, however, the realization of the Smart Grid held the promise of supporting ambitious targets of reduced carbon emissions and increased use of renewable resources. Additionally, the Smart Grid was presented with the lure of "green innovation" and clean tech jobs. Thus in the EU, the implementation of Smart Grids took the form of a *grand projet* representing *"a significant opportunity for European industry to research, market and export new technologies, to create new jobs and to maintain global technological leadership."* (European Commission, 2011, p. 8). In the US, progress on building the Smart Grid was framed as crucial, *"for the United States to lead the world in the 21st century economy, be at the forefront of the clean energy revolution, and to win the future by encouraging American innovation."* (EOP, 2011, p. v) In these visionary accounts of the Smart Grid, its realization held the solutions to some of the most pressing societal challenges of today; the appeal to policy-makers was obvious.

Due to the extraordinary complexity of the Smart Grid and the need to involve different sectors and numerous actors, policy documents in the United States and in the European

Union identified the development of a common set of ICT interoperability standards as high priority and a prerequisite for successful rollout. Standards would have a substantial impact on the development of the Smart Grid's architecture and determine how utilities' systems and smart meters communicate with each other, how the grid fosters Demand Response (DR) and Distributed Generation (DG), how electric vehicles plug into and communicate with the grid, and how consumers' home networks integrate energy management capabilities. Achieving interoperability relied on the agreement of hundreds of standards and at the outset there was no common understanding on even basic issues including the type of data that should be collected and how they might be shared (Arnold, 2011b).

The undertaking thus required by the standardization world to achieve this task was described as *"unprecedented"* in scope and complexity (NIST, 2012) and *"not business as usual"* (CEN/CENELEC/ETSI, 2011). With the aim to support this massive effort, significant policy initiatives on both sides of the Atlantic were put in place in a relatively short period of time, culminating in the period between 2007 and 2014, to accelerate the development and implementation of standardization road maps. The level of government pressure on the ICT standardization community to deliver interoperability standards for Smart Grid appeared to break with existing policy in this domain. While standardization in more heavily regulated sectors have seen varying degrees of government intervention, governments on both sides of the Atlantic have generally been reluctant to intervene in the ICT standardization field because it has been seen as paramount to ensure that innovation is not hampered by premature standards-setting or lock-in to inferior technology. However, citing the societal imperative of building the Smart Grid, the US federal government and the European Commission departed from established practice of relying on industry self-organization and signalled the intention to intervene with the aim to *encourage*, *coordinate* and *accelerate* standardization activities.

The policy intervention contained an inherent tension: to achieve what was seen as an important societal objective, governments urged industry to engage in a process that they insisted should normally be voluntary and at the initiative of the private sector. In both the EU and the US, standardization was described as an industry-led, voluntary process, even as proposals were made for policy actions to further the development and implementation of

standards for smart grid. While technical standards have various functions, they are ultimately about reducing unnecessary variety and creating order in the market: an activity that European and US governments have been reluctant to undertake, especially in the area of ICT (Werbach, 2009). Thus, a core impetus for the research in this thesis is the aim to explore how this tension was negotiated, i.e., understanding how the policy intervention was legitimated.

Ultimately, results of the policy intervention appear to have fallen short of stated ambitions. During a period of heightened involvement, Governments in the EU and the US put pressure on the standardization community to deliver a full set of required interoperability standards within a few years. Today, more than a decade later, the lack of agreement and adoption of common standards is still seen as one of the key factors hampering large-scale rollout of smart grids. The hype surrounding Smart Grid, which was based on promises presented by theoretical projections and pilot project, has since subsided. Yet the need to solve practical challenges of large-scale deployment of Smart Grid remain and are important for making progress on societal objectives relating to the energy transition.

The research undertaken in this thesis aims to contribute to the field of standardization research and to a growing body of knowledge about the policies surrounding the development of Smart Grid and more generally on the sociotechnical aspects of the energy transition. In pursuing this objective, it also aims to make theoretical contribution to a key concern within the field of policy analysis: how can we better understand factors that influence consistency and change within a policy domain? Further insight into these processes is becoming increasingly crucial since it has been suggested that tackling the challenges posed by climate change will require profound changes to policies and institutions. Black (2005) refers to such changes as “third-order” regulatory innovation, similar to the “paradigm shifts” of Hall’s oft-cited work (1993). It is generally agreed that these occur only rarely, following policy failure to deal with challenges and, crucially, where the existing system is identified as having failed and is discredited. Examples of such whole-sale change are economic crises such as the Great Depression and the “stagflation” crisis in the 70s which were perceived as resulting from a failure of the prevailing orthodoxy and

which led to the global adoption of radically different systems, influenced by new schools of thought.

Drawing on several recent studies that have looked at discourse and the resilience of ideas to explain why the global financial crisis of 2008 did not lead to such a paradigm shift (Grant & Wilson, 2012), and approaching the analysis of the policy response to the challenge of Smart Grid standardization as an "emblematic" case (Hajer, 1995), this thesis examines how a policy of government intervention in Smart Grid standardization was constructed in the official policy discourse. By exposing prevailing understandings about the nature of the standardization challenge and the appropriate roles of government and industry self-organization it is argued that we can better understand the possibilities for new types of policy responses to emerge.

The thesis also suggests directions for further research that can contribute to the fields of standardization and the growing literature that explores the social and political implications of energy transition. In addition, certain normative conclusions are presented. Given that standards can aid in achieving some of the most important policy challenges facing society today, policymakers are called on to take on a more informed role in standardization. A lack of standards, proprietary "standards" and standards wars – leading to situations of undesired diversity – can have a negative societal impact that may call for intervention. But rather than coming down squarely on the side of intervention versus just letting industry "get on with it", it argues for a more reflective policy debate into the roles and responsibilities of governments and relevant stakeholders, one that goes beyond this simple dichotomy to explore the possibility of novel policy arrangements. As Crouch (2011) argues, it is only by moving away from the prevailing view of the relationship between state and market as one of confrontation that new conceptualizations can emerge.

In the remainder of this introductory chapter, the first section provides a brief background and description of existing knowledge about ICT interoperability standards and specifies the focus area which is centred on EU and US official policy discourse on the need to bring about Smart Grid standards. Based on the initial discussion, a central research question is then formulated. Stemming from the central question, a number of themes, or guiding questions, are subsequently introduced. These are themes that recur in the framing of the empirical

chapters and to which the concluding discussion of this thesis will link back to. The questions are further elaborated in chapter 2 and are aimed at exploring factors that influence *consistency* and *change* in government policy on standardization. This first chapter also provides a preliminary sketch of the research approach and the conceptual framework, which is broadly situated within a *discursive institutionalism* tradition (Schmidt, 2008, 2010), and which emphasizes the importance of discourse within its political and institutional context and the role that human agency can play. The chapter further contains notions of the methodology employed which is primarily discourse analysis of policy documents, supplemented by expert interviews. The chapter closes with a wider discussion on the contribution of the research and an outline of the remainder of the thesis.

1.1 Existing conceptualizations of standards

The aim of this section is two-fold. First, by providing understanding and context to the focus of this thesis it supports the argument that standardization is under increased scrutiny and developing as a policy domain. Also, by critically assessing academic and policy conceptualizations of standardization, this section develops a theoretical rationale to conduct the current research and supports the need to develop an innovative approach.

1.1.1 The paradox of standards – ubiquity and obscurity

Scholarly accounts of standardization often make an apparently paradoxical observation: standards are of central importance in modern society, yet they have been all but neglected – both as an area of academic inquiry and as a focus of public policy. For example Borraz notes that "there is practically no economic activity nowadays that is not framed, whether partly or totally, by standards" (Borraz, 2007, p. 57), yet they exist in relative obscurity. And Brunsson and Jacobsson explore why, despite their "extreme pervasiveness in modern society", the study of standards remain such an underdeveloped area of social science (Brunsson & Jacobsson, 2000a, p. 7).

In particular, although it is increasingly recognized that standards play a critical role in shaping high-technology industries and for the current digital transformation of society, the understanding of the nature of the standardization process, and what would constitute proper public policies in regard to standards, remain under-developed (Shane Greenstein & Victor Stango, 2007). Much of the literature in this area has focused on the relationships

between standards, competition and innovation (Blind, 2004; Swann, 2010) along with case studies of specific and high profile de facto "standards wars" such as between VHS and Betamax (Cusumano, Mylonadis, & Rosenbloom, 1992). As such there has been a certain preoccupation with the timing or specific technologies of adopted standards. From a policy point of view, it has been seen as particularly important to ensure that innovation is not hampered by coordination problems such as premature standards-setting or lock-in to inferior technology – an emphasis which may explain the relative reluctance of governments to interfere too much in the process.

At a fundamental level, part of the difficulty of reaching and engaging with wider audiences is arguably that the term "standard" has multiple meanings. In every day usage the word carries connotations of similarity and uniformity (Brunsson & Jacobsson, 2000a, p. 14), which do not at first glance rhyme with overall messages that promote innovation, competition and choice. In its Communication on the contribution from standardization to innovation in Europe, the European Commission hints at this problem: *"Standardisation, usually bringing predictability and a level playing field, may be intuitively perceived as conflicting with innovation, which strives for change and exclusivity. However, as confirmed by the stakeholder consultation, dynamic standardisation is an important enabler of innovation."* (European Commission, 2008). The precise mechanisms by which having a single standard can increase innovation and enable competition between multiple market players are further outlined in the economics of standards section below. Suffice here to note that there exists a certain counterintuitiveness with regards to standards can complicate policy messaging where simplicity is preferred.[1]

In this thesis the term 'standard' refers more precisely to committee standards,[2] which are documented specifications "established by consensus (…), that provides, for common and

[1] The term "standard" is also used to describe *de facto* standards, which are proprietary specifications serving as the foundation for products and services with substantial market adoption. An example is the PDF specification which was developed by Adobe Systems as a proprietary format but subsequently adopted as an ISO standard.

[2] This definition includes standards developed by formal standards bodies (e.g. International Organization for Standardization, ISO), standards consortia (e.g. World Wide Web Consortium, W3C) and professional organizations (e.g. Institute of Electrical and Electronics Engineers, IEEE). ICT standardization takes place in committees of organizations like The International Standards

repeated use, rules, guidelines or characteristics for activities or their results, aimed at the achievement of the optimum degree of order in a given context" (adapted from ISO/IEC, 2004, p. 8). In other words: "A standard is the specification of the characteristics of goods and services that provides information on the quality of these goods and services and/or enhances their interoperability." (den Butter, Groot, & Lazrak, p. 4). The objective that drives the development and adoption of committee standards is the reduction of unnecessary diversity in the market through the establishment of common reference points. While committee standards are typically designed for voluntary adoption, there are instances, such as the IEC standard on 110V and 220V where they are cited in regulations and thus classified as de jure standards.

1.1.2 Standardization – a developing discipline

Notwithstanding the above, scholarly interest in standardization has grown since the late 1990s and in response to calls for a more systematic and holistic study of this phenomenon (de Vries, 2002; de Vries et al, 2018; de Vries et al, 2019). Various scholars have contributed to broadening the inquiry into standardization, adding theoretical perspectives and exploring factors like culture and ethical considerations, thus collectively contributing to the establishment of standbardisation as a distinct discipline. Notable examples include van de Kaa (2009) who develops a comprehensive framework for understanding the outcome of standards battles. When applying this framework to cases of market adoption of interoperability standards for complex systems van de Kaa and de Vries (2015) find that the regulator has not played a big role in determining market adoption. However, in a recent publication, van de Kaa and colleagues (Hoggerbrugge, van de Kaa & Chappert, 2023) find that when it comes to the adoption of (less technically complex) quality standards, government can play a bigger role and the mere expression of support for a standard can have a significant impact on its rate of adoption.

Organization (ISO) which brings together the national standards bodies of 157 countries, the World Wide Web Consortium (W3C) and the Institute of Electrical and Electronics Engineers (IEEE).

1.1.3 The economics of standards

Economic scholars take an instrumentalist view of committee standards and categorize them according to their functions and effects on the market (Blind, 2004). It is worth introducing the economics of standards discourse here in some detail because, as will be clearly seen in the empirical chapters, it has greatly influenced the current policy discourse on standards.

Table 1.1 provides an overview of the main functions and market effects associated with standards. Firstly, they provide an informative function which serves to lower transaction costs between producers and consumers. This is achieved by allowing for better communication of a product’s technical attributes which reduces the risk of buyer dissatisfaction (Reddy, 1990). Standards also lower customer search costs by reducing the need for extensive product evaluations (Jones & Hudson, 1996). Additionally, these standards enhance market transparency, effectively mitigating the occurrence of “adverse selection”. Adverse selection can manifest when a supplier of an inferior product gains market share through price competition, as the supplier of a high-quality product lacks means to signal this information to potential consumers. Furthermore, by improving market transparency, standards facilitate trade, particularly in anonymous international markets where transaction parties lack familiarity with each other.

Secondly, compatibility or interoperability standards play a significant role in simplifying everyday life, for example when purchasing an electric toothbrush or a replacement vacuum cleaner bag. These standards enable the interchangeability of system components, including physical compatibility like plug and socket connections, as well as more abstract aspects such as software interoperability. While interoperability standards are especially critical within the ICT sector, the importance of a shared standard isn't solely tied to "high tech" innovations: “rather it is the agreement in itself on a common standard and the surrounding infrastructure that bring about the welfare effects”. (den Butter et al, 2007).

This thesis focuses on the category of standards that are responsible for creating compatibility or interoperability.[3] Unlike product-related standards that deal with safety or energy use, interoperability standards form the foundation for networks and specify parameters that determine the interaction between actors and components within systems (Werbach, 2009, p. 197). Interoperability standards serve to interconnect and integrate subsystems, allowing subsystems from different suppliers to operate together or even replace each other. Essentially, standardized gateways lessen technical interdependencies (Egyedi & Verwater-Lukszo, 2005), thereby enhancing system flexibility (Egyedi & Spirco, 2011, p. 3), and reducing market interdependencies. In addition, they promote a more open and competitive market. When standardized interfaces are in place, consumers are able to switch and choice between providers and products, reducing the likelihood of being "locked-in" (Farrell & Saloner, 1985b). In turn, increased consumer choice and freedom, enhances the overall economic efficiency of the market.

Table 1.1 Main Functions of compatibility standards

Function of standards	Effects on the Market
Information	Increase market transparency Reduce transaction costs Correct adverse selection Facilitate trade
Compatibility/interoperability	Create network externalities Increase competition Decrease vendor lock-in

[3] Compatibility and interoperability are related terms: a product can be said to be *compatible* with a standard and *interoperable* with other products that meet the same standard. Policy documents tend to use the term interoperability and the economics of standards literature compatibility standards.

Variety reduction	Allow economies of scale Build critical mass

Source (Egyedi & Blind, 2008).

Standards also facilitate the emergence of standards-based clusters of new economic activity, creating a more innovative market environment. Notable instances include the cluster of paper processing equipment and office products (such as printers, copy machines, binders) that developed based on the A-series of paper formats (ISO 216); and the explosion of internet services enabled by TCP/IP. Reduced variety enables economies of scale, making the production of more affordable units possible, and also helps build the critical mass necessary for markets to take off.

The economics of standards literature recognizes that the standardization process does not always lead to societally optimal outcomes and that government intervention might be necessary under certain conditions (Farrell, 2007). As mentioned, the literature has focused on whether or not governments should intervene and on the timing of such intervention. There is some disagreement within the discipline with Cargill and Bolin (2007) calling for increased policy intervention and declaring industry-driven standardization a failed paradigm: *"[t]he private sector within the United States has largely failed in managing the public good that is standardization. Because of the inability to cooperate, the standards being produced are leading to either chaos or monopoly positioning."* According to this view, the main reason that standardization efforts fail has ultimately to do with the strategic motivation of industry participants engaging in standardization which are not aligned with the public interest: *"the needs that are being met are not technical needs, but rather are the providers' market-positioning requirements."* (C. Cargill & Bolin, 2007, p. 308) However, the problem – and the proposed solution to the problem – lies not with the private sector, whose behavior in fact is to be expected. Instead the solution when standardization fails is government intervention, but standards need first to be conceptualized and acknowledged as "impure public goods" - in this case goods that are produced by the private sector but that also have important welfare effects (C. Cargill, 2011). While others take a less clear-cut stance, Greenstein and Stango (S. Greenstein & V. Stango, 2007) conclude that there is at

least “weak consensus” that market-led standardization can lead to suboptimal outcomes, thereby creating a rationale for government intervention.

1.1.4 Governance literature and standards

While the economics of standards literature has tended to focus primarily on the (predominately beneficial) effects of standards themselves, another body of literature has taken a less sanguine view of the process by which they are developed. In the governance literature, several scholars have viewed standards as part of a general trend that involves the delegation of regulatory powers from elected bodies to various non-governmental and private institutions (Borraz, 2007; Brunsson & Jacobsson, 2000b; Conzelmann, 2008; Hallström, 2004; Héritier & Eckert, 2008; Higgins & Hallström, 2007).

While holding that “proper understanding of standardization is a prerequisite for understanding the way modern society functions”, they argue that the importance of standards has been downplayed by social science and by the actors participating in standardization activities (Brunsson & Jacobsson, 2000a, p. 9). It is the dominant conceptualization of standardization – as a process best left to institutions of experts that are knowledgeable, neutral, objective, and above criticism – that makes possible the delegation to the private sector of such an important societal function, and which results in standardization policy characterized by deference to industry experts as a matter of course (Teivainen, 2002).

Such framing contrasts with empirical investigation into the social practice of standardization which reveals that expert participants are not neutral and that standardization activities are not identical to market processes. This is true also in the economics literature: because of its instrumental view of standards it is less categorical in prescribing intervention, but it readily assumes that development of standards is not driven by purely technical considerations and that agreement is not straightforward. In public policy, however, the view of standardization as a process where industry acts according to economic laws and where government interference needs to be limited has prevailed (Swanson, 2008, p. 64). Additionally, the continued emphasis of the complexities of technical standardization has meant that government officials have been deemed too inept to make

decisions. Indeed, as observed by Delimatsis, "the more complex a given area of standardisation is, the more likely a hands-off approach will be chosen." (2015, p. 6).

The explicitly normative conclusion advanced by the governance literature is therefore that more public awareness and proactive engagement and government oversight of standards is required. Based on democratic theory such oversight is justified even if the current standardization system does not systematically produce "bad" outcomes. Because of the important societal reach and impact of standards, public policy should in any case be based on the knowledge that the process by which they are adopted is one where different, possibly competing, interests are involved (Büthe, 2010). As argued by Mattli and Büthe, however, effective government intervention is restricted by the existence of institutionalized processes "where states as such are not recognized as legitimate actors" (2003, p. 17).

1.2 Smart Grid standards – the dilemma of policy intervention

1.2.1 The appeal of Smart Grid: operationalizing "sustainable development"

As mentioned in the opening paragraphs of this thesis, the appeal of Smart Grid to policymakers lies not only in the possibility for increased efficiency and security, but also in the promise of sustainability and green innovation. Initial optimism was fuelled by technical projections and potential but subsequently there has been a growth in research that brings in socio-technical perspectives and a shift towards viewing energy transition as more than a technical challenge. In a 2017 special outlook of Nature journal, the editors claim that energy transition is also "about history, democracy, economics, and society."[4] Various scholars have pointed to the different ways that public debates on Smart Grid have been framed (Wilson & Stephens, 2009) and to the utopian nature of the Smart Grid discourse (Slayton, 2013). Others have focused on public acceptance, public engagement, and public resistance to certain salient aspects of Smart Grid, such as Smart Meters and the deployment of wind energy. Finally, legal scholars in both Europe and the US have considered the regulatory

[4] Nature 551, S133 (2017) https://www.nature.com/articles/d41586-017-07507-y

innovation required to align energy policy, technology regulation and smart grid developments (Bellantuono, 2014; Eisen, 2013).

1.2.2 Unprecedented pressure on standardization community

The imperative of developing interoperability standards for the Smart Grid put unprecedented focus on thus far little-politicized world of ICT standardization. Policy documents in both the EU and the US highlighted the urgent need for Smart Grid standards, and both governments took policy action to encourage their development. In the US, the Energy Independence and Security Act (EISA) of 2007 (Pub.L. 110-140) provided for the creation of a Smart Grid and required that standards be developed to enable interoperability. EISA granted the Federal Energy Regulatory Commission (FERC) the authority to adopt standards and protocols for the implementation of the Smart Grid and mandated the National Institute of Standards and Technology (NIST) to develop a Smart Grid interoperability framework. Specifically, NIST was authorized under EISA *"to coordinate development of a framework that includes protocols and model standards for information management to achieve interoperability of smart grid devices and systems"*. The American Recovery and Reinvestment Act of 2009 increased the pressure for delivering standards (Contreras, 2012) through the explicit requirement that federally funded projects use *"open"* standards *"if available and appropriate."* ("American Recovery and Reinvestment Act," 2009). In April 2009, a NIST staff member, George Arnold, was appointed National Coordinator for Smart Grid Interoperability. NIST released its initial version of a framework and roadmap for Smart Grid interoperability standards in January 2010. Following a period of public consultation, Release 2.0 of this framework document was published in February 2012. In addition, the role of standards were given a prominent role in the White House's publication entitled "A policy framework for the 21st Century grid: Enabling Our Secure Energy Future", which was published in June 2011 (EOP, 2011).

In the EU, the European Commission Directorate-General (DG) for Energy created a Smart Grids Task Force (SGTF) at the end of 2009 which was given the mandate to consider the requirements for successful deployment of Smart Grids in Europe. In its final deliverable of

December 2010[5], the SGTF underscored the significance of standards for successful deployment, mentioning both the development of new standards and the need for revising existing standards. In addition, the task force noted the risk of several standardization bodies developing a potentially inconsistent set of standards. This suggestion led to the establishing of a Joint CEN/CENELEC/ETSI Working Group (JWG) on standards for smart grids, which was given the task of establishing detailed recommendations to standardization bodies. The European Council of February 2011 recognized the important role of Smart Grids and invited Member States, in liaison with European standardization bodies and industry, *"to accelerate work with a view to adopting technical standards for electric vehicle charging systems by mid-2011 and for smart grids and meters by the end of 2012"*[6]. In March 2011, the European Commission issued Mandate M/490[7] requesting the three European Standards Organisations (ESOs), CEN, CENELEC and ETSI, *"to develop a framework to enable European Standardisation Organisations to perform continuous standard enhancement and development in the field of Smart Grids."* The final report of the JWG coincided with the publication of a Commission Communication on Smart Grids: from innovation to deployment (COM(2011) 202 of 12/04/11), which sets out the European Commission's policy in this area. In the Communication, the Commission noted that the ESOs were almost a year behind on standardization deliverables and signalled the urgency of the situation by warning that *"if progress in the course of 2011 is not sufficient, the Commission will intervene to ensure that the deadline is met and the necessary standards are set, for example by defining a network code."*

1.2.3 Intervention as exception

[5] EU Commission Task Force for Smart Grids, Expert Group 1: Functionalities of smart grids and smart meters, December 2010, available at:
http://ec.europa.eu/energy/gas_electricity/smartgrids/doc/expert_group1.pdf

[6] European Council, Conclusions on Energy, 4 February 2011,
https://www.consilium.europa.eu/uedocs/cms_data/docs/pressdata/en/trans/119253.pdf

[7] European Commission Standardization Mandate to European Standardisation Organisations (ESOs) to support European Smart Grid deployment, available at:
http://ec.europa.eu/energy/gas_electricity/smartgrids/doc/2011_03_01_mandate_m490_en.pdf

Recognizing that rapid progress on standards was needed to further the Smart Grid project, the US federal government and the European Commission intervened in an area where responsibility had normally been deferred to the private sector. Indeed, policy documents in both the EU and US make explicit that efforts to encourage standardization for Smart Grid is a departure from established practice by emphasizing that standardization initiatives should normally be industry-led and voluntary, and therefore that the proposed government intervention requires justification. Thus US policy documents describe the standards system *as "private-sector led and bottom-up, with the Federal Government acting as the public-sector partner and sometimes as a convener,"* and emphasizes that, *"[c]onsistent with the primary role of the private sector, strategic Federal involvement is sensible and appropriate where necessary [italics added] to convene key stakeholders and enable standard-setting efforts to succeed."* (EOP, 2011, pp. 26-27) Elsewhere, it is maintained that *"reliance on private sector leadership, supplemented by Federal Government contributions to discrete standardization processes […] remains the primary strategy for government engagement in standards development"* and it is reiterated that *"all standards activities should involve the private sector"*[8]

In a similar way, EU policy documents describe the standardization process as, *"voluntary and should be market-driven, whereby the needs of the economic operators and stakeholders directly and indirectly affected by such standards prevail."* (EU, 2012) Furthermore, Regulation 1025/2012 on European Standardisation emphasizes *"the commitment to market-led standardisation and to the voluntary use of standards",* adding that *"[t]he specific added value of standardisation with respect to setting technical specifications lies indeed in the voluntary cooperation of private and public actors."*

One of the underlying themes explored in thesis is how a balance between government intervention and market-led was negotiated in the policy on Smart Grid standardization. The ultimate aim is to bring further understanding to the dynamics of change in a policy domain characterized by technical complexity and low salience, about which knowledge is limited

[8] Memorandum from Aneesh Chopra, Miriam Sapiro & Cass R. Sunstein to the Heads of Executive Departments and Agencies (Jan. 17, 2012), available at http://www.whitehouse.gov/sites/default/files/omb/memoranda/2012/m-12-08.pdf

outside those few directly involved. The existing academic literature on public policy and standardization have tended to contrast the standardization policies of the EU and US, pointing to the more formal-hierarchical character of the EU system compared with the more hands-off approach of the US government. This characterization of the standardization policy domain is often made with reference to the overall political system in which the US is seen as the epitome of a market liberal economy, and were the EU is viewed as more interventionist. Rather than taking it for granted, this thesis explores whether this general characterization captures the dynamics of government intervention in the Smart Grid standardization process, and considers the implications for lasting change in the policy domain of ICT standardization.

1.2.4 Digital transformation and new challenges for standardization

In recent years, the digital transformation of society has arguably raised the stakes of ICT standardization to the point that it can no longer be seen as a purely vertical concern. Digital technologies are deployed and changing traditional industries, and in concepts like smart mobility and smart energy there are expectations that they can be leveraged to improve the lives of citizens and aid in sustainable transitions. Yet promising pilot projects in these areas will fail to deliver at scale in the absence of interoperability standards.

Table 1.2 From massively interconnected systems to complex systems of systems: challenges and implications for standardization

	Massively interconnected systems (monolithic) Independent systems designed as stand-alone and self-sufficient	**Complex systems of systems (collaborative)** Distributed "systems of systems" with multiple autonomous and independent subsystems	**Resulting Challenge**	**Implication for standardization**
	Technical characteristics			
Analysis	The system can be disassembled and understood as the sum of its parts	Emergent properties arise from interactions among constituent parts; characteristics cannot be predicted from analysis of the	Some **uncertainties** will always be unmeasurable because of system **dynamics**	

		individual parts of the system.		Technical complexity makes **interoperability standards increasingly crucial**
Development	Aligned to established development processes	Include multiple system lifecycles and asynchronous development efforts, involve legacy systems, developmental systems and technology insertion	Because of increased **heterogeneity** development is driven by the specific situation of each constituent	
	Economic/Managerial characteristics			
Ownership	A single authority is responsible for the entire system acquisition and development	Each constituent has its own local "owner". Liberalized markets and unbundling means owners do not always control development	More actors	Voluntary collaboration makes **agreement on standards increasingly problematic**
Stakeholders	Clear set of stakeholders	Multiple layers of stakeholders including different sectors with different cultures and expectations	Cultural heterogeneity	
Goals and priorities	Designed and developed to meet common objectives	The objectives of constituent parts may not align with those of the overall system.	Multiple, possibly competing goals	
Governance	Directed – system owner has authority to impose decisions on constituent parts	Collaborative – relies on voluntary action of the participants	System cannot rely on coercive powers of a single authority but incentives need to be built in.	
	Political/Social aspects			
Role of the ICT sector	ICT seen as a vertical sector	ICT is horizontal, supporting various domains, such as energy, health, industry	Increased political pressure. ICT more crucial to societal challenges (e.g. energy and environment)	

Regulatory pressure	ICT sector viewed mainly as contributing to economic growth and innovation.	ICT become ubiquitous and issues surrounding personal data, privacy, security, etc.	Increased political pressure due to ICT link to security and fundamental rights.	Increased political pressure make **standards politically urgent**

Insights drawn from the systems engineering literature (Maier, 1998; Haberfellner et al, 2019) can be used to illustrate the nature of the challenge and the need for novel approaches to overcome them. show that increased dynamics and heterogeneity of systems of systems (such as the smart grid) make interoperability standards increasingly crucial. In addition, since those systems of systems are key to delivering important societal objectives, the standardization effort also becomes more politically urgent. However, because such systems of systems are characterized by dispersed ownership and the lack of a centralized authority, such standards have become increasingly problematic to achieve. To deal with this new complexity, scholars have called for a qualitative shift, arguing that existing approaches cannot be “scaled-up” (Sommerville). The first table sets out to list the characteristics of such systems and the resulting challenges.

Approaches to policy problems in any given domain will often become entrenched to a point where certain dynamics are taken for granted. A useful tool for critical engagement with such dominant understandings can therefore be to study how a particular phenomenon is viewed in a different discipline. The point is not to compare and evaluate the different conceptualizations as to which holds a stronger claim to the “truth”. The assumption is rather that any societal phenomenon can be approached in a variety of ways and knowledge can always be increased by considering insights from an expanded range of disciplines. Given that the systems engineering literature has identified a set of factors that combine to make standards increasingly crucial while simultaneously making standards agreement more difficult, it becomes relevant to ask the question whether policy responses in the EU and the US acknowledge this tension and the consequences thereof.

The role of the regulator in standardization for smart systems has been considered by various scholars as part of a multi-factor approach, including van de Kaa (2009), van de Kaa

and de Vries (2015) and Jakobs (2023). Van de Kaa and de Bruijn (2015) note that standardization in complex systems requires cooperation between actors with conflicting interests in the absence of a central authority. However, while the research emphasizes the need to consider a broad range of factors and perspectives the role of the government/regulator is one of many factors considered and is not the subject of in-depth study or elaboration. Similarly, Jakobs provides a multidimensional perspective on company participation in standardization committees and considers policymakers/regulator as part of the wider standardization environment. Jakobs' concludes that the current standardization system is inadequate for meeting the demands of a smart ICT infrastructure and calls for policymakers to recognize the importance of standardization, assume leadership roles in relevant domains, foster cooperation across competitive boundaries, and invest in the necessary efforts to drive standardization. Overall, the literature shows a growing recognition within the standardization discipline of the need to incorporate diverse factors and adopt multi-disciplinary approaches. However, there remains a notable gap of studies that explicitly address the public policy and standardization (van de Kaa, 2023), beyond a spate of normative studies in the governance literature in the early and mid-2000s.

1.3 Research approach

The starting point of this research is an apparent contradiction: *if standardization is seen to work well as an industry-led, voluntary process, how is government intervention to bring about Smart Grid standards justified?* This section introduces the reader to the approach that this thesis takes in exploring this contradiction and sets the scene for a more in-depth elaboration of the conceptual framework chapter 2.

1.3.1 Research focus and aims

This research explores how governments have defined and legitimated their role in the process of bringing about interoperability standards related to the Smart Grid, comparing policy discourses of the US federal government and the European Commission. The core argument of this thesis follows the following logic:

- US and EU governments have traditionally taken a relatively hands-off approach to ICT standardization. The political science literature has seen this approach as an example of a general trend from Government to *Governance*.

- The imperative of realizing the Smart Grid put a new political focus on the standardization world (an unprecedented effort is required) which resulted in a window of opportunity within this policy domain – a time where outside pressures or developments can bring in new actors and new discourses to bring about *change* in existing policy.

- At the same time, there are factors such as dominant discourses and institutional legacies that promote *stability* and persistent trajectories.

- This thesis aims to explore the interplay between stability and change by analyzing discourse and discursive agency in its political and institutional context

Based on these initial reflections, focusing on continuity and change, comparing and contrasting, the following main question has been formulated to guide this research: *How was the need to develop Smart Grid standards constructed as a policy problem and what consequences does this have for policy intervention in this area?*

1.3.2 Conceptual framework

In a comprehensive study of the theoretical frameworks deemed valuable for studying socio-technical change, Sovacool and Hess conclude that, "deeper understanding may emerge only when different theoretical perspectives are analyzed and juxtaposed, culminating in a sort of meta-theoretical triangulation."(Sovacool & Hess, 2017, p. 741). The authors recommend a strategy of triangulation, not only by using multiple methods, but also by applying different theories: "This approach could be seen as akin to hypothesis testing, where different theories could be applied to a single research question or topic, and then analyzed for the best fit or strongest exploratory power." (ibid, p. 741). In drawing from two separate traditions in social science research, this thesis adopts such a strategy of theoretical triangulation. It does this by first analyzing the policy discourse using a critical discourse analysis perspective. In a second stage it applies a framework built on neo-institutionalist theory – mainly historical institutionalism – to gain further insights.

The resulting approach – further elaborated in the next chapter – falls broadly in the school of discursive institutionalism, as described by Schmidt (2010). Empirically it is a work of discourse analysis, a focus which is justified on both ontological and epistemological

grounds. Conceptually, however, it draws from both discourse theory and neo-institutionalism – mainly historical institutionalism – to build a framework for policy analysis that "takes ideas seriously" while at the same time acknowledging that "history matters" (Tosh, 2008).

A central tenet of discourse theory and the current research is the notion that the study of policy is *necessarily* a study of discourse: because *"public policy is made of language"* (Majone, 1989: 1). In this sense, talk is not the opposite of action; talk *is* action. In the last few decades many scholars have described policy as discursive action (Bacchi, 2000; Hajer, 1995; Rein & Schön, 1996), a trend which has been referred to as an *"argumentative turn"* in the social and political sciences (Fischer & Forester, 1993). According to Hajer, *"discourse analysis has changed the way policy-making is studied"* (2002, p.1).

Discourse has been defined by Hajer as *"a specific ensemble of ideas, concepts and categorisations that are produced, reproduced and transformed in a particular set of practices and through which meaning is given to physical and social realities"* (Hajer, 1995, p. 44). In more straightforward terms, policy discourse, as defined by Schmidt (2002), consists of *"whatever policy actors say to one another and to the public in their efforts to generate and legitimize a policy programme"* (p. 211). Discourse is different from discussion as actors with diverging or opposing interests can and often do share the same *frames*.

Crucial for the research undertaken in this thesis is the notion in discourse and narrative approaches – first developed by Foucault (1970) – that language does not simply mirror the world but it acts to encourage certain ways of thinking and silencing others: policy sets out a dominant conceptualization of the problem which sets limits on what can be said and felt about it. Politics has (in)famously been described as the art of the possible; in this sense discourse analysis explores what is *discursively* possible. Simultaneously, these conceptualizations are not fixed but retain a degree of openness and changeability. Discursive change is possible through dialogue and interaction (Fairclough, 1992: 9).

While emphasizing the overall significance of language in policy analysis, this thesis develops a framework which contextualizes the discourse and allows for the role of human agency that allows us to understand continuity and change within a policy domain. The conceptual

framework uses notions from discourse theory and neo-institutionalism. Change can come about when a focusing event (Birkland, 1997, 1998) creates a window of opportunity for a policy entrepreneur (Kingdon 1984) to introduce new discourses and policy alternatives (Knoke, 2004).

This section has described how this thesis sets out to analyze whether context-specific arguments and ideas put forward in policy documents on Smart Grid can reveal a shift in government policy on standards. The subsequent sections of this chapter briefly introduce the defined purpose, significance, and potential target audience of this thesis. Additionally, to provide readers with an overview of the entire thesis, the final section presents a concise outline of the upcoming chapters.

This thesis aims to make a significant contribution to the study of standardization by expanding the knowledge and understanding of this subject area which, outside the field of economics and innovation, has so far been largely neglected by the social sciences and by policymakers (see also section 2.7). Interest in standards has increased in recent years, but the issue is only beginning to become the focus of mainstream political interest. Although existing research shows that companies engage strategically in standardization and that outcomes may not be optimal for society, public policy still reflects the sense that standards are "just" technical matters to be agreed by neutral experts in committees (Grindley, 1995). Standards are in this sense depoliticized, i.e. they are strategically important but not politically contested. However, because of the importance of standards for achieving societal objectives through large-scale application of ICTs (all policy initiatives prefixed by "Smart" - cities, houses, transport - or "e" - health, identity, education), interoperability standards are likely to become an increasing political concern.

The examination of standardization policy discourse is particularly timely. During a period of heightened interest in Smart Grid, policy intervention in the EU and in the US appeared to break from the status quo. By considering how the standardization was constructed as a policy problem and how intervention was justified, we gain insight both about prevailing understandings and the potential for change – the departure from existing practice in a policy domain has been identified as a critical juncture at which new ideas might be considered (N. Fairclough, 1992). This consideration is crucial because the way an issue is

discursively defined as a problem that can be addressed by society will consequently delimit what particular solutions are considered and ultimately favored. (Hajer, 1995; Majone, 1998). Such problematization can later become entrenched and can have an impact on whether a policy succeeds or not (Page, 2006).

In addition to academic researchers interested in standardization and the energy transition, this thesis therefore also explicitly addresses policymakers as an audience. A feature of the modern information society is that the achievement of important societal objectives hinges on a voluntary industry coming together to agree and implement standards. Yet recent research from the 'system of systems' literature has concluded that the lack of an authority which has "control" over the System-of-Systems prevents the development of holistic and system-independent solutions. The challenge is not merely technical but stems from the fact that actors have different preferences and that agreeing on a single solution implies trade-offs (Schütz et al, 2020). Against this background, policies on standardization that only foresee win-win scenarios appear insufficient: increased awareness and capacity coupled with new ideas on the role of government in this process are called for.

1.4 Thesis structure

The rest of the thesis is structured as follows:

Chapter 2: Conceptual framework and methodology

This chapter outlines an approach to answer the main research question. It draws on discourse theory and various strands of neo-institutionalism, emphasising temporality ("windows of opportunity"), the importance of "policy entrepreneurs", and the relative stability of discourses which shape the way actors understand the nature of an issue, potential solutions, and their own roles. An overly deterministic view (path dependency) is rejected. Rather the theoretical framework is aimed at understanding the potential for policy change within the constraints of relatively persistent discursive and institutional structures, what Pierson (2004) refers to as "bounded change".

Chapter 3: Protecting public investment and NIST as an "honest broker": US response to the Smart Grid standardization challenge

In the US the discursive legacy consists of a policy language expressing a strong preference for market-led standardization, which has to a certain extent been counter-posed by an antitrust tradition. However, the storyline that developed surrounding the Smart Grid standardization departs from previous policy language on standardization. It introduces new discourses and frames, namely the economics of standards discourse and the framing of "Smart Grid" as a grand national project (parallels drawn with the building of the electricity grid in the 20th century). The economics of standards discourse combines with the notion of competing interests and the possibility that industry-led efforts may lead to suboptimal outcomes. This new perspective provides a justification for government leadership in the standardization effort.

Chapter 4: Innovation discourse and the legacy of the "New Approach": EU response to the Smart Grid standardization challenge

In the EU, the argumentative context reflects a long-standing policy framework on standardization, dating back to the 1970s and linked to the completion of the Single Market. However, the storyline that developed around Smart Grid standards draws on only a limited range of available discourses, focusing on the technical aspects of standardization and presenting standardization as win-win.

Chapter 5: Contrasting storylines: exploring the explanatory power of institutions and agency

This chapter starts by comparing and contrasting the case studies. The results of the analysis are interesting because based on the existing literature the expectation was one of greater convergence. In both cases, the policy documents show that there is an awareness of international efforts and especially a tendency for the EU and the US to consider each other's policy developments. It is also interesting because it has been argued, and is often presumed, that the US approach to standardization is more laissez-faire (C. Cargill, 2011).

Based on the framework developed in chapter 2, this chapter extends the analysis to include concepts from historical neo-institutionalism to gain further understanding of the observed differences – and commonalities. Such a consideration of the explanatory power of a combination of agency and structural factors is in line with the approach outlined in chapter

2. It emphasizes the legacy of the New Approach in the EU case. It considers the political factors that combined to make the challenge of Smart Grid standards more salient in the US. It utilizes the theoretical concept of "policy entrepreneur" to explore the role of NIST and the appointment of a national coordinator for Smart Grid interoperability. This policy entrepreneur has drawn heavily on academic insights, notably the economics of standards perspective in order to justify a strong leadership role for NIST. In contrast, the EU arrangement of a CEN/Cenelec/ETSI joint working group on Smart Grid standards has created a situation where the policy on Smart Grid standards is being developed by existing stakeholders and the challenge is defined mainly in technical terms.

Chapter 6: Conclusion

This final chapter outlines the findings and considers how discourse is linked to contributions, parameters, limitations and areas for future research. What has the research shown and how it is relevant to the central research question of the thesis and the themes set out at the start of this thesis? What has been achieved by this research by exploring how might we expect policy discourse to have a bearing on institutional arrangements? The second part of the chapter links to the broader themes and issues introduced in the introductory and opens out into a discussion of wider academic debates and controversies. Finally, it considers some future directions in which research might go from where this thesis leaves off, including a policy learning approach that would require longer time-frames and the study of response to policy failure.

2 Conceptual framework and methodology

The ideas of economists and political philosophers… are more powerful than is commonly understood… I am sure that the power of vested interests is vastly exaggerated compared with the gradual encroachment of ideas. (Keynes, 1935: 383)

2.1 Introduction

Chapter one introduced this thesis as an investigation into the policy discourse on Smart Grid standardization. Starting from the observation that the standardization effort required has been described as "unprecedented" (NIST, 2010) and "not business as usual" (JWG, 2011), and the argument that digital transformation are making standards more crucial and urgent while they have also become increasingly problematic to achieve, the main objective of this work is to understand how policy intervention to achieve interoperability standards for the Smart Grid was constructed in the communicative discourse in the EU and in the US. The purpose of this chapter is to outline a theoretical and methodological framework devised to achieve this objective.

Policy documents in both the EU and the US describe standardization, especially in the ICT domain, as mainly a voluntary, "bottom-up" effort. The need for policy intervention in this process is therefore something that needs to be justified or explained. More pointedly: the need for policy intervention contains a tension through an inherent (even if implicit) critique of the current arrangement where standardization is for the most part delegated to industry. Although Smart Grid standardization could certainly be studied from a rationalist, materialist, and interest-based perspective, it is this tension that has guided this thesis to focus empirically on the *discourse* of policy intervention. Significantly, discourse theorists like Norman Fairclough (1992, 2003) have suggested that the in-depth study of documents that describe departures from established arrangements – by exploring both what is taken for granted and what needs to be explained, and how tensions and contradictions are

negotiated – can reveal important insight about policy change and stability. Furthermore, political scientists interested in policy change have since the late 1980s increasingly turned to ideas and discourse, partly as a reaction to rational choice approaches and also to avoid an overly deterministic view where the constraint of institutional path dependence means change can only be explained by referring to exogenous shocks (cf. Goldstein & Keohane, 1993; Steinmo & Thelen, 1992; M. Weir, 2006).

Consequently, and with the overarching aim of achieving deeper understanding through a form of theoretical triangulation (Sovacool & Hess, 2017), the conceptual framework developed in this chapter draws from both discourse theory and from various complementary strands of neo-institutionalist theory, chiefly the historical institutionalism tradition, to understand the constraints and opportunities for policy change. In doing so, the framework develops an approach to policy analysis that situated broadly in the school of discursive institutionalism, as defined by Schmidt (2008, 2010) and which "takes ideas seriously" while also acknowledging that "history matters" (Tosh, 2008). As Schmidt (2010) argues, the understanding of policy as a discursive construct enables us to better explain endogenous change while also recognizing the enduring effects of institutions, understood by historical institutionalists as "the formal or informal procedures, routines, norms and conventions embedded in the organizational structure of the polity or the political economy." (Hall & Taylor, 1996)

In pursuing such a framework, with its focus on contextualized discourse, the overall research approach aligns with a school of policy studies that have been termed the "argumentative turn" (Fischer & Forester, 1993), which builds on the premise that "public policy is made of language" (Majone, 1989, p. 1). However, as Hajer emphasizes, discourse analysis in this approach "is not to be counterposed with institutional analysis but is rather a different way of looking at institutions that is meant to shed new light on the functioning of those institutions and how political change in institutional arrangements comes about" (Hajer, 1995, p. 264). Discourse analysis concerns not only what is being said or written by policy actors, but also includes the context – institutionalized patterns of interactions among actors and the governmental structures that frame those political interactions – which "co-determines what can be said meaningfully" (Hajer, 1995, p. 2).

On the other hand, approaches that take ideas seriously do contrast with models that emphasize "entrenched interests, hidden instrumental agendas" and that view ideas "as mere rhetoric, a cover or justification for other things" (Barker, 2000: 223). The thesis consciously sides with the post-positivist political science that has emerged in the last few decades in which "discourse is not to be seen [exclusively] as a medium through which individuals can manipulate the world" (Hajer, 1995: 51). While actors can certainly make conscious, strategic (calculating) use of discourse to make their message resonate and to further their interests, that does not preclude that those same actors are also simultaneously constrained by the dominant discourse, even at an unconscious level. Schmidt refers to "background ideational abilities" that are structures and constructs internal to agents and "foreground ideational abilities" which can explain the role agents play in bringing about change (Schmidt, 2008).

Taking ideas and discourse seriously does not imply a naïve assumption that there is a one-to-one relationship between talk and action. In fact, the discrepancy between talk (espoused theory) and action (theories-in-use) or how "an organization fulfils the inconsistent demands of its environment by decoupling its action from its symbolic displays" (Meyer and Rowan, 1977) – the "hypocritical organization" (Brunsson, 1989) – is an interesting avenue of investigation. Indeed, Brunsson and Jacobsson (2000b) and Hallström (2004) do apply this concept to standardization, and show that standards organizations have an interest in presenting their work as neutral and technology-focused, while de-emphasizing the corporate economic interests that drive standardization to a significant extent. However intriguing, this discrepancy is not the focus of this thesis. Instead the theoretical premise that underlies this work is that discourse, by setting limits on what is deemed as reasonable policy action, is in itself a worthwhile object of study that does not necessitate "going behind it" to discover "real" intentions and interests.

Crucially, the focus on the discursive aspects of policy, combined with concepts drawn from historic institutionalism, creates the possibility for human agency to play a role in engendering change. As argued by Mc Beth et al the power of a good story used by a policy entrepreneur can change subsystem policy learning and outcome (McBeth, Shanahan, Arnell, & Hathaway, 2007, p. 549). And Blume et al argue that through harnessing the power

of narrative, "human agency plays a decisive role in seizing potential for change" (2006 p. 4). Using Kingdon's (1995) vocabulary, policy entrepreneurs recognize and use "windows of opportunity" to "change discursive and institutional patterns" and "bring in new arenas and actors" (ibid. p4). At the same time, discourse and institutional arrangements set limits to human action. It is this dialectic interplay of exogenous factors, discourse, and human agency to shape policy that can help to explain both change and stability.

The rest of this chapter is organized as follows: the next section focuses on how discourse theory can assist in answering the research question. It considers a number of underlying assumptions that are fundamental to the approach of this thesis, including the view of *policy as discourse*. The following section considers the additional insights that can be brought by considering ideas alongside concepts drawn from neo-institutionalism. The key concepts of the framework, how they relate to each other and the underlying argument, are subsequently developed into a set of guiding research questions. Thereafter follows a description of the methodological choices that have been made in this thesis, including qualitative approach, comparative case study and discourse analysis. The chapter finishes with a consideration of some of the limitations of the approach, balancing them against the value of the contributions this thesis makes.

2.2 Discourse theory and policy change

2.2.1 Policy as discourse

The primary focus of this thesis is on discourse: on language as a form of social practice (Fairclough 1992). The material for the study is official policy documents, including legislation, white papers, transcribed speeches, and press releases. They have been approached from an interdisciplinary viewpoint and have been read, coded, and analyzed and discussed, not as isolated texts, but "with an emphasis on their political meanings in particular contexts" (Grue, 2011). The underlying theoretical assumptions of this approach is that "discourse matters" (Schmidt, 2008, 2010), that politics is "made of language" (Majone, 1998), and that argument and persuasion are central to politics and policy making (Hajer, 2002; Finlayson, 2004). The thesis follows a strong tradition in the social sciences of looking at discourse as *constitutive*, ultimately based on Foucault's understanding that

"discursive practices construct social reality and regulate what is reasoned about and how a topic is discussed" (Howarth, 2015).

In the last several decades, discourse analysis has been applied widely across a wide range of disciplines in the social sciences. Developed out of a diverse and subtly overlapping body of literature, discourse theory builds frequently on the later works of Foucault and social psychologists like Billlig (1996). The approach employed in this thesis draws more explicitly on work done by Fairclough (1992, 2003) and Hajer (1995, 1996) to adapt discourse theory to the area of policy analysis. This has led to working with Hajer's definition of discourse as *"a specific ensemble of ideas, concepts and categorizations that are produced, reproduced and transformed in a particular set of practices and through which meaning is given to physical and social realities"*. In Dryzek's (2005: 8) more straightforward terms, a discourse is "a shared way of apprehending the world", which allows diverse pieces of information to be brought together to create a coherent narrative (Stephan, 2015). Discourse analysis in the specific context of policy analysis concerns "the practices that construct the policy problems and their solutions" and seeks to answer the question: "How do problems get defined and what sort of political consequences does this have?" (Hajer, 1995).

Fundamental to discourse theory is that problems and interests are not taken for granted but are constituted through discourse, and the orientation of discourse analysis is not instrumental: it is not about evaluating policy outcomes. The analysis does not start from a definition of a problem and concentrate on explaining who or what determined whether action was taken. Instead, it takes an interest in they way that issues become defined as problems that can be addressed by policy action (ibid.). Policy is also "not merely determined by a consistent set of deeper economic, political, or social structures that in some way generate a preconditioned set of outcomes" (Haas, 1992: 31). Indeed, "reference to institutional backgrounds or vested interests is an unsatisfactory circular explanation because institutions are only powerful in so far as they are constituted as authorities vis-à-vis other actors through discourse" (Hajer, 1995, p.51). In response to those who posit that politics is merely about who has the power, Fairclough and Fairclough (2011) maintain the crucial role of argument in politics:

> In whatever way a claim about what should be done is reached (behind closed doors, through democratic public deliberation or by manipulating public opinion), *as long as normative claims and decisions are justified by reasons* (even by 'bad' reasons, e.g. unacceptable, irrelevant or insufficient reasons), practical reasoning (and argumentation more generally) constitutes an integral part of political discourse.

Following Fairclough, (1992) discourse is in this approach viewed as both text and action. The publication of a white paper, the setting up of a task force, or allocating a budget, are all what one could call "non-discursive" actions, but these actions are simultaneously discursive actions because they are invariably accompanied by language. This thesis certainly includes study of "non-discursive" action but the focus is on discourse as the best way to approach the analysis of those actions. For example, when studying the potential role of agents in bringing about change, the focus is on their use of discursive devices to create an argument for a specific course of action.

Discourse is in this sense treated as "real" and it is important to emphasize that to take the view that policy is discursively created means that there is no attempt in this analysis to "get behind" the text. Texts are not viewed as just a "conduit" to a reality beyond the text, but they are deemed to actively organize social action and are consequential for that action, by directing its course. For Hajer in his account of the "acid rain" storyline, the realist approach "assumes incorrectly that the natural environment that is discussed in environmental politics is equivalent to the "real" environment "out there" (1995, 16). He argues instead that reality is always dependent on subject-specific framing or time-and-place specific discourses that guide our perceptions of what is the case. Or as Hansen notes, "there is no 'extra-discursive' materiality that can be studied independently of its discursive representation. This should not be taken to mean that the material world does not matter [or does not exist], but rather "that it is always discursively mediated" (L. Hansen, 2005). Or as stated by Laclau and Mouffe (1985):

> The fact that every object is constituted as an object of discourse has nothing to do with whether there is a world external to thought, or with the realism/idealism opposition. An earthquake or the falling of a brick is

> an event that certainly exists, in the sense that it occurs here and now, independently of my will. But whether their specificity as objects is constructed in terms of 'natural phenomena' or 'expressions of the wrath of God' depends upon the structuring of a discursive field.

In other words, discourse theory does not conceive that there is no problem existing in reality, but rather that our understanding of the problem always implies a set of assumptions "that are mediated through an ensemble of specific discursive practices" and that politics therefore "cannot be understood without examining the discursive practices that guide our perception of reality" (Hajer, 1995: 17) Such examination cannot be taken for granted, as routinized forms of discourse have a normalizing effect which means that people do not recognize making statements as "moments of positioning" or taking a stance, but simply assume that this is "the way one talks" on this sort of occasion (Davies and Harré 1990: 49). Thus, reflecting on the framing of security in computing, Slayton (2016) notes: "in the late 1960s, the focus of public discourse about computer-related insecurity was not on threats to national security or even crime, but on the Orwellian spectre of government surveillance." In this way, discursive and behavioural action is either enabled or constrained by the historicity of discourse.

The constraining effect of discourse can be observed in the way that participants in a discussion, even when they express opposition to an initial speaker, are expected to formulate their answers within the same discursive frame. The constraining, disciplinary force of discursive practice often consists in the implicit assumption that subsequent speakers will answer within the same discursive frame. Discourse, according to Schmidt, "not only commits the speakers… to action, but also their successors, so that new leaders have to 'honour their predecessors' commitments' and so are trapped by their… communicative discourse (2008: 309). Even if actors attempt to challenge the dominant story-line, there is an expectation that they formulate their views by referring "known categories" (Hajer, 1995: 57). Callon and Latour refers to this fundamental aspect of discursive mechanisms as black boxing:

> An actor grows with the number of relations he or she can put, as we say, in black boxes. A black box contains that which no longer needs to be

> reconsidered, those things whose contents have become a matter of indifference. The more elements one can place in black boxes – modes of thought, habits, forces and objects – the broader the construction one can raise. (Callon and Latour, 1981: 284)

One important effect of normalization is to make difficult the challenging of a dominant understanding of a policy problem (or storyline) because the ability to include and refer to existing, known categories affects the status and power of the speaker. As noted by Hajer notes, the use of storylines results inevitably in some sort of black boxing, where policy statements are linked to generally accepted norms and ideas and therefore are made to seem fixed and natural (Hajer, 1995: 272). For scholars exploring the potential for policy change, an important aim of employing critical discourse analysis is therefore to seek explanations as to why certain beliefs and concerns resonate and persist and the processes by which they become normalized and institutionalized (Fairclough & Fairclough, 2011). The next section will consider more closely the relationship between discourse and policy change and how these theoretical insights will be operationalized in this thesis.

2.2.2 Discourse theory and change

At the start of this inquiry lies an intriguing dilemma: by taking policy action to bring about progress on smart grid standardization, governments are intervening in a process which they insist can normally be delegated to industry. How is such a departure from an existing policy legitimated and what are the limits to change? It is the search for answers to this paradox that lies at the heart of this research and which directs it to focus on discourse. Crucially, discourse theory provides a way to approach such contradictory situations. When problematizations arise that expose the contradictory basis of discursive constructions, the result is a dilemma or contradiction (Howarth, 2012). Societal change can be said to come about through efforts to resolve these contradictions, and this process "leaves traces in texts in the form of the co-occurrence of contradictory or inconsistent elements" (Fairclough, 1992: 96). As Swanson argues (2008), a discourse that acknowledges tension shows some awareness that the current setup is only one of several possible solutions and as such it may clear the way for a fundamental change in policy. Such a policy discourse may "reconceptualise interests rather than just reflect them, to chart new institutional paths

instead of simply following old ones, and to reframe cultural norms rather than only reify them" (Schmidt, 2002, p. 212).

This research employs a form of discourse theory that is grounded in the idea that discourse is a social process that generates meaning within specific contextual settings. It adopts a perspective on discourse that is critical, dialectical, and seen as a driver of social change, as articulated by Fairclough (1992). Fairclough's dialectical approach underscores the dynamic interplay between discursive practices and pre-existing social structures, relationships, and hegemonic forces (1992: 60). These interactions are not one-sided; instead, discourse is both influenced by and exerts an influence on social structures, simultaneously contributing to the construction of these structures, as noted by Howarth (2012).

The role played by discourse in both constraining and facilitating change is also explored by Neumann (2008). He begins by highlighting how discourse, by imparting a certain degree of regularity to social interactions, exerts constraints on actors within social contexts.

> Because discourse maintains a degree of regularity in social relations, it produces preconditions for action. It constrains how the stuff that the world consists of is ordered, and also how people categorize and think about the world. It constrains what is thought of at all, what is thought of as possible, and what is thought of as the 'natural thing' to do in a given situation.

Crucially, the study of discourse also concerns the conditions for change:

> But discourse cannot determine action completely. There will always be more than one possible outcome. Discourse analysis aims at specifying the bandwidth of possible outcomes (ibid: 62).

The discursive context is a concept that have been used to describe all circulating discourses, past and present, that can be associated with a particular issue and that are available to policymakers when constructing a policy argument (Howarth, 2012). Rather than simply reflecting a situation "out there", problem statements are representations of how specific actors perceive of as the nature and cause of a problem. The components of such statements

are drawn from discursive contexts, including current societal debates and policy legacies, from which policy actors use claims when constructing their own problematization. These "discourses of problematization" are "constitutive of reality" because the way a problem is defined significantly influences the range of options that can be considered as rational (Howarth, 2012). The dominant discourse in a given policy domain acts as a constraint to the development of new story-lines. The policy discourses also draw on and need to be made to "fit" with macro discourses, such as those related to market capitalism, innovation and sustainable development. Certain ways of thinking about the issue are naturalized and reflected in institutional arrangements. The way that a problem becomes defined has consequences for what policy alternatives are considered and ultimately what solution is chosen.

2.2.3 Constructing policy problem and response

Drauth (2007) notes how Hajer's concept of the "storyline" can be used to better understand the role of discourse in policy change. Hajer defines the story-line is as "a generative sort of narrative that allows actors to draw upon various discursive categories to give meaning to specific physical or social phenomena." To be effective, storylines need to simplify policy problems and suggested solutions and describe them in a way that appear to align with common sense. Hajer (1995: 60) refers to "discourse structuration" when the ideas and language of a discourse becomes "sedimented into a set of concepts and organizational practices that are taken for granted by social and political actors" (Torfing 201, cited in Stephan, 2015). To radically depart from the established repertoire and to propose "a new problem definition would risk being perceived as illegitimate or unintelligible" (Stephan, 2015).

Underpinning the approach of this thesis is a focus on discourse and narrative analysis aimed at illuminating how the policy problem and intervention has been constructed and legitimated. At the time when a policy problem is constructed and framed, whether it is viewed as a new type of issue is of great importance for the development of a new story-line. New or alternative discourses can be used in the creation of new story-lines. These can be brought in by policy entrepreneurs or result from wider consultation. If the policy problem is deemed to be of a new type, it is more likely that new actors are brought in and

that other discourses are drawn upon to legitimate a remedy in the form of policy intervention. While dominant discourses act to restrict how a policy problem is understood and formulated, policy actors are also able to introduce new discourses that can bring about change – especially when exogenous events create windows of opportunity. Policy texts can draw on both dominant and alternative discourses to construct a problem requiring policy response. Alternative discourses include those coming from academia or other policy domains. The concept of interdiscursivity is used to identify discursive influences.

What makes a storyline powerful is not necessarily that it is founded on rigorous empirical evidence but rather hinges around its intuitive resonance – that it "*sounds right"* (Hajer, 1995). In fact, research in the field of psychology has demonstrated that compelling narratives are more persuasive than science (Ricketts, 2007). In addition to drawing on existing ideological repertoires, policy narratives gain credibility and become persuasive by ordering the elements of the story according to familiar plotlines. This can be done by invoking a classic myth or by referring to archetypal figures and motifs, e.g. the hero, martyr, or wanderer. Probably the most common narrative follows a simplified version of the epic hero's journey (Campbell, 1968, cited in Janda and Topouzi, 2015). In the epic form, the protagonist answers "the call" and finds itself, often in a parallel world, confronting a number of enemies and/or obstacles. Employing strengths, sometimes symbolized as a silver bullet or magic elixir, and overcoming weaknesses, the protagonist becomes a hero and returns to the ordinary world a saviour. In the romanticist form (Jeffcut, 1994) the plot may involve a fall from grace and describe a return to or rediscovery of a purer self. Another recognisable plot have a David and Goliath character, with several small players attempting to topple a very large, dominant player (Bridgman & Barry, 2002). Stone (2002) identifies two broad categories of plots with numerous possible variations: stories of decline and stories of control. The plot of decline is a story emphasizing how things will get worse if the opposing solution is enacted; the plot of control is aimed to convince the audience that things once believed to be out of our control are now within reach. Common to all these stories is that the recognizable form and characters help them make immediate sense to the audience.

Seen through the lens of discourse theory, political change does not automatically come about due to factual changes but require the emergence of new storylines that "re-order understandings" (Hajer, 1995: 56). Discursive interactions are not mere exchanges of words but the process has the potential to change cognitive patterns, shaping how individuals think about and position themselves in relation to political matters. Hence discourse not only plays a fundamental role in political change but *"finding an appropriate story-line becomes an important form of agency."* (ibid: 56). Building on these insights, Van Gorp (2010,) underscores the potential for individuals to actively engage with and manipulate the narratives that surround them, affecting not only their own understanding but also the perspectives of those they engage with: "individuals can mediate the persuasive power of frames by using them" (2010, p 89). This interaction can either broaden the horizons or constrain the scope of political possibilities: "clusters of ideas in particular contexts can open up new ways of thinking or limit the field of what is thinkable and arguable" (Finlayson, 2004).

2.2.4 Policy outcome – challenging or accommodated within existing institutional arrangements

An important consideration pursued in this thesis is how and under what circumstances discourse can have institutional repercussions. Policy challenges can be framed in ways that explicitly challenge existing institutional arrangements, reduced to more manageable incidents present institutional hurdles, broken down into more manageable incidents for institutions to address, or perceived as processes of structural transformation that transcend human intervention (Hajer, 1995: 40-41). New story-lines have to compete against existing story-lines that dominate public understanding and are rationalized and naturalized in the existing institutional arrangement. "The status quo is protected by a multitude of practices that can be seen to uphold the structures of society and avoid politicization of certain existing arrangements" (Ibid, 276). Whether or not "problems appear as anomalies to the existing institutional arrangements depends first of all on the way in which these problems are framed and defined" (Ibid, 4).

Through critical discourse analysis it is possible to investigate "how a particular framing of the discussion makes certain elements appear as fixed or appropriate while other elements

appear problematic." And "one can endeavour to show whether definitions 'homogenize' a problem, that is to say make the problem understandable within a reified perception of the wider problem field, or whether definitions suggest a 'heterogenization' that requires an opening up of established discursive categories." (Hajer, 1995: 54) A new story-line can be formulated in a way that it can be accommodated within the existing institutional arrangements or that it challenges them. A new story-line is a prerequisite to change, but a new story-line should not be taken to mean a paradigm shift. In the absence of an exogenous crisis or repeated policy failure, pragmatic solutions are often sought within the existing institutional arrangements.

2.3 Historical institutionalism

As stated at the beginning of this chapter, while the empirical part of this thesis consists of a critical discourse analysis of policy texts the thesis also draws on concepts from neo-institutionalist theories, chiefly historic institutionalism, to bring further insight to the subject matter. The discourse theory elements are employed in the case study chapters (3 and 4) and the concepts drawn chiefly from historic institutionalism are brought into the comparative analysis in chapter 5. There is no separate, empirical analysis of formal institutions and laws, instead the approach aligns with the recommendation by Sovacool and Hess (2017) to use theoretical triangulation to improve research in the area of energy transitions. In this case, concepts drawn from neo-institutional theories are applied in chapter 5 to deepen the understanding of the results of the discourse analysis undertaken in chapters 3 and 4. Again, the approach in the empirical chapters follows Foucault's understanding of discourse and extends beyond the analysis of language to include its institutional underpinnings. The objective throughout is to explore the contextual facets of discourse, considering where these discourses emerge and how certain ways of perceiving a problem become inherent in social systems.

This section first introduces neo-institutionalism and contrasts it with "old" institutionalism. It then considers how several scholars in this field have turned to ideas and discourse as a way to find endogenous explanations for change. Indeed, many neo-institutionalist scholars have integrated ideas and discourse in ways that sometimes appear to overlap with the perspectives presented in the previous section. However, treating institutions as analytically

distinguishable from agents and as existing 'out there' and not just constituted by "real-time subjective ideational construction" (Bell, 2011) adds significant theoretical clarity to the analysis and thus complements and give structure to the findings of the critical discourse analysis and provide input to further research recommendations. Advancing the analysis in two stages, as this thesis does, also allows for comparing explanatory power of the theoretical perspectives; this point is further considered in chapter 6.

2.3.1 "New" and "old" institutionalism

Until the 1950s the field of political science was predominately centered around the study of political institutions. This persepective, sometimes referred to as 'old' institutionalism, the analysis focused on formal and legal aspects of institutions from a comparative or historical perspective. Political science then saw a "behavioural turn" with a focus on analyzing individual actors, sometimes with a disregard to the constraint of the legal and political context 'agency without structure' or 'agency without sentient agents or structures'. Starting in the late 1970s, there was renewed interest in the relationship between institutions and behaviour and to explain how institutions are formed and how they change. In a much-cited article, Hall and Taylor (1996) describe the development of three distinct approaches, labelling them: historical institutionalism, rational choice institutionalism, and sociological institutionalism. All three were formed as a reaction to the behavioural perspectives that dominated in the 1960s and 1970s, and sought to bring renewed attention to the role of institutions in constraining human actors. But in contrast with "old" institutionalism, neo-institutionalism approach institutions more generally as social constructs rather than the formal and legal aspects.

In rational choice institutionalism, actors behave strategically to maximize the attainment of fixed preferences. Institutions represent the incentive structures that reduce uncertainty. Sociological institutionalists define institutions more broadly to the point of removing the conceptual distinction between 'institutions' and 'culture'. Finally, historical institutionalism contends that formal political institutions matter but also extends the conception and how they matter. Historical institutionalism defines institutions as "the formal or informal procedures, routines, norms and conventions embedded in the organizational structure of the polity or the political economy". (Hall and Taylor, 1996: 938)

In the last twenty years or so, some critics from have begun to argue that 'bringing institutions back' has led to 'institutional determinism' e.g. historical institutionalist path dependencies that change only at exogenously induced critical junctures including economic crisis and military conflict (Schmidt, 2012:160). Thelen and Steinmo note that, "the problem with this model is that institutions explain everything until they explain nothing. Institutions are an independent variable and explain political outcomes in periods of stability; but when they break down, they become the dependent variable, whose shape is determined by the political conflicts that such breakdown unleashes" (Thelen and Steinmo, 1992: 15). Schmidt also argues that the three strands of neo-institutionalisms are all better at describing persistent trajectories rather than change:

> For the three older neo-institutionalisms, institutions are structures external to agents that constitute rules about acting in the world that serve mainly as constraints – whether by way of rationalist incentives that structure action, historical paths that shape action, or cultural norms that frame action. For DI, by contrast, institutions are internal to sentient agents, serving both as structures (of thinking and acting) that constrain actions and as constructs (of thinking and acting) created and change by those actors. (Schmidt 2010: 14)

To overcome such determinism, Thelen and Steinmo (1992) advocate for the need to unravel the "institutional black box" and redirecting scholarly attention towards 'strategic actors' which have the capacity to navigate and capitalize on "openings" presented by evolving contextual dynamics. Hall (2010, cited in Bell, 2011) cited in Bell argues, we need to "understand how institutions that are to some extent plastic can nonetheless contribute to the structuring of the political world". As will be seen below, scholars of all three traditions, but particularly in the historic institutionalism school, have turned to ideas and discourse in seeking to endogenize change. Historical institutionalism emphasizes path dependence but also combine institutional analysis with the added explanatory contribution of factors such as ideas, making these theories compatible with the overall discursive approach of this thesis. Institutions are viewed as providing "moral or cognitive templates for interpretation and action." (Ibid.: 939) As Wendt argues, "social structures have an inherently discursive dimension in the sense that they are inseparable from the reasoning and self-understandings

that agents bring to their actions". (1987, p. 359) Streeck and Thelen also take a social constructivist view in emphasizing that institutions "define roles but not final behaviours, and roles always need to be interpreted". "Applying a general rule to a specific situation is a creative act… the meaning of a rule is never self-evident and is always subject to and in need of interpretation." (Streeck & Thelen, 2005, p. 14). And Hansen further notes that "for facts to become politically salient and influence the production and reproduction of […] policy discourse there must be human and discursive agency; individuals, media, and institutions who collect, document and distribute them" (2006: 32).

2.3.2 Ideas, Agency, and Change: overcoming institutional determinism

Many scholars of political change have considered the relationship between institutions and ideas. This can come about when agents of change engage with institutional histories as ideational "imprints of the past" (l'empreinte des origines) (Merrien, 1997, cited in Schmidt, 2012) or through "collective memories" (Rothstein, 2005) that can be brought back and reinterpreted in response to current challenges. Arguing for the need to advance beyond institutional determinism and the black box of exogenous shocks, Blyth maintains that exogenous factors can never by themselves explain a particular outcome. Only agents *within* institutions produce change (Blyth, 2002, p. 8). And according to Kingdon, while exogenous events, shocks and crisis, act as triggers to create an open situation or window of opportunity, crises do not in and of themselves produce institutional change or dictate the direction of the change: "They need to be accompanied by something else. […T]hey reinforce some pre-existing perception of a problem, focus attention on a problem that was already "in the back of people's minds"" (Kingdon, 1995, p. 98). The ability to return quickly to the ideas and discourse is thus seen as important even if it does not immediately affect policy practice.

While the substantive focus in this thesis is on critical discourse analysis, the concept of "policy legacy", which is derived from historical neo-institutionalism, is used to denote a paradigm which emphasizes the history and impact of political institutions on political behaviour (cf. Skocpol, 1992; Baumgartner & Jones, 1993; Pierson, 1994; Skowronek, 1997). Béland (2009) describes the logic of availability, wherein policymakers draw lessons from not too distant policy legacies. In certain cases policy legacies can amount to "policy

monopoly" as outlined by Baumgartner and Jones (1993). Generally, such monopolies are supported by ideas that can be linked to fundamental societal values and can be conveyed to generalist audiences via simple messages (True, Jones, & Baumgartner, 1999). Applied to this thesis, an important consideration is the level of institutionalization of the standardization policy domain.

A second contextual factor in the framework can be described as the broad characteristics of the political system in terms of the relationship between government and various interest groups. The characteristics of the overall political system can either constrain or enable change. The concept of "policy style" is used to analyse *who* is consulted and *how* and is thus a measure of the relative openness of the system (Jordan & Richardson, 1983). The concept of policy style captures regularities of a system and the role played by the government and various stakeholders. An example is when particular departments or Directorates General immediately assume which are the "relevant" groups within a specific policy domain and focus their attention on obtaining support from that community around proposed policies. The characteristics of the political system have a bearing on which actors are able to influence policy, and determine whether policy advice is sought from new communities, e.g. academia, which can also introduce new discourses. In addition, the Varieties of Capitalism (VoC) school distinguishes between systems relying more on market forces to achieve coordination, epitomized by the US, versus coordinated market systems. As neatly summarized Hall and Soskice (2001), in liberal market economies (LMEs), the market serves as the primary mechanism for coordinating interactions between socioeconomic actors, whereas in coordinated market economies (CMEs) those actors participate in coordination activities that transcend the traditional market dynamics (Hall and Soskice 2001).

A third important contextual factor considered in this thesis is the political climate, which includes the "political mood" and other exogenous factors such as a change in government (Kingdon, 1995). Such factors may combine to create a "window of opportunity" as outlined in Kingdon's multiple streams approach (Kingdon, 1995). Baumgartner and Jones (Baumgartner & Jones, 1993) find that heightened attention and public debate about a particular topic will tend to make public opinion about existing policy more negative. This

negative attention can lead to a push for a policy monopoly to consider change and thereby creating an opening for by policy entrepreneurs to introduce new discourses. In this thesis, the imperative to make progress on Smart Grid is seen as providing an impetus for change. The salience of the Smart Grid, the political stakes involved, and the relative importance given to standards in Smart Grid policy discourse are important factors to consider.

2.3.3 Paradigm shifts

It has been suggested that climate change policies require third-order regulatory innovations (Black, 2005) or a paradigm shift. However, according to Peter Hall's well-cited work on policy learning (Hall, 1993), such wholesale changes in policy occur relatively rarely. Many scholars, including Baumgartner and Jones (1993) and Hall (1993), have suggested that such third-level change or paradigm shifts will occur only when the existing system is discredited following policy failure to deal with major challenges or a crisis. The examples most commonly cited are economic crises. The Great Depression created the conditions that led to the adoption of Keynesian economics and the welfare state. Even the US, though considered a laggard, adopted this. Then came the "stagflation" crisis in the 70s, which was explicitly perceived as a failure of Keynesian economics and which led to a major global shift to adopt market liberalism. Against this background, Grant and Wilson (Grant & Wilson, 2012) explore the effects of the global financial crisis that began in 2008 – the most severe international economic crisis since the Great Depression – how governments responded to the crisis and the political and policy consequences. Given the prevailing view of the US as the archetypal liberal market economy, the US bail-out AIG and GM were counter to what might have been expected and initially a major policy paradigm shift seemed likely. However, Wilson and Grant notesthat to someone there in 2009 and then absent until 2011 would be surprised: "American reform efforts, ostensibly among the most comprehensive, have amounted to little" (Wilson and Grant, 2012: 12). The empirical chapters are therefore "more often concerned with trying to explain why change did not occur as much as explaining what did" (ibid, p. 9).

The authors conclude that, "the policy response to the global financial crisis has been remarkably limited," and that the crisis led to no fundamental reform of the global financial system. While the global financial crisis initially led to a repudiation of the economic system,

prevailing policy orthodoxies have not been replaced (Ibid 257). In searching for explanations to why the crisis did not result in significant change in policy and policy thinking, the authors look to Kingdon (1984) who suggested that major policy change require three conditions – "recognition of a problem, political circumstances, and the availability of new ideas". Of those three, they identify the final one as absent following the crisis in 2008. In contrast with the 1970s where a powerful alternative narrative existed influenced by monetarists such as Milton Friedman. The discontent was heard but leaders "could not offer a coherent set of proposals or an alternative paradigm" (Wilson and Grant, 2012: 249). A turn to neo-Keynesianism (was initially seen as possible but was soon discarded. A similar observation by Crouch, leads to the conclusion that, "the political entrepreneur who can produce a new vision untarnished by events has a great opportunity" p 259 (2011: 179). However, to create such a narrative, Crouch argues that a shift from the current preoccupation with the state versus market dichotomy (2011: 179).

2.3.4 Policy entrepreneurs as discursive agents

The conceptual framework employed in this thesis avoids an overly deterministic approach by allowing for human agency to play a role of change. When given a window of opportunity, the "policy entrepreneur" can draw on existing and new discourses to create a new story-line and also broaden the audiences by linking to "high" politics. The concept of a policy entrepreneur is taken from Kingdon's (1995) multiple streams approach which lists three criteria, or resources, required for actors to qualify as policy entrepreneurs. The first regards having the ability to command attention. The actor must be allowed to represent others, be in a decision-making position, or be generally perceived as an expert. The second criterion relates to political connections or being a skilled negotiator. Finally, a policy entrepreneur needs to be persistent, meaning that they promote their ideas through various means, and that they are single-mindedly focus on their particular issue (Guldbrandsson & Fossum, 2009).

Policy entrepreneurs can play an important role, both in placing an issue on the agenda and in proposing politically viable solutions. Knoke (Knoke, 2004) notes that policy entrepreneurs tend to be strongly committed to the ideas that they promote. They make strategic use of storylines to position their interpretation of a policy challenge as well as potential responses (Hajer, 1995), using "statements, normative appellations, and communicative strategies

invoking historical arguments" to shape opinion Blume et al (2006, 19). Kingdon emphasizes that the existence of a problem does not automatically place it on the agenda of decision-makers. A viable solution must be readily available, and policymakers need to be ready for it. Policy entrepreneurs are therefore often engaged in educational and communication activities aimed at "softening up" both the public and expert audiences.

According to Kingdon, policy entrepreneurs leverage available ideological repertoires to support their agenda which makes the act of framing policy alternatives a potentially important aspect of the policymaking process. Indeed, the very definition of agency in the policy context can be understood as the ability of certain actors to make use of specific narratives to position themselves strategically (Howarth 2012). Recalling the observation by Baumgartner and Jones, that the framing of an issue determines who will be seen as a legitimate stakeholder in the policy process, Princen (2009) notes that policy entrepreneurs can attempt to move an issue up the political agenda by expanding the conflict to "increasingly wider circles of participants", by framing the issue as something that concerns not only a narrow set of experts but also the general public. Similarly, Béland's (2006) notion of high-profile versus low-profile social learning relates to the way that framing can widen the concern of an issue and thereby open up for change: "While bureaucratic processes that offer technical guidance to policymakers frequently maintain a low media and political profile, policy lessons whose main purpose is to convince the population to back a specific policy alternative have a much higher profile." (Béland, 2006, p. 564)

In the concomitant use of several neo-institutionalist theories to explain change and stability in the policy responses to the Smart Grid standardization challenge this thesis follows an approach that has been deemed useful by a number of other scholars. For example, Meijerink (2005) notes that in their analysis of long term change in British transport policy, Dudley and Richardson (1996) used concepts drawn from various theories, including advocacy coalition, epistemic community and venues; Carroll and Jones (2000) applied innovation, convergence, policy learning and policy inheritance to housing policy in Canada; and Meijerink (2005) used concepts from the advocacy coalition, multiple streams, punctuated equilibrium, and epistemic community frameworks to explain policy responses to Dutch coastal flooding. Here, such an approach is applied to the area of standardization

for Smart Grid, and the thesis thus responds to suggestions by Meadowcroft (2009) who found that the field of energy transitions could benefit from the political science perspective and the study of ideas, interests, and institutions.

2.4 Key concepts and guiding research questions

The previous sections describe the search for a conceptual framework devised to address the main research question of this thesis, namely: *How was the need to develop Smart Grid standards been constructed as a policy problem and what consequences did this have for policy intervention in this area?* The resulting approach is a framework that builds on discursive approaches but avoids the usual emphasis on contestation, that recognizes the insights from neo-intuitionalist theories of policy change, and which locates this process within political and institutional contexts. The underlying focus is on change and stability: more specifically on whether and how the policy on smart grid standardization represents a break from the past and to what extent the policy response led to lasting change that had the ability to challenge and transforming institutional arrangements. Hence the three main factors – discourse, context and actors – are interpreted as being either conducive to change or inhibiting change.

The approach taken in this thesis draws on complementary concepts employed by Norman Fairclough (N. Fairclough, 1992, 2003) and Maarten Hajer (Hajer, 1995, 1996). Fairclough is judged to be offering a more complete understanding of the ideological constructions underlying discourse. Hajer's approach, on the other hand, is adapted to policy analysis, it draws attention to the argumentative aspects of politics and his concept of 'story-lines' is highly useful for understanding the relationship between discourse and social change. Specifically, the concept of story-lines is employed in the empirical part of this thesis to identify persistent assumptions and contradictions in underlying rationales in the policy discourse on standardization. On the other hand, Hajer's notion of discourse coalitions is seen as less useful in the context of this thesis because of the focus on salient issues. As outlined in the chapter 1, one of the defining features of standardization is that despite its importance it lacks saliency.

The other parts of the framework are drawn from neo-institutional theory and draws attention to the institutional and political contexts that are either conducive or resistant to

change, as well as the potential role of actors. Concepts like policy legacy, policy feedback, and policy style deal with the institutional context, political climate considers exogenous events like crises and the political mood. Finally, the concept of policy entrepreneur brings a consideration of agency and the possible impact by individual actors.

Chapters 3 and 4 form the empirical part of the thesis. They begin with a consideration of the discursive context in which the policy of smart grid developed. The underlying premise is that problematization of an issue does not develop in isolation. There is an exchange between the wider discursive context and the construction of a problem. In other words, policy actors draw from available discourses and make connections with previous challenges when constructing their problem definition and in providing evidence for it – and also in warning about averse results in the absence of the proposed action (Howarth, 2012).

The research is pursued in the form of the following more specific questions, reflecting the three main factors of discourse, institutional and political context, and actors.

Focusing on discourse, chapter 3 and 4 consider:

- What dominant and alternative discourses are drawn upon to create the policy narrative on Smart Grid standardization policy?
- To what extent does the policy narrative reflect challenges inherent in systems of systems and which make standards increasingly crucial and urgent while simultaneously more difficult to achieve?
- To what extent does the policy narrative challenge existing institutional arrangements?

In chapter 5, concepts drawn from historic institutionalism employed to bring additional insights – not in the form of an analysis of formal institutions, but rather as a different conceptual lens through which to consider the interplay between institutions, ideas, and actors identified in chapters 3 and 4:

- With regards to the broader characteristics of the political system, can the concept of policy style help us explore which actors and discourses are influential in the development of a policy response Smart Grid standardization?

- How have policy legacies and the level of institutionalization within the standardization policy domain (e.g. New Approach) influenced the response to the Smart Grid standardization challenge?

Considering then the political context:

- To what extent has the imperative of making progress on Smart Grid created a political climate, a window of opportunity for policy entrepreneurs to bring in new discourses and create new story-lines?

Finally, the potential role of actors in policy change is analysed using the concept of policy entrepreneur:

- How does the concept of policy entrepreneur help us understand the role that NIST and the National Coordinator have played in shaping the US discourse on Smart Grid standards?

2.5 Methodology

This section outlines the methodological premises which has guided the research in this thesis. To a significant extent, these are implications of taking the theoretical stance that policy is discursively constituted (Bowen, 2005). As noted by Jensen (2012), while discourse analysis can be used in a wide range of academic disciplines it is important to recognize that not all theoretical frameworks are compatible with this methodology (Jensen, 2012). Within the tradition of discourse analysis, theory and method are inextricably linked, which means researchers must accept certain fundamental underpinnings if they are to employ discourse analysis as a method of empirical study (Jørgensen and Phillips 2002). As with all qualitative research, performing discourse analysis comes with specific challenges about how to judge its quality and trustworthiness(Lincoln & Guba, 1985; Padgett, 2004). The strategies applied to enhance rigour in this process are outlined in section 2.8 below.

2.5.1 Qualitative approach and comparative case study

A qualitative research approach was chosen with the aim of deepening understanding about policy as it relates to standardization. The thesis was designed to provide a better understanding of the policy intervention, focusing on the qualitative aspects of the policy discourse.

The study's empirical scope is limited to the official policy discourses of the US federal government and the European Commission. This study employed a comparative case study approach in operationalizing the discourse analysis of selected policy texts from the EU and the US. The main reason for adopting the case study as a research strategy is to conduct "in-depth, multi-faceted investigation" (Feagin, Orum, & Sjoberg, 1991, p. 2) with the aim of achieving a "deep understanding of particular instances of phenomena" (Mabry 2008: 214) "within [their] real-life context" (Yin, 1994, p. 13).

As Hajer (1995) argues, if the conflict is socially constructed "we should allow for international variation" (p. 6). The selection of US and the EU is aimed at comparing and contrasting and shows existence of different representations of a particular phenomenon. It follows the most similar systems design (Przeworski & Teune, 1970), the most often employed method by researchers in comparative politics (Peters, 1998). Qualitative cross-national research in combination with a fine-tuned conceptual framework allows the researcher to engage with a particular phenomenon and identify commonalities that can apply in different contexts without sacrificing rigour (Rueschemeyer 1991: 32). The advantage, compared to more quantitative approaches is that the discourse analysis can be performed within its specific context (Ragin, 1987, pp. 69-70).

Although the comparison pursued here is of a most-similar design, this should not be taken to suggest that Smart Grid-related challenges faced by the US and the EU are the same in every respect. It has for example frequently been pointed out that the US electrical grid is in more urgent need of upgrading as evidenced by recent blackouts. However, there are several important similarities between the two cases, making a comparison useful. One such similarity is the challenge of regional diversity, which would be less pronounced in the case of a unitary system. In the EU, certain Member States are much further along in the development of Smart Grids than others, which inevitably results in tensions between vested

interests. In the US the situation is similar with some states further along than others. At the outset of the process, 25 states had existing policies relating to smart grid which had resulted in "a lot of different smart grids" (McGranaghan 2010, cited in EOP, 2011)." Also, both the EU and US have to contend more generally with the political tension between central and peripheral powers. In the EU it is well-documented that the push to complete the common market has given way to a focus on subsidiarity and inter-governmentalism. In the US, the tension between federal and state powers is also an on-going balancing act, which has come into play in discussions on Smart Grid. Eisen details this tension in his article, referring to "federalism tension between the FERC and state PUCs that threatens to hamper governments' abilities to cooperate in Smart Grid development" (Eisen, 2013, p. 114). [9]

2.5.2 Discourse analysis: data collection, analysis, and presentation

This thesis primarily constitutes a discourse analysis. The material collected and selected for analysis consists of language in context. The resulting corpus of policy-making texts reflects the identified research problem and is draws from three categories of primary sources. The first is variety of official policy documents that are associated standards, including legislation, white papers, press releases, conference presentations, and meeting reports. The second category consists of transcribed interviews with experts. The third category includes academic literature focusing on standardization. Texts from this final group are also used as secondary sources in the research.

The most important source of data were formal policy documents. Because these "monuments" are the results of discursive negotiation they are given epistemological and methodological priority (Lene Hansen, 2006). Texts were initially identified through a search of different databases, most importantly europa.eu and usa.gov. A number of different search terms were used initially but because the term "standard" has different uses, "interoperability" was finally used as a way to reduce the total number of documents and

[9] See e.g., Ashley C. Brown, Controversies and Sources of Resistance to Smart Grid Deployment (2010), available at http://www.hks.harvard.edu/hepg/Papers/2010/Ashley_BrownHEPGSept2010.pdf; Paula M. Carmody, Smarting from Resistance to the Smart Grid (Presentation to the Harvard Energy Policy Group) (Sep. 29, 2010), available at http://www.hks.harvard.edu/hepg/Papers/2010/Paula_Carmody_HEPGSept2010.pdf.

this also served to improve the quality of the documents resulting from the search, as any non-superficial account of smart grid standards would necessarily mention interoperability. Because the term “smart grid” was not widely used before 2007, there was no need to limit the search to a specific period. The search string “smart grid*” AND “interoperability” gave rise to around 500 documents on both europa.eu and usa.gov. All policy texts thus identified – a relatively large number – were scanned for relevance. Many documents were immediately discarded, either because they were duplications or they dealt with the matter in a very brief way, e.g. smart grid standards were simply mentioned in a list of examples or in a single sentence and with no further elaboration. Approximately 100 documents, comprising white papers, legislation, press releases, speeches and journal articles, were eventually reviewed and coded for analysis.

A purposive sampling strategy was used where texts were selected based on their relevance to the core issues of the research, aiming for in-depth analysis of information-rich cases (Tashakkori & Teddlie, 2003). In accordance with the overall qualitative, in-depth approach, the aim was not to maximize the number of documents in the corpus but rather to reach a certain level of information “saturation” (Padgett, 1998, p. 52). Following a first reading, texts were categorized as primary or secondary texts. Primary policy texts were identified based on criteria such as clear articulation of policies and formal authority to define a political position (Bryman, 1989; Hansen, 1998; Hill, 1993).

It became clear quite early on in the collection of data that although “smart grid” and “interoperability” was mentioned with similar frequency in both the EU and the US, the EU documents contained less in-depth information. EU documents more frequently made statements such as “standards are needed urgently”, but without following these statements with explanations or arguments. Also, the activities of EU stakeholder groups, meeting minutes and presentations, etc. were not as extensively documented as in the US. While this in and of itself is a finding, it was seen as important to find a way to better understand the reason for the discrepancy. A secondary data collection method was therefore conducted in the form of in-depth, open-ended interviews, mainly with European experts, and for which an interview guide was used. The use of an interview guide provided a degree of structure to the interviews, even though they were conducted in a

conversational manner with the aim of eliciting in-depth information from the participants: "One way to provide more structure than in the completely unstructured, informal interview, while maintaining a relatively high degree of flexibility, is to use the interview guide strategy" (Patton as cited by Rubin & Babbie, 2001, p. 407). This structured approach facilitated the organization and analysis of the interview data, while also providing readers with a basis for evaluating the efficacy of the interview methods and instruments employed.

The analysis of documents and interview transcripts first proceeded based on a number of a priori codes that had been formulated based on the literature review. Subsequently, an inductive approach was adopted, allowing empirical codes to "emerge out of the data rather than being imposed on them prior to data collection and analysis (Patton, 1980, p. 306)." The result was an expansion in the number of codes based on the identification of new discourses that had not been predicted. An example of a theme that emerged out of the data was the frequently occurring focus in the US policy texts on standards being needed to "future-proof" public investments. Once the analysis was completed, the documents were examined again for similarities and differences – using the constant comparative method – in order to ensure consistent application of the codes. In this second reading, possible quotes to include in the write-up of the thesis were highlighted as well as every use of metaphors.

HyperRESEARCH was chosen among the available qualitative data analysis (QDA) programs for data organization and management. The use of such software can provide an efficient way to manage and organize data while facilitating rigorous data analysis.[10] It offers several benefits when handling large quantities of qualitative data, including improved validity and auditability of the research. However, the decision to use this software should not be viewed as an attempt to emulate a more quantitative research stance. In fact, most critical discourse analysis practitioners tend to adopt a qualitative approach, considering the social, political, historical and intertextual contexts of language use to be crucial. As Fowler (1991) argues that "critical interpretation requires historical knowledge and sensitivity, which can be possessed by human beings but not by machines" (p. 68).

[10] Further details and examples of HyperRESEARCH output are provided in Annex II of this thesis.

Finally, the presentation of the data in this thesis follows the "telling, showing, and telling" method described by Golden-Biddle & Locke (2007: 53), whereby the main idea represented by the cited passage is presented before the actual quote is presented. The quote is then further analysed and interpreted at a more abstract level. This provides ongoing evidence for the interpretations and conclusions and is a way to enable the reader to assess the soundness of the analysis and conclusions made, and also allows for alternative interpretations, if necessary.

2.6 Enhancing rigour in qualitative research and discourse analysis

The use of discourse analysis in social science has become generally accepted, and in the words of Hajer and Wagenaar, "*has changed the way policy-making is studied"* (2003). More specifically, in a recent study (Sovacool & Hess, 2017) of the theories or concepts most useful at explaining socio-technical diffusion and transitions, discourse theory was the third most frequently mentioned across the sample of experts interviewed.[11] Nevertheless, as with all qualitative research, performing discourse analysis raises challenges about how to judge its quality and trustworthiness (Lincoln & Guba, 1985; Padgett, 2004).

Transparency and accountability are crucial for enhancing the credibility of conclusions derived from interpretative research (Gaskell & Bauer, 2002). In order to make the process as transparent as possible, the methodology employed has been spelled out in detail. Particular attention was given to the outline of the conceptual or framework of the study and to providing a theoretical justification for the choice of central concepts. The subsequent sections detail a number of strategies commonly employed to ensure acceptable standards of scientific inquiry and how they were employed in this thesis.

2.6.1 Challenges

[11] The research identified 96 distinct theories and conceptual approaches spanning 22 disciplines. The top two were Sociotechnical Transitions / the Multi-Level Perspective Social Practice Theory / Theories of Practice.

Greckhamer and Cilesiz (2014) outline four inter-related challenges faced by the researcher aiming to engage in rigorous empirical qualitative research. Applied to discourse analysis, they are concerned with how to:

- perform a systematic discourse analysis that goes beyond descriptive "analysis" of texts in order to focus on hidden and naturalized functions the discourse fulfils;
- do the analysis transparently, which is particularly challenging considering discourse analysis's interpretive focus on the constructive effects of texts;
- warrant with appropriate evidence the study's rigorous and systematic process as well as its knowledge claims;
- represent the process and results of discourse analyses to accomplish transparency and warranting of evidence, while producing sufficiently succinct (ibid, p. 425).

Since these challenges overlap, recommended tools often address several of them concurrently.

A number of strategies were employed for enhancing the rigour of the research as suggested by Padgett (1998). Perhaps most importantly, this thesis provides detailed information of the methods used to collect data along with the processes and steps employed for the data analysis. The literature suggests various methods for strengthening credibility, which refers to the level of confidence one can place in the validity of the research findings. An emphasis in this research was put on triangulation, which means employing various methods and using multiple sources for data, to reduce bias and provide for more confidence around research conclusions. External validity in interpretative research can also be improved by ensuring a level of transferability, which means that other researchers should be able to apply the findings of the study to their own (Bowen, 2005). With the aim of enhancing transferability, the findings in this are presented in the form of "thick" descriptions (Lincoln and Guba 1985). Thick description means providing enough details about a phenomenon to allow for an assessment about the transferability of the conclusions to other settings.

While conceptions of rigour varies across paradigms (Hammersley, 2007), in qualitative research, rigour is generally acquired by paying close attention to the research process (Davies & Dodd, 2002). What follows is an outline of the strategies that are widely accepted for achieving rigour within the discipline of discourse analysis and an account of how concerns regarding rigour were dealt with during the course of the research.

2.6.2 Systematic and theoretically grounded analysis

Put simply, a first set of challenges relate to performing rigorous analysis, and a second set has to do with demonstrating this rigour to evaluators and readers. The thesis describes several tools applied to ensure systematic, theory-based inquiry. Some of them are listed in the section 2.6.2 but others are described elsewhere, for example in the sections setting out the argumentative contexts (3.2 and 4.2), and without explicitly mentioning how these contribute to rigour.

The process of developing the codes proceeded in several stages. For example, sources of priori codes were both the general literature on discourse analysis, e.g. Van Gorp (2010) suggests to use frames that are applicable to other issues, beyond the specific topic; Ruef and Markard (2010) use four contexts, or "meta-discourses" for coding, namely: economy, policy, society and environment, a variation of which is used in the current research. Also, specific discourses originate from the background reading of secondary sources on standardization. For example, the identification and theoretical basis of the "innovation and competitiveness" discourse is described in section 3.2.2 of the manuscript. When new codes emerged from the data, for example the "NIST as convenor" or "From industry-led to partnership", these were added to the code book and taken into account in the second round of coding.

The two-step process for operationalizing the discursive context was also aimed at enhancing rigour. The discursive context included previous debates and all discourses that have been associated with standardization policy. It then identified what discourses were drawn on in constructing the storyline on Smart Grid standardization. The approach made it possible to systematically consider the extent to which new discourses were brought in and also which discourses were marginalized in the process.

While Van Gorp (2010) suggests using codes that are mutually exclusive to improve reliability, a conscious decision was made to allow a certain amount of overlap to allow for more nuanced analysis. An example of this is a text that refers to how standards *"create export opportunities for U.S. companies"*. This data unit is as coded both as "competitiveness" and as "national interest". To make the definition of frames more

rigorous, as recommended by Boyatzis (1998). Tables 3.1 and 4.1 in the manuscript list the identified discourses along with a description of their standout features.

Padgett lists *prolonged exposure* to the subject matter as one of the strategies for improving rigour (Padgett, 1998). Here, the fact that the researcher has been standardization policy since 2007 and has conducted academic research in the area since 2010 reduces the risk that relevant perspectives are missed.

2.6.3 Chronicling of process/trail of evidence

While precise chronicling of the research process is neither possible nor practical. Detailed descriptions are provided in the methods section. For example:

> The analysis of documents and interview transcripts first proceeded based on a number of a priori codes that had been formulated based on the literature review. Subsequently, an inductive approach was adopted, allowing empirical codes to "emerge out of the data rather than being imposed on them prior to data collection and analysis (Patton, 1980, p. 306)." The result was an expansion in the number of codes based on the identification of new discourses that had not been predicted. An example of a theme that emerged out of the data was the frequently occurring focus in the US policy texts on standards being needed to "future-proof" public investments. Once the analysis was completed, the documents were examined again for similarities and differences – using the constant comparative method – in order to ensure consistent application of the codes. In this second reading, possible quotes to include in the write-up of the thesis were highlighted as well as every use of metaphors.

2.6.4 Triangulation of data and method

Sovacool and Hess (2017) have called on energy transition researchers to reevaluate the conventional understanding of 'triangulation', which typically involves employing various methods (e.g., combining a literature review with surveys or interviews) to validate findings. The authors suggests that "triangulation may be needed not only between data and theory but also across theory types". In deliberately building a conceptual framework that draws

from both discourse theory and neo-institutionalism, the approach taken in the current thesis responds to this call.

2.6.5 Presenting the evidence

The thesis follows the "telling, showing, and telling" method described by Golden-Biddle & Locke (2007: 53), whereby the main idea represented by the cited passage is presented before the actual quote is presented. The quote is then further analysed and interpreted at a more abstract level. This provides ongoing evidence for the interpretations and conclusions and is a way to enable the reader to assess the soundness of the analysis and conclusions made, and also allows for alternative interpretations, if necessary.

As Greckhamer and Cilesiz (2014) argue, there is no standard agreement on what amount of evidence should be considered "sufficient" as this varies depending on the specific research context. Importantly, the demonstration of how results and assertions align with the available data does not necessitate a specific quantity of data unit samples (Wood & Kroger, 2000). What is crucial is the presentation of the analysis and methodology in a way that is comprehensible and interpretable by readers. Inevitably, researchers must make informed decisions about what insights have been provided by the research and the means by which they have been acquired.

2.6.6 Member checks

Part of the work focusing on the US case has been published in the peer-reviewed journal Energy and Social Science Research and has thus been subject to member checks. From the journal's website: *"Articles submitted to the journal will undergo two levels of review. First, the editor(s) will screen them to determine their appropriateness to the aims and scope of the journal, as well as to gauge their methodological rigor and their quality of English writing. Second, if articles pass the editorial screening, they will undergo rigorous peer review by anonymized referees (double blind review)."*[12]

[12] https://www.journals.elsevier.com/energy-research-and-social-science/

The work has been presented 3 times at the Annual meeting of the Society for Social Studies of Science with additional member checks to enhance rigour.[13] 2 PhD students at the Center for Science, Technology, Medicine and Society (CSTMS) Berkeley and participating in an STS writing group at Stanford in the spring of 2014, having experience of conducting discourse analysis, were asked to code a portion of the corpus. The coding discrepancies were relatively low and related to a lack of familiarity with standards and the EU. In further developing the manuscript, more detailed context has been provided which should enhance the level of transferability.

2.6.7 Interviews

During data collection, it became evident that significantly more and more detailed documentation was available relating to the US case compared to the EU. This related both to official policy documents prepared by the White House, NIST, and FERC and to transcripts of stakeholder meetings. In the case of the US, the Smart Grid standardization process was also reported in the trade press, such as Smart Grid Today. While this thesis does not include media analysis, these journalistic accounts provided a way to check official accounts published by the authorities.

An explanation for the difference between the EU and the US can be found in Schmidt's classification of "simple" and "compound" polities, where simple polities have a stronger communicative discourse and a weaker coordinative discourse, and compound polities have a weaker communicative discourse and more focus on the coordinative discourse. While the US and the EU are both "compound" polities (where decision-making is dispersed among multiple authorities) Schmidt notes that the US is an exception to the rule. It has *both* a strong communicative discourse due to its majoritarian and presidential system *and* a strong coordinative discourse resulting from federalism and pluralist traditions . In contrast, the European Union, which qualifies as highly compound, "has the weakest of communicative discourses as a result of the lack of an elected central government – and its dependence on national leaders to speak for it". (Schmidt, 2008, p. 313)

[13] http://www.4sonline.org/meeting

Semi-structured interviews were thus conducted with 5 experts as a way to make up for a relative lack of data for the EU case. The aim of the interviews was mainly to check that nothing obvious had been missed. Open-ended questions related mainly to the motivations of actors and perceived challenges faced by the process. The interviews brought attention to two findings that were subsequently investigated:

- The EU policy action was influenced by developments in the US which had started earlier
- The financial crisis of 2008 meant that fewer resources were available for the EU standardization effort and may have had consequences for how it was carried out

On the other hand, it is reiterated here, that using interviewees to check reliability would have the effect of introducing bias as discourse analysis favours naturally occurring language. Hence, the interviews were given significantly less weight in the empirical analysis.

2.7 Contributions of this research

This thesis starts from the observation that policy responses to the need for Smart Grid interoperability standards constitute a departure from existing policy practice in the EU and the US. In recent years, policymakers in both places have taken a relatively laissez-faire approach to ICT standardization (Contreras, 2012), but the imperative to make progress on Smart Grid has put a spotlight on standardization and prompted sometimes innovative policy responses (Bellantuono, 2012). Against this background the research questions pursued in this thesis concerns how this change of stance in policy towards ICT standardization has been constructed. More precisely, it asks: how has the need to agree on a set of interoperability standards for the Smart Grid been constructed as a policy problem? In answering this questions, the thesis seeks to contribute to a growing literature that approaches Smart Grid and energy transitions from a social science perspective (cf Slayton, 2013; Wilson & Stephens, 2009). In addition, it is argued here that as our societies increasingly seek to solve societal problems through large-scale application of ICTs, achieving interoperability will be a crucial challenge. As ICTs go from being a sector of innovation to being deployed to achieve societal objectives, this thesis contributes to the understanding of this challenge as a public policy concern. It does this by examining the policy discourse to explore current

conceptualizations of the effects of standards, the functioning of the standardization process, and the proper role of government in this context.

Given that this study is concerned with the policy response to standardization, it seems appropriate to provide a note on standardization as an academic discipline and how the current research relates to it. In seeking a theoretical framework that answers the main research question, the decision was made to study the policy response to standardization as a case of a changing policy domain – in this case from a more laissez-faire approach to intervention aimed at accelerating or coordinating the standardization effort. In doing so, the thesis draws theoretically from discourse theory and theories of policy change. As such, it contributes to burgeoning literature on standardization but does not draw theoretical insights from this field of study. Rather, as further outlined in the methodology section, some of the academic literature on standardization can be said to form part of the empirical data for this thesis. More precisely, this academic literature is the object of study here because it is one of the discourses that policymakers draw on in constructing the official discourse, a process captured by the concept of inter-discursivity.

The field of standardization has grown in the last 15 years or so. Despite important contributions, notably from the field of economics (Swann, 2010), standardization as a separate scholarly domain is in some respects still in a developing stage. Typically, authors will preface any publication on this topic with the observation that standardization is all-important but under-explored (Borraz, 2007; Brunsson & Jacobsson, 2000b; Busch, 2011). This developing character of the field is both a blessing and a curse to the researcher. On the one hand, the literature has provided important input and background to the research. The field is inherently cross-disciplinary, although the influence of economics is particularly strong. On the other hand, it does not provide a coherent theoretical founding on which to build an approach.

Looking specifically at studies of public policy and standards, these can be viewed as belonging in two main categories. The first takes an instrumental approach to standardization and focuses on determining under what circumstances policy intervention is beneficial. Authors such as Grindley (1995) and Greenstein and Stango (2007) attempt to answer the question: when is standardization best left to industry and when should

governments intervene in order to create an optimal societal outcome? The second category is a critical approach about the delegation of power to international standardization organizations. Several social and political science scholars, especially in the EU context, have looked at standardization as part of a regulatory trend that takes decisions away from the democratically elected and gives responsibility for issues of societal importance to non-elected experts, among them standardizers (Borraz, 2007; Brunsson & Jacobsson, 2000a; Majone, 1998). The focus of this literature is on exposing such practices and to question the premises for this delegation of responsibility – essentially the notion of neutral expertise. Rather than evaluating the outcome, they view standardization as inherently problematic for democracy.

In focusing on how standardization is constructed as a public policy problem, and how intervention has been legitimated, the research undertaken in this thesis differs in its approach from the above perspectives. It applies political science approaches to understanding change in a policy domain, specifically in an area that is highly technical and therefore influenced by an expert community, not often exposed to democratic pressures. This perspective on standardization has not been the subject of in-depth inquiry, although Hommels, Egyedi & Cleophas (2013) take a similar approach in their exploration of how the framing of standardization in the EU has changed from public safety to innovation. Underpinning the approach taken here is the notion that discourse is fundamental to understanding how a problem is defined and what therefore constitutes a reasonable policy response. Here this thesis follows Hajer (1995, 1996, 2005), who has adapted discourse theory to policy analysis. Particular attention is paid to the way in which the concept of storylines takes away from proper public debate, a form of black-boxing (Callon & Latour, 1981). While a normative stance is taken in the sense that there should be a quality of debate, this thesis does not come down on whether and when intervention is the correct; it is not instrumental.

As mentioned above, the approach of this thesis can be said to fall broadly in the tradition of discursive institutionalism as coined by Schmidt (Schmidt, 2008, 2010). However, Schmidt comes to the concepts of ideas and discourse from the field of institutionalism and thus focuses on the situations when discourses can have a decisive influence on institutional

arrangements, i.e. focusing explicitly on discourse as an independent variable. The term discursive institutionalism is useful in that it conveys the approach of taking ideas and discourse seriously while at the same time acknowledging the importance of institutions, understood as "the formal or informal procedures, routines, norms and conventions embedded in the organizational structure of the polity or the political economy". (Hall and Taylor, 1996: 938). However, the emphasis in this thesis is different as it views policy discourse as inherently worthwhile to study. Even in cases where policy arrangements persist, the analysis of what is taken for granted and what is excluded in policy discourse is important as it defines the bandwidth of possibilities.

Understanding policy change is one of the main preoccupations of political science theory and a number of approaches have been formulated for this purpose. In developing a framework to study the changing nature of the policy response to standardization, it was deemed important to find theoretical concepts that capture the following characteristics that are specific to the standardization policy domain:

1. The role of experts in policymaking in areas characterized by technical complexity.

2. The dynamic of the situation where on the one hand there is pressure on the standardization world to respond to the Smart Grid challenge, while on the other hand there has not been a crisis or a focusing event. Previous research into areas of technical or scientific complexity has frequently focused on such highly salient topics, e.g. in the "new risks" literature, nanotechnologies, GMOs, etc. The lack of contestation in the area of standardization has steered the choice away from including Hajer's concept of discourse coalitions – standardization is not deemed sufficiently politicized, and the issue lacks salience. For the same reason, the concept of advocacy coalition formulated by Sabatier is also rejected (Sabatier, 1988): it is deemed to be better suited to areas of policy characterized by conflict and opposing interests.

3. Another consideration is that the area of study in this case is still developing. For this reason, while the policy learning approach could be interesting, it has been rejected due to the longer time-frame required (Hall, 1993). In the case of Smart

Grid there has been some recognition of policy failure, but it is too early to evaluate the evolutionary consequences of this. However, this would be interesting avenue for future work.

As mentioned above, Dudley and Richardson (1996); Mintrom and Vergari (1996); Carroll and Jones (2000); and Meijerink (2005) all used concepts from several theories to explain consistency and change in their case studies. This thesis agrees with those authors in viewing these theories not as opposing or contradictory, but rather as at turns overlapping and complementary. It follows them in their approach to use several theories and applies it to a case to which it has not been applied before: Smart Grid. Also in the need to develop a conceptual framework for exploring the specific topic at hand, this thesis creates a tailor-made conceptual framework.

The intention in asking these questions is not to argue that standards should be more thoroughly addressed, but rather to better understand ways and reasons standardization are framed, caught up in, and dissolved in the process of developing new technology in two different regions of the world. What broad discourses, institutional histories, and other factors have played into the US and EU pursuing different ways of talking about standards? The work draws on and contributes to the growing literature on the social and political implications of energy transitions. It contributes to the fields of standardization and policy analysis.

More specifically, this thesis contributes to the existing literature on policy change and addresses an important conundrum. How can we understand policy change in the absence of crisis? Previous accounts of policy change in highly technical policy areas have focused on exogenous shocks such as the BSE (mad cow disease) crisis or heavily contested or salient issues such as genetically modified foods. These are issues where pressure from public opinion and media contribute significantly to the dynamic. Similarly, the growing area of Smart Grid research has also centred on the more salient issues, such as the consumer experience with smart meters and deployment of wind energy. This thesis makes a contribution by developing a conceptual framework adequate for analyzing policy areas marked by the absence of exogenous crisis, a low level of salience, and absence of conflict. It then applies this framework to the case of the current efforts by the European Commission

and the US federal government to encourage, coordinate and accelerate the development of a set of interoperability standards for the Smart Grid. Previous comparisons between the US and EU have focused on traditional areas of standardization, and the received wisdom from these studies is that the EU approach to standardization is more top down and the US approach more bottom up.

This research contributes towards understanding the dynamics of standardization policy in the EU and US. Standardization has been a topic in disciplines that range from economics to organizational science, but the emergence of standardization studies as an independent field is relatively recent. What is here called the paradox of standards, their simultaneous ubiquity and invisibility, make them a suitable area of investigation for the social researcher. Despite their ubiquity and importance for many sectors and for achieving societal objectives, the value and dynamics of standardization is seldom discussed except by academics and professionals who specialize in it. Standards have also not often been the subject of analysis employing Standards are often overlooked or scarcely addressed within certain research traditions, despite their potential for intriguing exploration. One such tradition is discourse analysis, and this thesis is an attempt to remedy the omission. aims to rectify this oversight by delving into the subject.

3 Protecting public investment and NIST as an "honest broker": US response to the Smart Grid standardization challenge[14]

There is an urgent need to establish protocols and standards for the Smart Grid… Without standards, there is the potential for technologies developed or implemented with sizable public and private investments to become obsolete prematurely (NIST, 2010)

Since its establishment in 1901, NIST has earned a reputation as an "honest broker" that works collaboratively with industry and other government agencies. Today in the 21st century, then, NIST is ideally suited for its latest assignment. (NIST website, last accessed on 23/11/2015)

The conceptual framework developed in Chapter 2 draws attention to the way issues become defined as policy problems, and how the understanding of a problem has a bearing on the type of policy response that is deemed appropriate. Policy texts draw from dominant and alternative discourses to give meaning of societal phenomena and to create a storyline. This chapter explores how the response to the need for Smart Grid interoperability standards was constructed in the communicative discourse of the US federal government. In doing so it considers the broader discursive context which influences the formulation of a policy on Smart Grid. It considers how the political imperative to make progress on Smart Grid – and the utopian outcomes the Smart Grid promises – put significant focus on standardization, and the extent this focus resulted in a "window of opportunity", a temporal

[14] A version of this chapter has been published as "From laissez-faire to intervention: Analysing policy narratives on interoperability standards for the smart grid in the United States" in Energy Research & Social Science, Volume 31, September 2017, Pages 111-119

location in which a policy domain has the potential to be reshaped by new ideas and players. One of the claims of this thesis, supported by the conceptual framework employed, is that the policy discourse is shaped in part by the institutional and political context, and that in a two-way process, the discourse has the capacity to impact institutional arrangements. This chapter focuses on the development of a discourse within these existing contexts. Chapter 5, which builds on a comparison of the findings of the two case studies, and which adds the perspective of historical neo-institutionalism, will consider how this discourse – when challenging existing institutional arrangements – can act as an explanatory factor of policy change.

As stated in chapter 2, discourse analysis requires texts to be contextualized in terms of place and time. Section 3.1 of this chapter therefore starts by providing a background to the analysis, the *institutional* and *political context*, including a sketch of the changing nature of standardization policy in the US, and a chronology of the policy response to Smart Grid. It shows an inherited policy on standardization which for several decades has largely favoured an industry-driven approach, while also emphasizing that there exists a history of government involvement and institutional capacity. In terms of the political environment, the development of a US discourse on Smart Grid took place against a background of an aging grid with high-profile blackouts and the need to justify public investment in the wake of the financial crisis of 2008. As has been noted by a number of commentators (cf. Bellantuono, 2014), the need to ensure the security of the electrical grid was also particularly salient in the debates surrounding Smart Grid.

As a way to operationalize the *discursive context*, defined in chapter 2 as comprising all circulating discourses, past and present, that can be associated with a particular issue and that are available to policymakers when constructing a policy argument (Howarth, 2012), section 3.2 then develops a typology of existing relevant discourses in policy and academia, including earlier writings on standardization, inherited assumptions, and ideological contexts. This part of the analysis is based on a broad range of texts; in addition to policy documents, academic literature serves as primary sources in this section, insofar as they can be shown to have had direct influence on the policy discourse on standardization. The texts have been analyzed with the aim of identifying broad discursive patterns and regularities,

allowing discourses to be simplified and reduced to key concepts, outstanding features, narratives and metaphors. In line with a critical approach, particular attention is paid to instances where positions are taken for granted – e.g. where arguments are not mounted because opposition is not foreseen – as evidence of the existence of dominant discourses. This step is an essential part of discourse analysis and the resulting typology subsequently allows for a study of interdiscursivity and explicit intertextuality, that is to say an examination of what specific influences can be observed in the discussions relating to Smart Grid standards – for example the policy discourses of other countries, input from stakeholders, or academic sources.

The discursive context serves as a foundation for section 3.3, which is concerned with the presence, absence, influence, and interactions of different discourses in the construction of a policy narrative, or storyline, with regards to Smart Grid standardization. Key documents are analyzed with the aim of discovering what discourses are drawn upon in problematizing the issue of bringing about Smart Grid interoperability standards and in formulating and legitimating a specific solution or behavioural action in the form of government leadership in the standardization effort. This section is more narrowly based on the analysis of specific policy documents (legislation, reports, speeches, press releases) produced by or endorsed by the US federal government. The texts selected for inclusion in this section can all be considered 'primary texts' based on the selection criteria developed by Hansen (2006).

3.1 Background

As highlighted in the conceptual framework developed in chapter 2, discourse should be situated in its institutional and political context. This section therefore first sketches a brief outline of recent US policy on standardization; the main aim of which is to understand the level of institutionalization in this sector. Second, it provides political context to the present analysis by presenting a timeline of the main legislative and policy actions on Smart Grid, as well as a consideration of the impact of the intervening financial crisis and the resulting stimulus spending on Smart Grid-related activities.

3.1.1 The institutional context – US standardization system and policy

There is general agreement in the literature that US policy on standardization can been characterized by a strong preference for delegating leadership in the area of standardization

to industry (Contreras, 2012; Eisen, 2013; Marks & Hebner, 2004) . While the US does not have a comprehensive legislative and policy framework on standardization, this preference for a voluntary industry approach is mentioned in legislative acts and reinforced by several authoritative policy documents starting with the National Technology Transfer and Advancement Act (NTTAA; United States Public Law 104-113)[15] which was signed into law March 7, 1996. The Act introduced modification to a number of existing acts and established new directives for federal agencies with the overarching goal of achieving the following objectives: accelerating time to market for new technology and industrial innovation, fostering collaborative research and development partnerships between businesses and the federal government by granting access to federal laboratories, and simplifying the process for businesses to secure exclusive licenses for technology and inventions that emerge from joint research ventures with the federal government.

The NTTAA impacts the relationship between the government and standardization in three areas: (1) government procurement, (2) government regulations, and (3) government participation in standards development. Under the NTTAA, federal agencies are directed to rely on voluntary consensus standards wherever feasible and appropriate in their regulatory, procurement and policy activities. In particular it stipulates that, "[f]ederal agencies and departments shall use technical standards that are developed or adopted by voluntary consensus standards bodies, using such technical standards as a means to carry out policy objectives or activities determined by the agencies or departments." The NTTA provisions on standardization and the definition and requirements for voluntary consensus standards is reaffirmed and further elaborated in the Office of Management and Budget (OMB) Circular A-119.[16]

The academic literature on standards and public policy has tended to focus on this preference for industry-led standardization, but it is relevant to note that from a historical

[15] National Technology Transfer and Advancement Act of 2004, Pub. L. No. 104-113, § 12, 110 Stat. 775 (1996).

[16] Office of the Management & Budget, Executive Office of the President, OMB Circular No. A-119, Revised Federal Participation in the Development and Use of Voluntary Consensus Standards and in Conformity Assessment Activities (1998), available at http://standards.gov/a119.cfm

perspective the US government in fact has a long tradition of involvement in standardization. Notably, standardization is one of the areas where Congress has constitutional powers: Article 1, Section 8 of the US Constitution gives Congress the power to "fix the Standard of Weights and Measures." During the nineteenth century, it was the Office of Standard Weights and Measures that regulated measurements. In 1901 it became the National Bureau of Standards, and in 1988 it was renamed the National Institute of Standards and Technology (NIST). While the responsibility for standardization was gradually relinquished to private sector bodies from 1820 onwards (OTA, 1992), NIST remains as a non-regulatory agency of the U.S. Department of Commerce with a mission to promote U.S. innovation and industrial competitiveness by advancing measurement science, standards, and technology in ways that enhance economic security and improve quality of life. Its staff members regularly participate in standardization activities and NIST has at times initiated and led standardization activities in areas where gaps have been identified (Marks & Hebner, 2004).

Moreover, while the NTTAA and subsequent policy statements derived from this legislation clearly establishes that the U.S. government does not as a general rule endorse a government-*led* approach to standardization, it is important to note that OMB Circular A-119 actually introduces a distinct obligation on government agencies to actively *participate in* standardization:

> Agencies must consult with voluntary consensus standards bodies, both domestic and international, and *must participate with such bodies in the development of voluntary consensus standards when consultation and participation is in the public interest* and is compatible with their missions, authorities, priorities, and budget resources [emphasis added] (OMB Circular, 1998).

This imperative for government agencies to participate in standardization activities to further the public interest has also not been much emphasized in the literature on standardization as it has not often been reflected in recent practice. However, as will be seen below, policy documents are able to build on such statements when opening for a bigger public role in standardization to further the national goal of achieving the Smart Grid.

Crucially, in both the NTTAA and the OMB Circular, the Federal Government retains the right to assume a greater leadership role when it considers it necessary (OTA, 1992).

3.1.2 The political context – policy response to Smart Grid

The Energy Independence and Security Act (EISA) of 2007 (Pub.L. 110-140), originally named the Clean Energy Act of 2007, set out US energy policy with the stated purpose:

> to move the United States toward greater energy independence and security, to increase the production of clean renewable fuels, to protect consumers, to increase the efficiency of products, buildings, and vehicles, to promote research on and deploy greenhouse gas capture and storage options, and to improve the energy performance of the Federal Government, and for other purposes.

EISA provided for the creation of a Smart Grid and required that standards be developed to enable interoperability. Notably, EISA granted the Federal Energy Regulatory Commission (FERC) the authority to adopt standards and protocols for the implementation of the Smart Grid and mandated the National Institute of Standards and Technology (NIST) to develop a Smart Grid interoperability framework. More precisely, NIST is authorized under EISA "to coordinate development of a framework that includes protocols and model standards for information management to achieve interoperability of smart grid devices and systems". Finally, EISA foresaw that once FERC was satisfied that NIST's work has led to "sufficient consensus" on interoperability standards, it was directed to "institute a rulemaking proceeding to adopt such standards and protocols as may be necessary to insure smart-grid functionality and interoperability in interstate transmission of electric power, and regional and wholesale electricity markets (EISA, 2007)."

The intervening global financial crisis of 2007-2008 had repercussions for the Smart Grid effort. The American Recovery and Reinvestment Act of 2009 (ARRA; Pub. L. No. 111-5, 123 Stat. 115, 2009) provided $3.4 billion in funding aimed at accelerating the development and deployment of advanced electric grid and digital communications technologies, and grid-scale energy storage projects, through the Smart Grid Investment Grant and Demonstration programs. (U.S. Department of Energy, 2010). The funding made available to Smart Grid

investments had the effect of putting more impetus on the standardization process because of fears that substantial public investments were being made in the absence of agreed interoperability standards.[17] This link between public funding and standardization is emphasized by Eisen, who states that, "ARRA funding also prompted calls for rapid development of interoperability standards, which put pressure on that process to move quickly" (Eisen, 2013, p. 118).

In addition to the sheer technical complexity of the effort, Eisen (2013) identifies two major tensions that characterize smart grid standardization in the US context. The first is that industry participants from the telecoms and ICT sectors, "steeped in the decades-long traditions of technical standards development" and with prior experience with reliability standards "will expect the private sector to lead standards development." (Eisen, 2013, p. 122). The second tension involves another important set of actors, namely the state Public Utility Commissions (PUCs). FERC Smart Grid Policy documents recognizes that there is "a tension that the Proposed Policy Statement raises between federal jurisdiction and state jurisdiction . . . [with respect to] both standards adoption and applicability and whether deployed technology will be subject to state or federal rate authority". The involvement of state PUCs in building a Smart Grid, "and their often tense relationship with the federal government", makes the Smart Grid more challenging than previous attempt at building networks as both the states and the federal government have jurisdiction over parts of the Smart Grid. (Eisen, 2013, p. 118)

While EISA contains no specific deadline for NIST's work, it had become obvious in early 2009 that the effort was accumulating delays. According to reports in the trade press, this delay had stakeholders examining a plan to use a non-government entity, such as the North American Energy Standards Board (NAESB), to provide support to accelerate the program at NIST ("Stakeholders look to jump-start stalled Smart Grid standards," 2009). Instead, the Obama administration began a coordinated joint-agency effort involving DOE, FERC, and NIST – and including direct White House involvement to accelerate the process.

[17] See FERC on the concept of "stranded costs" and investments in the absence of interoperability standards http://www.ferc.gov/whats-new/comm-meet/2009/031909/E-22.pdf.

Again, according to reports in the trade press, Energy Secretary Steven Chu, FERC Chairman Jon Wellinghoff and NIST Deputy Director Patrick Gallagher agreed an aggressive strategy with a view to "ensuring effective interagency coordination and accelerating the development of standards for the smart grid," (Siciliano, 2009). On 19 March, FERC released a policy statement and action plan to provide guidance to NIST, citing “a sense of urgency within industry and government for the development of standards for and deployment of smart grid technologies generally.”[18] The FERC action was immediately followed by NIST appointing a new smart grid interoperability chief and office to oversee the creation of the standards. A NIST staff member and a former Bell Labs official, George Arnold, was given the role of National Coordinator for Smart Grid Interoperability. The establishment of the post clearly underscored the importance of the issue. FERC's release of its smart grid policy statement and road map to accelerate development of the standards was coordinated with the NIST appointment of a coordinator, which was also a sign of the high level of orchestration taking place to accelerate development. Finally, on 18 May a “leadership meeting” was convened by Secretary of Commerce Locke and Secretary of Energy Chu on May 18 2009, in which 70 industry CEOs and senior executives were invited to the White House in order to gain their commitment to the standardization effort. Referring to the meeting in an interview, Arnold underscores its significance, “It was an unprecedented meeting. I cannot think of any other program in which standards have received that level of attention.” (Updegrove, 2009)

In December 2009, NIST created the Smart Grid Interoperability Panel (SGIP) as a public-private partnership tasked with driving the collaboration, coordination, and promotion of smart grid standards interoperability on a global basis. NIST released its initial version of a framework and roadmap for Smart Grid interoperability standards in January 2010. In addition, the role of standards was given a prominent role in the White House’s publication entitled “A policy framework for the 21st Century grid: Enabling Our Secure Energy Future”, which was published in June 2011. The Obama administration affirmed its commitment to the process in the “Blueprint for a Secure Energy Future” (White House 2011b). Following a

[18] https://www.ferc.gov/whats-new/comm-meet/2009/031909/E-22.pdf

period of public consultation, Release 2.0 of the NIST framework document was published in February 2012.

After this initial push from the federal government, there were signs of it taking a step back. NIST presented a first set of standards in 2011 and much was made about the fact that FERC chose not to mandate those standards although EISA had foreseen this possibility (Eisen, 2013). FERC cited "insufficient consensus" in its decision not to mandate[19]. Crucially, EISA had only provided for the funding of NIST's activity through the years 2008-2012, and the SGIP transitioned in December 2012 to a member-led, industry-based organization, set up as an international non-profit organization. Also, George Arnold stepped down from the role of National Coordinator for Smart Grid in early 2013 (with no replacement), and thus removing the focusing effect that this post had created.

NIST initially remained involved in the SGIP through a $2.75m annual contribution[20] and through NIST staff holding key technical positions in the SGIP, "providing strong support for the acceleration of the standards necessary for the safe, secure, and reliable Smart Grid."[21] However, the commitment was reduced to $2.1 million of federal funding for the 2-year period from January 1, 2016, to December 2018. In February 2017, SGIP merged with Smart Electric Power Alliance (SEPA) under the SEPA brand and organizational umbrella. A 2018 report by the Congressional Research Service noted that, "Standards and protocols, such as IEC 61850 and IEEE 1547, are being developed and applied with significant efforts by the private sector and industry led groups to ensure interoperability and security." However, "continued assessment by the federal government is recommended to ensure that interoperability and cybersecurity standards evolve and are implemented at a pace sufficient to support needed technology deployment." Congress has not allocated funding explicitly for the Smart Grid since the Obama stimulus package in 2009 [22]

[19] http://www.ferc.gov/EventCalendar/Files/20110719143912-RM11-2-000.pdf
[20] http://www.metering.com/SGIP/gets/2.75m/dollars/from/NIST
[21] http://www.nist.gov/smartgrid/sgipbuffer.cfm

[22]https://www.energy.gov/sites/prod/files/2019/02/f59/Smart%20Grid%20System%20Report%20November%202018_1.pdf

3.2 The discursive context: industry-driven standardization and antitrust discourse

This section is based on a broad sample of documents that make statements about public policy and standardization. These have been analysed with the aim of identifying regularities and patterns. The dominant and alternative discourses that emerged from the analysis of US policy texts on standardization are summarized in table 4.1 and developed in the sections below.

3.2.1 Standardization as an industry-driven process

As noted above, in recent history, the US has an overall strong tradition of favouring industry-driven standardization. (OTA, 1992) Policy documents refer to the U S standards system as "private-sector led and bottom-up". The NTTA which requires federal agencies to favor the use voluntary consensus standards developed by private-sector bodies instead of standards developed by government agencies for regulatory and procurement purposes, The use of voluntary consensus standard in lieu of government-developed standards is intended to achieve the following goals:

> a. Eliminate the cost to the Government of developing its own standards and decrease the cost of goods procured and the burden of complying with agency regulation.
> b. Provide incentives and opportunities to establish standards that serve national needs.
> c. Encourage long-term growth for U.S. enterprises and promote efficiency and economic competition through harmonization of standards.
> d. Further the policy of reliance upon the private sector to supply Government needs for goods and services.

The document outlines a rationale for public agency representatives actively engage in voluntary consensus standards activities. Participation in these activities is expected to support several aims. Firstly, it should allow for the elimination of the necessity to develop or maintain of separate standards unique to the government, thereby reducing duplication of efforts and promoting efficiency. Secondly, active Outstanding features of this discourse

are the frequent use of terms like “bottom-up”, “private-sector led”, and “voluntary”, “competition”. The aim is to speed up processes and reduce the cost to the Government, while encouraging industry innovation and competition.

Frequently a link is made between this approach to standardization and the overall US society and culture: As observed in a 1992 report by the Congressional Office of Technology Assessment (OTA), “The U.S. standards setting process reflects a strong political and cultural bias in favor of the marketplace, a preference that has its origins deep in American history.”

“[t]he system reflects American political culture, and the general preference for market-based, pluralist solutions… The American preference for private, pluralist solutions is as old as the Constitution itself” (OTA report, 1992). A similar sentiment The “United States Standards Strategy”, published by ANSI in 2005 and endorsed by the U.S. Department of Commerce contains a statement which is typical in how standards are described in the US context: “[v]oluntary consensus standards are at the foundation of the U.S. economy… The United States is a market-driven, highly diversified society, and its standards system encompasses and reflects this framework…” (ANSI, 2005: 4).

Table 3.1 Typology of discourses: US

Discourse	**Standout features**
Standardization as an industry-driven process	Sees standardization generally as voluntary and the domain of industry. Suggests a limited role for government standards in favour of industry standards.
Standards and antitrust	Identifies standardization agreement as a possible instance of uncompetitive behaviour. Introduces the notion that standardization can have results counter to general welfare, hence the need for NIST as an "honest broker".
Interoperability standards and new technologies	Establishes the ICT as a special case when it comes to standardization, which may warrant closer policy scrutiny, and launches the term "interoperability standards" to contrast with other standards.
Economics of Standards	Outlines the specific effects that standards have in the market, including the reduction of transaction costs, improved economies of scale, role in building critical mass. Highlights the need to ensure that public funds are spent on technology that will still be relevant in the future, thus avoiding "stranded costs".
Security and National interest	Considers the use of standards as a way to protect US infrastructure and to promote US industry internationally.
From industry-led to partnership	Creates a narrative that justifies intervention in certain cases of public interest.

Interoperability standards for the smart grid as a unique case	Presents smart grid standardization as unique in its complexity and the realization of the smart grid itself as a *grand projet*.
NIST as an honest broker	Presents NIST as uniquely placed to convene stakeholders and catalyse standardization efforts.

3.2.2 Standards and Antitrust

Another factor in the US context is a long tradition of considering standardization organizations as a potential arena for anticompetitive behaviour, a discursive influence that is to some extent contradictory to the preference for industry-led standardization outlined above. Investigations in the 1970s into possible anti-trust infringements and unfairness in standardization led the Federal Trade Commission (FTC) to recommend that government should take on a more active role in regulating standard-developing bodies (OTA, 1992)[23]. The FTC has since been involved in a number of drawn-out legal cases and in having to justify its position publicly it has published several reports that draw heavily on academic sources.[24] While much of the focus has centered on intellectual property rights and patents, this discourse is of interest to the current analysis because it links standards to company patent strategies that may end up being harmful to competition and innovation:

> When the patented technology is needed to conform to a standard or consumers are otherwise locked in or when the infringing approach is already built into a competitor's product before the patent issues, design-around may be economically impossible"[25]

[23] FTC, Bureau of Consumer Protection, Standards and Certification: Proposed Rules and Staff Report (Washington, DC: Government Printing Office, 1978)

[24] In one report, the FTC draws heavily on Carl Shapiro, Navigating the Patent Thicket: Cross Licenses, Patent Pools, and Standard-Setting in Innovation Policy and the Economy, Adam Jaffe et al eds. 2001

[25] Federal Trade Commission, To promote Innovation: the proper balance of competition and patent law and policy (October 2003), p. 22, available at http://ftc.gov/os/2003/10/innovationrpt.pdf

Specifically, the antitrust tradition introduces the notion that companies in a standardization context cannot always be counted on to act in a way that is beneficial for society as a whole, and that government intervention might be needed to monitor and remedy a situation:

> Many in the private sector contend that it is the participants in the system themselves, who should be the final arbiter. This position assumes both that 1) the participants know and are willing to pursue their own best interests; and 2) that participants' interests always coincide with the *national* interest. *Both assumptions are certainly open to question, if not clearly refuted by history* [emphasis added] (OTA, 1992, p. 7).

A feature of this discourse is also the notion that a difficult balance must be struck between different principles:

> Although there is broad consensus that the basic goals of antitrust and intellectual property law are aligned, difficult questions can arise when antitrust law is applied to specific activities that do create market power. That may happen when, for instance, a standard of manufacture for an entire industry or the only treatment for a particular disease incorporates patented technology… [In striking a balance] the Agencies must apply antitrust principles to identify illegal collusive or exclusionary conduct while at the same time supporting the incentives to innovate created by intellectual property rights. [26]

A feature of this discourse is that there is frequent referencing to academic research. In its report, FERC cites over a 100 academic sources, including many of the leading authors that have commented on networked technologies, standards, and uncompetitive behaviour, such as Church and Gandal (1992), Farrell and Saloner (1992), Katz and Shapiro (1994), Lemley (2002), Mueller (2002), Shapiro (2002), Shapiro and Varian (1999), and Tassey (2000).

[26] Federal Trade Commission & Department of Justice Antitrust Division, Antitrust Enforcement and Intellectual Property Rights: Promoting Innovation and Competition (April 2007), available at http://www.ftc.gov/reports/innovation/P040101PromotingInnovationandCompetitionrpt0704.pdf

This influence has the effect that in the US standardization context, "industry-led" is not conflated with a perfectly functioning "market". Instead, this discourse brings attention to the issue of how standardization can encourage various strategic behaviour of firms because "vested interests" result from the assymetries between the "winner" and "loser" after a standard has been adopted. Among the sources cited in the FERC report are several authors, including Shapiro (2002), that have brought attention to the uncompetitive effects of industry actors organizing to agree on technology in order to dominate a market. Lemley, (Lemley, 1996) also cited, have discussed antitrust concerns and private standards organizations. Other authors, including several Lerner and Tirole (2004) discuss the potential for individual actors' dominance of private SDOs and describe situations where strategic behavior in standardization delay the process. As Eisen (2013) notes, such concerns have prompted certain authors to the above concerns have ultimately led some of these authors to criticize the US government policy on standardization, viewing it as regulation delegated to the private sector without adequate oversight:

> The incentives of the private actors who create the standards may be different than the incentives of agency officials who are attempting to implement their statutory mandate in good faith. Private actors will seek to resolve policy issues in a manner that maximizes their own profit. If the private actor is nonprofit, its incentives may still be inconsistent with the agency's objectives, *either because the group has a different set of goals than the agency or because it is heavily influenced by profit-maximizing private firms*. [emphasis added] (Shapiro, 2003, pp. 406-407)

3.2.3 Interoperability and new technologies

Tracing the roots of current discussions further back, to the early days of government engagement with information technologies and their impact on society, two forward-looking reports, published by the US Congress Office of Technology Assessment in 1990 and 1992, warrant interest. The first is entitled Critical Connections: Communication for the Future,

OTA-CIT-407 U.S. Congress, Office of Technology Assessment[27], and the second: Global Standards: Building Blocks for the Future, TCT-512[28]. The OTA notes that US policy in recent history leaves standardization in the hands of the private sector.

> Although government provided at the turn of the century the first impetus for national standards, *it gradually relinquished much of this responsibility to private standards setting organizations*, which had already begun to emerge as early as 1820. *This private sector tradition remains strong today* [emphasis added] (OTA, 1992: 14).

Focusing on new communication technology and the importance of interoperability, the OTA predicts that:

> Standards will become more important due to growing reliance on technology. Just as specialization and assembly line production provided an impetus for standardization during the industrial era, so too networked production and computer-assisted work are increasing the demand for standards today (OTA, 1992: 8)

Fearing that the EU will take leadership in international standardization (GSM and ISDN examples), linking standards to security, and citing academic sources such as Cargill (1989), C. Kindelberger, Besen and Saloner (1988), (Besen & Johnson, 1986), (Farrell & Saloner, 1985a), (Farrell & Saloner, 1985c), and (Noam, 1986), the OTA observes that:

> In the past, achieving adequate interoperability within the communication industry was relatively easy. In telephony, AT&T provided both end-to-end service and system interconnection. In mass media and information-

[27] U.S. Congress, Office of Technology Assessment, Critical Connections: Communication for the Future, OTA-CIT-407 (Washington, DC: U.S. Government Printing Office, January 1990). Available from: https://www.princeton.edu/~ota/disk2/1990/9014_n.html

[28] U.S. Congress, Office of Technology Assessment, Global Standards: Building Blocks for the Future, TCT-512 (Washington, DC: U.S. Government Printing Office, March 1992). Available from: https://www.princeton.edu/~ota/disk1/1992/9220/9220.PDF

> processing technologies, the government played an important role, assuring, when necessary, that adequate standardization took place… However, OTA found that interoperability is likely to become more problematic in the future, from both technical and administrative standpoints. *Not only will the need for interoperability become greater, but achieving it is also likely to be harder* (OTA, 1992) [emphasis added].

The report lists seven factors that are expected to contribute to making the achievement of interoperability a greater challenge:

- The growing importance of information and communication as strategic resources;
- The elimination of many of the traditional mechanisms by which interoperability has historically been achieved (e.g. the monopoly of AT&T), and the emergence of new players;
- The globalization of the economy and, hence, a greater need for international standards and the extension of standards-setting efforts to the international arena;
- The increased politicization of standards-setting issues;
- Increased technological complexity and the shift from product-implementation standards to anticipatory-process standards;
- The growing divergence of vendor/user goals and interests;
- The increasing demands on international standards-setting organizations.

All of these factors have relevance on the Smart Grid standardization process. And while not much emphasized in the intervening period, we will see that the discourse on Smart Grid draws on some of the argumentation developed in these documents. In a clear example of interdiscursivity, George Arnold draws on the example of AT&T in his testimony to Congress in 2009.[29]

[29] http://www.nist.gov/smartgrid/upload/NIST_SGAC_Final_Recommendations_Report_3-05-12_with_Attachments.pdf

Interestingly, the OTA makes a clear distinction between product standards and interoperability standards, arguing that the US government should pay greater attention to the latter.

> Some standards will likely be more important from a national perspective than others. In a global, information-based economy, networking technologies provide a basis for productivity and economic growth. These technologies will become the basis of an infrastructure for all economic activity. If networks fail to interconnect for lack of standards, the Nation could suffer considerable economic loss and national security might also be jeopardized. *Thus, while government may have a relatively small interest in the development of certain product standards, its stake in others, such as standards for interoperability, will be high* [emphasis added].

The OTA warns against the lack of government support for standardization:

> There is a clear need in the United States for greater attention to standards. In an information-based global economy, where standards are not only employed strategically as marketing to but also serve to interconnect economic activities*, inadequate support for the standards setting process will have detrimental effects* [emphasis added].

A clear impetus for the reports was a perception of the US losing out to the EU, at a time when harmonized standards were being used to complete the Single Market.

> Failure to bring American standards setting organizations together, and to work out their relationship with government is a real and very serious problem in dealing with other nations. A solution requires a fresh perspective that objectively considers both the problems of the system and the ways in which all participants can join to resolve them (OTA, 1992: 14).

These concerns are echoed a decade later in ANSI's U.S. National Standards Strategy:

> The European Union is aggressively and successfully promoting its technology and practices to other nations around the world through its own standards processes and through its national representation in the international standards activities… Emerging economies with the potential for explosive growth are looking to ISO and IEC for standards. In some sectors these standards do not reflect U.S. needs or practices… The exclusion of technology supporting U.S. needs from international standards can be a significant detriment to U.S. competitiveness. The U.S. will lose market share as competitors work hard to shape standards to support their own technologies and methods. Equally important, standards are the basis for protection of health, safety and the environment. When our standards in these areas are not accepted elsewhere, we all lose.

In its conclusion, citing Besen and Saloner(1988), the OTA concludes that: "[r]esearch on standards, as well as past experience, clearly illustrate that there is no single optimum way of arriving at interoperability." The US government is urged to consider four different strategies:

- supporting research to provide better data and a more analytic rationale for standards-setting decisions;
- allowing for the emergence of market solutions, either in the form of gateway technologies or through the de facto setting of standards;
- indirectly influencing the standards-setting process by providing assistance and guidance to foster the setting of standards;
- influencing the setting of particular standards; influencing the setting of particular standards by providing incentives or imposing sanctions; and mandating industry-wide standards.

The OTA also notes that the government has intensified its involvement in standardization, notably during the first and second world wars, when "product diversity was so great it threatened to hinder the War effort (OTA, 1992: 7)." The government responded by regulating the manufacturing of over 30 000 products.

> Never before has the country been so standards conscious. Their president – his Director of Economic Stabilization, the Army, the Navy, WPB, OPA, industry – are all using standards as a means of carrying out the stake imposed upon them by war. Standards are being debated on the floor of Congress, which has set up a committee to study their use (OTA, 1992: 7).

Thus standards, which are generally viewed as "low politics", can become more salient when they are linked to more salient high politics such as national security and war. Similarly, one of the starting points of this research is the degree to which standards have been made more salient because of their association with the realization of the Smart Grid and its projected benefits and the risks stemming from the lack of interoperability.

3.3 Constructing Smart Grid standardization as a policy problem – existing and new discourses

How has the impetus for government intervention been constructed in the communicative discourse of the US federal government? While the US does not have a comprehensive legislative and policy framework on standardization, the preference for a voluntary industry approach is mentioned in legislative acts and reinforced by several authoritative policy documents. It is against this background, that the current research explores how a policy based on public leadership to accelerate the agreement of a set of interoperability standards for smart grid has been legitimated. In pursuing this question, this part of the analysis focuses mainly on four key documents. They are the two White House reports, "A Strategy for American Innovation – Securing Our Economic Growth and Prosperity" written by the National Economic Council, Council of Economic Advisers, and Office of Science and Technology Policy, published in February 2011, and "A Policy Framework for the 21st Century Grid: Enabling Our Secure Energy Future", Executive Office of the President, National Science and Technology Council, published in June 2011, and the two versions of the NIST roadmap, the first published in January 2010, and the second in February 2012. Primary consideration in this section is assigned to those documents that focus specifically on Smart Grid standards, but the analysis also includes on the one hand documents on Smart Grid policy that mention standards, and on the other hand documents on standards and standardization in general that mention Smart Grid as a focus area.

As we will see, the way that standardization is described in these documents differs quite markedly from policy statements of the last couple of decades by the US federal government. The narrative on Smart Grid standards draws on the discourses identified in the previous section, but adds a number of other discourses that are used in a way to argue for a change in policy. In these communications, the starting point is that the US standardization system is generally bottom-up and industry-led. The challenge of Smart Grid is a special case that requires federal intervention: there is an opportunity to build the 21st century grid. The numerous benefits of standards and the risks of not having them in place create a sense of urgency. From the antitrust tradition is added the notion that industry might not always act in the best interests of society. NIST is thus presented as an "honest broker", well-equipped to lead the effort to achieve standardization coordination.

3.3.1 Economics of Standards

The documents analysed for this section all exhibit a strong and explicit influence of the economics of standards literature. In addition to mentioning technical aspects of interoperability, the US documents also emphasize the economic effects of interoperability standards and specifically link them to the functioning of the market, including innovation and pricing.

> Recognizing that standards play a critical role in enabling a 21st century grid, EISA called for NIST and FERC to facilitate the development and adoption of interoperability standards. The ongoing smart grid interoperability process, led by NIST, promises to lead to flexible, uniform, and technology neutral standards that can *enable innovation, improve consumer choice, and yield economies of scale* [emphasis added].

Both the NIST roadmap and the two White House reports contain comprehensive accounts of the full range of the effects of compatibility standards, showing a clear influence of the economics of standards literature as summarized in table 1.2.

A significant emphasis throughout is on the notion that standards can help ensure the long-term value of public and private investment:

> Standards help ensure that today's investments will still be valuable in the future. Because smart grid technology is changing swiftly, utilities and vendors may be reluctant to invest in infrastructure that may soon be out of date, and regulators and ratepayers may be justifiably reluctant to compensate them for it. *Standards can ensure that smart grid investments made today will be compatible with advancing technology* (EOP, 2011, p. 26).
>
> NIST will continue to develop and update the standards from the NIST Framework and Roadmap for Smart Grid Interoperability Standards, Release 1.0, recognizing that *the continued development and adoption of standards is an important driver for ensuring maximum value from ongoing smart grid investments* (ibid. p29).

This focus reflects the fact that the Administration had made "unprecedented investments in clean-energy technologies and grid modernization (ibid. preface)" A sense of urgency is created by the fact that these investments are already underway, and will be accelerated by Recovery Act funding:

> There is an urgent need to establish protocols and standards for the Smart Grid. Deployment of various Smart Grid elements, including smart sensors on distribution lines, smart meters in homes, and widely dispersed sources of renewable energy, is already underway and will be accelerated as a result of Department of Energy (DOE) Smart Grid Investment Grants and other incentives, such as loan guarantees for renewable energy generation projects. Without standards, there is the potential for technologies developed or implemented with *sizable public and private investments* to become obsolete prematurely or to be implemented without measures necessary to ensure security [emphasis added]. (NIST, 2010)

The same concern about investments stranded because of changing technology and the lack of standards is voiced in a 2009 report to Congress:

> Some utilities are incurring costs to replace smart meters installed just a few years ago with newer models, indicating both the rapidity with which the technology is changing and the absence of firm standards[30]

And the concern is echoed by the smart grids National Coordinator George Arnold in an interview:

> Deployment is actually running ahead of the standards, and the 11 billion of Recovery Act funding for the smart grid will make deployment go even faster. There is a concern that we cannot allow these investments to become stranded because the standards are not yet there to ensure interoperability. So the standards work has to move much faster than it usually does. (Updegrove, 2009)

The notion that standards can protect investments in legacy infrastructure by ensuring compatibility with older technologies as newer ones are deployed echoes the economics of standards literature. For example, Chiao et al state that, "[a] standard that demands backwards compatibility can ensure ongoing revenues for a legacy product for many years." (Chiao, Lerner, & Tirole, 2007, p. 139). Other expected benefits of standards are also mentioned, notably the relationship between standards and innovation.

> Standards help catalyze innovation. Shared standards and protocols provide some assurance that new technologies can be used throughout the grid and reduce investment uncertainty by lowering transaction costs and increasing compatibility. Standards demonstrate to entrepreneurs that a significant market will exist for their work. Standards also help consumers trust and adopt new technologies and products in their homes and businesses (NIST, 2010)

[30] Electric Power Transmission: Background and Policy Issues CRS Report for Congress Stan Mark Kaplan Specialist in Energy and Environmental Policy April 14, 2009 http://fpc.state.gov/documents/organization/122949.pdf

> Standards do more than make interaction possible. They can resolve confusion and promote investments in technology, giving firms the confidence to market products that meet the standards." (EOP, 2011, pp. 26-27).
>
> Standards can highlight best practices as utilities face new and difficult choices. Standards can facilitate the transition to a smarter grid by guiding utilities as they face novel cybersecurity, interoperability, and privacy concerns.

Again, the language is drawn from the academic literature on standards, which theorizes that standards lower transaction costs and can help markets take off.

The documents also draw on the economics of standards literature when they argue that standards help build critical mass, open up markets, facilitate economies of scale, favour competition, and ultimately lower costs for consumers.

> Standards help keep prices lower. Standards can reduce market fragmentation and help create economies of scale, providing consumers greater choice and lower costs […]
>
> Standards can help open markets. In addition to being developed in America, smart grid interoperability standards should be coordinated internationally. International engagement helps to open global markets, create export opportunities for U.S. companies, and achieve greater economies of scale and vendor competition that will result in lower costs for utilities and ultimately consumers. (NIST, 2011)

3.3.2 Standards and antitrust

In addition to the positive effects of interoperability standards, the US documents also show awareness of the dangers of a lack of standards, an influence of the standards and antitrust discourse identified in table 4.1: "In the absence of smart grid interoperability standards, companies may attempt to "lock-in" consumers by using proprietary technologies that make

their products (and, therefore, their consumers' assets) incompatible with other suppliers' products or services. Standards "can alleviate those concerns and ensure that consumers have choices." Elsewhere it warns of the situation where "a dominant firm's use of proprietary standards that locks out competition from rival products and services." (EOP, 2011, p.46) For this reason, "Federal and state officials should continue to monitor smart grid and smart energy initiatives to protect consumer options and prevent anticompetitive practices." The solution, according to the document, is an open architecture capable of removing market barriers, fostering vendor competition, and incentivizing the entry of new third-party participants: "Open standards can encourage a competitive, multi-supplier environment."

In an interesting example of interdiscursivity, the NSTC report in this section cites an academic article by Marks & Hebner entitled, "Government/Industry Interactions in the Global Standards System." (Marks & Hebner, 2004) The first author is a NIST employee and the article makes a case for NIST involvement in standardization, basing its argument partly on Varian and Shapiro's description of how companies can use strategies for exploiting the standards and achieve: *"An important strategy in the lock-in game is to price aggressively to win early market share in the hope that profit will follow later, once customers find change to be expensive."* And furthermore, *"exceptional success based on lock-in are well known"*. The authors thus conclude that there is a need for intervention in order to balance interests between manufacturers and users:

> When seeking to boost their own economies, governments may wish to consider the full range of voices within their constituencies. For instance, standardization is often driven most strongly by manufacturers and other product vendors. These voices may argue that government action on standards should be driven… by the goal of enhancing production and profits among manufacturers. However, governments should not overlook the economic interests of the users of the technology (Marks and Hebner, 2004).

3.3.3 Security and National interest

The previous section showed how, historically, standards have become more salient during war time and when national security was at stake (OTA Report, 1992). Security was also one of the main concerns expressed in FERC's policy statement when the NIST-led effort was accumulating delays in early 2009:

> In order to fully incorporate measures to protect against cyber and physical security threats, we also propose to advise the Institute to take the necessary steps to assure that its process for the development of any interoperability standards and protocols leaves no gaps in cyber or physical security unfilled. (FERC policy action plan, 2009: 11-12)

The concern is echoed in the report "A Policy Framework for the 21st Century Grid: Enabling Our Secure Energy Future."

> The greatest strength of a 21st century grid – evolving technology – may also present opportunities for additional vulnerabilities. Networks of computers, intelligent electronic devices, software, and communication technologies present greater infrastructure protection challenges than those of the traditional infrastructure. Notably, a smarter grid includes more devices and connections that may become avenues for intrusions, error-caused disruptions, malicious attack, destruction, and other threats (NSTC Report, 2011: 49).

While highlighting the inherent risks associated with a smarter grid, the report identifies standards are identified as key to mitigating vulnerabilities:

> Protecting the electric system from cyber-attacks and ensuring it can recover when attacked is vital to national security and economic well-being. Developing and maintaining threat awareness and rigorous cyber security guidelines and standards are key to a more secure grid. (NSTC Report, June 2011).

The same message is repeated by the National Coordinator, George Arnold, "Likewise, standards can ensure that smart grid devices installed today are installed with proper

consideration of the security required to enable and protect the grid of tomorrow" (Arnold 2011, pp. 1).

The problem is not the absence of standards but is seen to be exacerbated by a lack of coordination and a proliferation of different standards:

> We are concerned that this could be a particular problem where separate groups of interested industry members independently develop and advocate select standards or protocols for the Institute's [NIST's] consideration. (FERC policy action plan, 2009: 11-12)

While FERC's decision not to adopt the first set of standards identified by NIST was seen to be influenced by pushback, some stakeholders urged that FERC take a larger role in the standards process, at least in the area of cybersecurity:

> In particular, while the soft form of adoption recommended herein may be appropriate for interoperability standards that primarily address the functionality of the smart grid, *it may be appropriate to mandate compliance with some standards to the extent they are necessary to ensure cybersecurity or reliability of the grid* [emphasis added].[31]

Cybersecurity concerns thus added a sense of urgency to the standardization effort where the prospect of a lack of standards or the development of competing standards combined to make a case for a more the federal government to take a stronger coordinating role, with some supporting the idea that standards be mandatory in this area.

3.3.4 From industry-led to partnership

In contrast with the dominant conceptualization of the government's role in standardization, smart grid policy documents describe scenarios where public sector leadership can be

[31] See, e g., Joint Comments of the Public Utility Commission of Texas and the California Public Utilities Commission, Response to the NIST RFI, March 7, 2011 http://www puc state tx us/electric/projects/34610/CPUC_PUCT_Comments_NIST_030711 pdf

desirable. One clearly outlined example can be found in The White House description of NIST's effort:

> By setting standards for smart grid technologies and making information technology investments, the Administration is bringing the nation's electricity grid into the 21st century to reduce energy waste. In particular, federal investments and policy leadership in this area serve to help consumers and utilities optimize the timing and sourcing of electricity use, which promises to reduce costs, increase reliability, and limit blackouts, while improving the security of the electricity system and enabling it to better use clean energy technologies. As part of this grid modernization effort, the National Institute of Standards and Technology (NIST) is leading a public-private initiative to develop a framework and roadmap to develop smart grid interoperability standards (White House, 2011, p. 38)

The same document emphasizes the importance of standards for innovation and makes a number of statements about the role of government in certain sectors. Firstly, it acknowledges the link between public resources and innovative markets.

> Effective management of public resources, such as the electromagnetic spectrum, unleashes innovation by opening markets and reducing uncertainty over usage rights and engineering design…

The public sector can take leadership in setting standards and thereby provide certainty in the market place:

> In appropriate contexts, public leadership can help set standards for technology platforms, such as emerging smart grid or health IT technologies, providing confidence to the market place to develop and adopt new generations of products (ibid. p. 13)

It specifies the specific role of the government in standardization – that as a convener – and contrasts the benefits of larger markets for US businesses through coordination with the risks of "balkanized" markets in the absence of such coordination:

> Standard setting, *which the government can enable through its role as convener and support through research and development*, often involves facilitating coordination within the private sector to create a larger market, thus enhancing the demand for innovative products. Export initiatives further increase the market scale for US businesses. *Increased scale is an attraction to business innovation, while tiny, balkanized markets are not* [emphasis added] (ibid, p.13).

In terms of the role of government, a recurring theme is the notion of striking a balance between intervention and industry involvement. "Our spirit of public/private partnership motivates cooperation to find the right balance of "top down" and "bottom up" to achieve the coordination needed for the smart grid."[32] George Arnold:

> I think the smart grid is a perfect example of the reason the US is a leader in so many fields. The American way abhors "one size fits all" solutions and prizes innovation and flexibility. In the smart grid we are capitalizing on our strength – a dynamic and flexile decentralized system – as well as our innovation in solving problems and spirit of public/private partnership – to find the right balance of "top down" and "bottom up" to achieve the coordination needed for the smart grid. (Updegrove, 2009)

There is frequent alternation between presenting the natural preference, which is for free market processes, and the case for government intervention:

> Government direction can never be a substitute for the free market conditions that propel American innovation. But government must act to support those conditions and ensure that innovation, the engine of our prosperity, drives America further and faster towards higher quality jobs, healthier and longer lives, new opportunities and new industries, and the ever-expanding technological frontier. (White House, 2011, p. 13)

32 http://www.nist.gov/director/ocla/testimony/loader.cfm?csModule=security/getfile&pageid=1261447

> The appropriate role for government can be understood by clarifying the precise circumstances where markets, despite their many strengths, will not produce a sufficient stream of innovations on their own. Thus, the true choice in innovation policy is not starkly between government management and no government involvement, but rather choosing the right role for government in supporting private sector innovation. Finally, the government plays essential roles through public investments that businesses rely on but do not themselves create (ibid, p. 10).

The last point draws attention to the need in the US context to justify public investment and is an example of how the discourse on standardization fits with macro-level discourses. As previously mentioned, studies looking at the impact of the global financial crisis of 2008 have noted that following a brief period where "everybody was a Keynesian", by 2011 the stimulus measures were under attack and the need to defend public spending became an important narrative in Barack Obama's re-election campaign. The "you didn't build that" phrase became a major controversy when the Mitt Romney campaign used the statement as evidence of an attack by Obama on business and entrepreneurs. It is useful to provide more details about this because it shows to what extent government intervention needs to be warranted, and which may be overlooked when writing from a European perspective.

In August 2011, while considering her potential candidacy for the US Senate, Elizabeth Warren delivered a speech in Andover, Massachusetts in which she championed the principles of progressive economic theory and emphasized that individual success and wealth relies on the collective efforts and investments made by society as a whole.

> There is nobody in this country who got rich on his own — nobody. You built a factory out there? Good for you. But I want to be clear. You moved your goods to market on the roads the rest of us paid for. You hired workers the rest of us paid to educate. You were safe in your factory because of police-forces and fire-forces that the rest of us paid for. You didn't have to worry that marauding bands would come and seize everything at your factory — and hire someone to protect against this —

> because of the work the rest of us did. Now look, you built a factory and it turned into something terrific, or a great idea. God bless — keep a big hunk of it. But part of the underlying social contract is, you take a hunk of that and pay forward for the next kid who comes along.

Warren's message was picked up and repeated by Obama in a speech he gave in Roanoke, Virginia where he emphasized the role of publicly funded infrastructure, including the internet, in enabling businesses to thrive:

> Somebody helped to create this unbelievable American system that we have that allowed you to thrive. Somebody invested in roads and bridges. If you've got a business—you didn't build that. Somebody else made that happen. The Internet didn't get invented on its own. Government research created the Internet so that all the companies could make money off the Internet.

The message was subsequently turned against Obama in a campaign speech by the Republican candidate Mitt Romney:

> To say that Steve Jobs didn't build Apple, that Henry Ford didn't build Ford Motors, that Papa John didn't build Papa John Pizza ... To say something like that, it's not just foolishness. It's insulting to every entrepreneur, every innovator in America.

Ultimately the expression evolved into a tool used by the Republican campaign against Obama's re-election. The phrase "you didn't build that" was used as a way to cast a negative light on the President's approach to business, entrepreneurship, and the role of government in the economy. It was used to argue that Obama's policies were overly reliant on government intervention and regulation, potentially stifling individual initiative and economy growth. When used by Republicans in the campaign the phrase was offered up as a contrast with their own vision of limited government and a more market-driven approach. It became emblematic of the broader ideological divide between the two major political parties.

3.3.5 Interoperability standards for Smart Grid as a unique case

While emphasizing its preference for industry-led standardization, the US federal government has identified a number of key areas, including Smart Grid, in which it should take a "convening and/or active engagement role" to "ensure a rapid, coherent response to national challenges." One of these areas is the Smart Grid (Contreras, 2012). In his testimony to Congress, the national coordinator described the need for government involvement and emphasized the particular challenges facing Smart Grid standardization: "[F]ew, if any, interoperability standards have ever been adopted in regulation for national infrastructures such as the legacy electric grid, the telecommunications system, or the Internet […] In the US, the vast majority of standards are accepted by the market on a purely voluntary basis without any regulatory action or consideration […] the U.S. grid, which is operated by over 3200 electric utilities using equipment and systems from hundreds of suppliers, has historically not had much emphasis on interoperability or standardization."[33]

As noted by Eisen, coordination of the standardization effort at the federal level was deemed necessary because of the sheer scale of the undertaking, significant coordination challenges, the potential risk of fragmentation of technology and the recognition that serious national interests were at stake. The absence of national standards could lead to a scenario where 51 separate state public utility commissions ("PUCs") might adopt 51 distinct Smart Grid models, potentially resulting in systems that are inadequately protected from cyberattacks (Eisen, 2013, p. 104) The electric grid "has a tradition of using many proprietary customized systems, and there has never been a need for information systems on the utility side of the meter to interact with systems and devices on the customer side of the meter."[34] The US national coordinator for Smart Grid evoked the memory of this sort of coordination challenge in testimony given in the US Congress:

> Thirty years ago, Bell Laboratories successfully put in place architecture for the complete automation of maintenance and operations in the nationwide telecommunications network, with an underlying foundation of protocols and standards that utilized distributed computing and data

[33] Arnold SS&T Testimony
[34] Opening Remarks to FERC Technical Conference 2011

> networking technology of that era. That job was comparable in scale to the current challenge of the Smart Grid; *however the coordination challenge was a bit easier because the national network at that time was owned and operated by a single entity with a captive manufacturer rather than 3100 utilities and many more suppliers* [emphasis added].[35]

The above quote is interesting as, in a direct echo of the OTA report from 1990, Arnold notes that the challenge is different from those faced in recent years which justify a novel policy response. He also highlights that the challenge is made more difficult by the increasing complexities of the marketplace. There is also frequent invoking of history and the sense of a *grand projet*. In an article written by Arnold, he predicts that the Smart Grid will be one of the great engineering achievements of the 21st century.

3.3.6 NIST as an honest broker

While on the one hand presenting the smart grid standardization challenge as unique and intervention as exceptional, the US policy documents also refer to a history of successful examples of federal government intervention (through NIST) in standardization:

> "In the smart grid arena, the Federal Government is operating in the tradition it has followed previously in promoting the development of standards in a wide array of fields, including public health (NIST 2011a), national security (NIST 2011b), and the environment (NIST 2010a) Interoperability standards—standards that ensure "equipment or software from different vendors [can] work together or communicate" and allow "new, innovative creations to work with older, established services" (PCAST 2010, pp 15)—serve to support the development and deployment of emerging technologies like the smart grid." . (EOP, 2011, p. 26)

35 http://www.nist.gov/director/ocla/testimony/loader.cfm?csModule=security/getfile&pageid=1261447

While EISA gave NIST an unprecedented high profile, the storyline presented in policy communications is that this is a role that NIST has been called on to perform in the past.

> History has shown that the states and Federal Government have important roles in catalyzing innovation. In the electricity sector, this role can include facilitating the creation and use of standards, developing new energy efficiency programs, investigating the impact of different consumer incentive programs, and monitoring markets to prevent anticompetitive behavior.
>
> NIST […] has a long history of working collaboratively with industry, other government agencies, and national and international standards bodies in creating technical standards underpinning industry and commerce. Government regulators are playing an important role in these efforts to modernize the grid. Traditionally, regulators have been charged with overseeing electric utilities to ensure that electric service is affordable, reliable and universal. Increasingly, regulators also need to ensure that in meeting these goals, appropriate incentives exist to deploy the new technologies and innovations required to realize the smart grid. (Arnold, 2011a)
>
> Building on NIST's century-long partnership with the electric industry, we are embarking with our partners on this generation's grand challenge—modernizing the electric power grid so that it incorporates information technology to deliver electricity efficiently, reliably, sustainably, and securely. (NIST website, last accessed on 23/11/2015)

A recurring theme in the US policy discourse is the unique role of NIST as an "honest broker". The same message is repeated by the White House, by NIST, and by the National Coordinator in various outlets:

> The agency has earned a reputation as an "honest broker"—an impartial, technically knowledgeable third party with a long history of working

> collaboratively with industry and other government agencies (Arnold testimony, July 2009).
>
> Since its establishment in 1901, NIST has earned a reputation as an *"honest broker"* that works collaboratively with industry and other government agencies. Over the past century, NIST's mission has been to promote U.S. innovation and industrial competitiveness by advancing measurement science, standards, and technology in ways that enhance economic security and improve our quality of life. Today in the 21st century, then, NIST is ideally suited for its latest assignment. (NIST website, last accessed on 23/11/2015)

The same phrase is used in a NIST publication from 2012:

> NIST is well suited for the role of leading the charge for rapid standards development. In the role of an *"honest broker"* and based on its history of advancing technical standards testing and development, under the Energy Independence and Security Act of 2007 (EISA 2007), NIST was given "primary responsibility to coordinate development of a framework that includes protocols and model standards for information management to achieve interoperability of smart grid devices and systems."[36]

3.3.7 Key concepts and metaphors

US policy documents included in this analysis are written in a quasi-academic style with numerous references, which make them a rich source for analysis of interdiscursivity and intertextuality. Three types of interdiscursive influences have a prominent presence in the US policy discourse on Smart Grid standards. The first is references between documents. An example: the word "catalyze" did not appear in the 1.0 version of NIST's standardization roadmap. In the intervening White House policy document it appears 10 times. In version

[36] http://www.nist.gov/smartgrid/upload/NIST_SGAC_Final_Recommendations_Report_3-05-12_with_Attachments.pdf

2.0 of the NIST framework it then appears three times, echoing the words of the White House document.

> The Federal Government will continue to catalyze the development and adoption of open standards.
>
> History has shown that the states and Federal Government have important roles in catalyzing innovation. In the electricity sector, this role can include facilitating the creation and use of standards, developing new energy efficiency programs, investigating the impact of different consumer incentive programs, and monitoring markets to prevent anticompetitive behavior. (NSTC Report, 2011)

The second type of influence is from academic research. In an instance of specific intertextuality, the White House document quotes specifically a book chapter by Marks and Hebner entitled "Government/Industry Interactions in the Global Standards System[37] This article covers economies of scale and the risk presented by lock-in by de facto standards. It also describes strategies that industry players may adopt to "exceptional success" and to the detriment of the consumer. It also refers to an ANSI position that the US may fall behind internationally because of European involvement in standardization, and it may have inspired to ensure that the US has the initiative on the sizable future market for Smart Grid technology. The article further provides a case study of successful involvement of NIST as a catalyst to bring about standardization for fixed broadband wireless access. One of the authors, Roger B. Marks is a staff member of NIST and participated in the effort. Crucially, a section on the need to balance the interests of manufacturers versus users:

> "For instance, standardization is often driven most strongly by manufacturers and other product vendors. These voices may argue that government action on standards should be driven, within WTO obligations, by the goal of enhancing production and profits among manufacturers. However, governments should not overlook the economic

[37] http://wirelessman.org/docs/03/C80216-03_16.pdf.

> interests of the users of the technology. The way to do that is through de jure interoperability standards and competition between implementations of that standard.
>
> "As NIST is demonstrating through its participation in the IEEE 802.16 Working Group on Broadband Wireless Access, this role can constructively contribute to the economy and quality of life."

An outstanding feature of the US discourse on Smart Grid standardization is the use of metaphors. In addition to the already mentioned "catalyze" and "honest broker" use of "silo" as metaphor is frequently by both policymakers and academics, e.g. Ipakchi and Farrokh (2009): "In most cases, the information in each organizational 'silo' is not easily accessible to applications and users in other functional units.". It was used by George Arnold in his testimony to Congress: "The electric utility industry has "many proprietary interfaces and technologies that result in the equivalents of stand-alone silos."[38] A similar use of metaphor to illustrate the chaotic situation resulting from the absence of standards: "Without standards, trying to exchange information among utilities, vendors, regulators, and others, never mind linking thousands of utility systems together, would be a veritable 'Tower of Babel'" (Utility Standards Utility Standards Board, 2008). Another metaphor frequently used in mass media, academic articles and in policy documents and speeches is the term "balkanization".

Another feature of the US discourse and especially by NIST is that the word "standard" appears rarely without the word "interoperability". Throughout policy documents, "interoperability standards" is consistently used as a concept. This focus reflects the 1992 OTA report that encourages government involvement in the development of interoperability standards, and it is significant because it signals the type of standard and avoids confusion with product standards.

[38] http://www.nist.gov/director/ocla/testimony/loader.cfm?csModule=security/getfile&pageid=1261447

3.4 Chapter summary

The US can be said to lack a coherent legislative framework for standardization in that there is no single legislative act or policy document that spells out a comprehensive stance on standardization and how it relates to policy. However, there has, at least in the last three decades existed a clear tradition of preferring industry-led standardization. It is against this background that the current chapter has explored how a policy based on public leadership to accelerate the agreement of a set of interoperability standards for Smart Grid was constructed.

The communicative discourse of the US federal government on Smart Grid standardization is a departure from previous policy statements on standardization. Key texts from both the White House and NIST – the body tasked with coordinating the standardization effort – draw on some of the existing discourses but also introduce and develop on other discourses to create a new narrative to legitimize and make urgent the need for policy intervention in the field of standardization. Specific to the US context is a strong antitrust tradition from which comes the notion that the standardization strategies of companies can amount to anticompetitive behaviour. Another feature of US discursive context is a strong need to justify government intervention and investment. Perhaps for this reason, US policy documents often draw explicitly on independent resources, often academic literature, in order to legitimize the basis of an argument.

The analysis shows that the US policy storyline on Smart Grid standardization, while rooted in existing policy on standards as market-driven, introduced alternative discourses to legitimate intervention.

Given a legislative mandate for coordinating the Smart Grid standardization effort in 2007, NIST embarked on a research and communication strategy. This was stepped up following a March 17, 2009 testimony before the House Science and Technology Committee, where Secretary of Energy Chu expressed his displeasure with the lack of progress on standardization. NIST appointed George Arnold to be the national coordinator. Against a background of economic crisis and having to defend a stimulus package, the White House released a number of documents highlighting the positive role that the government can have. The White House took a special interest in Smart Grid, producing a heavily researched

report of its own, drawing on academic and other research to justify a role for the government as a catalyst in standardization.

While the US policy discourse makes a strong case for the need for standards and what is at stake if the effort fails, the use of contrasting in political communication can be criticized for over-simplification. This point will be discussed further in the concluding chapter of this thesis. The next chapter considers the development of a contrasting narrative in the EU. Then, in chapter 5, the findings of chapter 3 and 4 will be compared and contrasted using concepts drawn from neo-institutionalism to gain deeper understanding of the factors affecting the formulation of a policy on Smart Grid standardization.

4 Innovation discourse and the legacy of the "New Approach": EU response to the Smart Grid standardization challenge

"The Single Market is one of the great achievements of our time. The European Union has developed original and innovative instruments to remove the barriers to free circulation of goods. Among these, pride of place is taken by the New Approach…"

The common thread […] is that they limit public intervention to what is essential and leave to industry the greatest possible choice in how to meet their public obligations". (The European Commission, 2000).

An underlying premise of the analysis pursued in this thesis is that the process by which an issue comes to be addressed by policy is not arbitrary: when faced with a real-world issue, policy-makers will draw from available macro-level discourses in when constructing problem definitions and arguing for a specific course of action. The way that a problem becomes defined sets limits for the sort of policy response that can be deemed logical and legitimate. In the present case, recognizing that rapid progress on standards was needed to further the Smart Grid project, the European Commission intervened in an area where responsibility had normally been deferred to the private sector. Based on the theoretical discussion in chapter 2, it is expected that such departure from existing practice will be accompanied by a language and a logic that supports a shift in approach. The aim is thus to trace the development of a rationale for policy action by examining the ideas and arguments that influence problem construction and the formulation of a solution. In this chapter, this is done by looking at how policy documents respond to perceived imperatives for example by linking existing concepts into new configurations or repertoires.

The first section of this chapter provides institutional and political context to the subsequent analysis. Section 4.2 then develops the *discursive* context, by considering earlier writings and inherited assumptions, in which the policy discourse on Smart Grid standardization was formulated. The resulting typology is employed in section 4.3 as a framework to study the specific policy documents related to Smart Grid standardization to identify dominant discourses, including key concepts, narratives, and outstanding features. This two-step process allows for a study of interdiscursivity and explicit intertextuality, that is to say an examination of what specific influences can be observed, for example the policy discourses of other countries, input from stakeholders, or academic sources. It further allows us to consider silent discourses. These are discourses that are available to policymakers but ultimately not drawn on in the formulation of policy. Silent discourses are often not completely absent from the policy discourse. Indeed, the notion that they are "available" to the policymakers is evidenced by isolated references to them in the text. However, silent discourses, and the perspectives that they represent, end up being marginalized in favour of formulations more in keeping with the dominant logic.

This chapter draws on a corpus of policy documents (legislation, reports, transcribed speeches, press releases) produced by or endorsed by the EU institutions during the period 1985-2013. A complete list of key documents is provided in Annex I. The domains of government the documents relate to are the European Commission Directorate General for Energy (DG Energy), Directorate General for Enterprise and Industry (ENTR), European Parliament (EP), European Council, European Economic and Social Council (EESC), JRC, as well as the European Standardisation Organisations (ESOs) CEN-Cenelec and ETSI. The ESOs and the various expert groups cited are not European institutions but are included in the analysis because their reports are often prefaced by Commission officials or otherwise given tacit or explicit endorsement.

In conducting the analysis, primary consideration is assigned to those documents that focus specifically on the Smart Grid standardization challenge, but the analysis also includes on the one hand documents on Smart Grid policy that mention standards, and on the other hand documents on standards and standardization in general that mention Smart Grid as a focus area. The main emphasis is on final documents as an expression of communicated policy;

however, consideration is also given to inputs to the policy process in order to draw attention to views that may have been omitted in a final document (silent discourses). One of the strengths of using openly available documentary sources is that their examination is an unobtrusive method that allows for repeated analysis (Grewal, 2008), thus increasing both the validity and the reliability of the research. A number of expert interviews were conducted and the transcripts of these constitute an additional source of data. A full discussion on methodological choices and efforts to "enhance the corpus" with supplementary data is included in chapter 2.

4.1 Background

The framework developed in chapter 2 emphasized the importance of understanding the wider context in which a policy discourse is formulated. This background section therefore sets out the institutional and political context to the analysis that follows. It describes the European standardization system and EU policy on standardization – considering formal arrangements as well as informal aspects. It highlights the specificity of the ICT sector, where standardization in the last decade or so has taken place largely outside of the European system. Finally, it considers the political environment in which the response to the Smart Grid standardization is taking place. In the case of the EU, the imperative to make progress on Smart Grid is mainly based on political objectives surrounding climate change mitigation. The historical context is a decade of liberalization in the energy market.

4.1.1 The European Standardization System and policy

When making international comparisons, the standardization literature tends to emphasize the formal, hierarchical nature of the European standardization system, which is often contrasted with what is seen as a more informal and diverse nature of the US system (Shane Greenstein & Victor Stango, 2007). Such observations are based on the coherent structure of the European Standardization system and the European Commission's use of standards as a policy instrument to implement legislation through the New Approach (subsequently confirmed in the New Legislative Framework). As will be argued in this thesis, in light of the policy response to the need for ICT interoperability standards, such characterizations might need to be partially re-evaluated to allow for differences in the response of the institutions depending on the particular sector and policy area.

The European standardization system is highly structured and based on the principle of national delegation. At the European level, the system is led by three European Standardisation Organisations (ESOs): CEN - European Committee for Standardisation CENELEC - European Committee for Electrotechnical Standardisation ETSI - European Telecommunications Standards Institute. CEN and CENELEC are European organizations made up of national standards bodies (NSBs), which are members of CEN and of CENELEC. When CEN or CENELEC elaborate a new European Standard, they set up a European technical committee under the responsibility of one of its national members, and consisting of other national members (NSBs). At the same time NSBs create the so-called "National Mirror Committees". These National Mirror Committees elaborate a national position for the drafting and voting of a European standard, which is then presented at the European technical committee. ETSI (created in 1988) is based on direct participation of industry (without NSBs or other intermediaries). The work done by ETSI is carried out in committees and working groups composed of technical experts from the Institute's member companies and organizations. These committees are often referred to as "Technical Bodies".

Legal and policy texts on European standardization often highlight the value of the NSBs, which are seen to represent the national interest and enable interested parties (enterprises, consumers, public authorities, NGOs, etc.) to participate in the creation of the standard at national level and in their own language. While the Commission emphasizes (and indeed funds) the participation of consumer and environmental groups at the European level, policy texts do not elaborate on how these organizations are constituted at the national level. It is important to note, however, that the NSBs are for the most part private organizations – not public bodies – with no formal responsibility to ensure representation in its mirror committees; indeed the membership will often include many multinational companies. However, it is contended here that this focus on the principle of national delegation in the official discourse on standardization, has as a consequence that any tensions acknowledged are, on the one hand, those between the European and Member State level, and, on the other hand, between the different Member States. Consequently, and importantly for the themes considered in this thesis, possible tensions between industry and the public interest are less emphasized. There is also a tendency to group “industry” together as a whole, as

one stakeholder, and thereby disregarding the competing interests and strategic behaviour of firms.

The EU has had an active standardization policy, in particular with regard to issues relating to health, safety, security and of the environment. This policy is centred upon the recognized European standardization system and a partnership with stakeholders to implement the "New Approach" which promotes standardization in support of "better regulation". The ESOs are private organizations but receive part of their funding from the European Commission. The majority of the work of the ESOs (80%, according to expert interviewed) is "by business, for business". However, the ESOs are recognized in the Regulation on standardization and the European Commission can, through a so-called mandate, ask the ESOs to develop a standard. Under the New Approach, EU legislation in the form of Directives defines "essential requirements", most often related to health, safety and environmental issues. Products must meet these requirements in order to be placed on the European market. While the three ESOs enable these requirements to be fulfilled through the path of harmonized European Standards, market actors may also use other ways to show compliance with the "essential requirements" and the use of standards therefore remains voluntary. It has been noted that while these standards remain technically voluntary, they take on a de facto mandatory status.

It is recognized that through the development of European standards and the withdrawal of conflicting national standards, standardization has played a leading role in the achievement of a Single Market for goods. Several authors have pointed to changes in the standardization policy domain, from a focus on product safety to standards in favour of innovation, emphasising the need to speed up the process and as an instrument for the competitiveness of European industry. In large part, this changed focus has to do with the importance that standards play with regards to the ICT sector.

4.1.2 The institutional context – ICT as a special case

Compared to traditional industrial sectors and that of telecommunications and broadcasting, standardization in the ICT domain has been less linked to the public interest dimension. From a Commission policy perspective, the ICT sector has been seen as

contributing to innovation and growth where the role of government should be concerned with creating an enabling environment for business through deregulation and liberalization.

The policy of DGXIII (Telecommunications, Information and Exploitation of Research) was "characterized by the development of a strong relationship with large companies in IT and telecommunications, contributing to its largely pro-market liberalization sympathies" (Simpson, 2000, pp. 447-448). In formulating policy, the Commission liaised mainly "with players they knew best" such as large companies and "The headlong rush into a bright new technological future offered by seamless digital information structures does appear to have influenced the debate over policy choices" (Cawson & Holmes, 1995, p. 666). Feijóo et al (Feijóo, Gómez-Barroso, & Karnitis, 2007) in a review of 20 years of information society policy in the EU points to the Bangemann Report[39] as a turning point with its emphasis on liberalization, the role of the private sector, and trust in technological innovation automatically leading to win-win scenarios.

> The responses outlined above to the challenges posed by the deployment of the information society will be positive for all involved in its creation and use.
>
> Telecommunications, cable and satellite operators will be in a position to take full advantage of market opportunities as they see fit, and to expand their market share.
>
> The service provider and content industries will be able to offer innovative products at attractive prices.
>
> Citizens and users will benefit from a broader range of competing services. Telecommunication equipment and software suppliers will see an expanding market.

Simpson (2000) shows how such an approach contrasted with that of DGV (Employment, Industrial Relations and Social Affairs) of the Commission, which insisted on specific policy

[39] http://aei.pitt.edu/1199/1/info_society_bangeman_report.pdf

action and argued that deference to the market alone was not sufficient to ensure technological advancement led to benefits for all.

Several experts interviewed for this thesis pointed to the specific nature of ICT standardization and to the different nature of the relationship between DG INFSO and the ICT industry compared with DG ENTR and other sectors. The need for a more coherent approach to standardization across the DGs of the European Commission was emphasized by a group of 30 experts brought together in January 2009 by the European Commission to form the Expert Panel for the Review of the European Standardisation System (EXPRESS). The Panel was composed of members from European, national and international standards organizations, industry, SMEs, NGOs, trade unions, academia, fora and consortia and public authorities from EU Member States. Their final report emphasized that:

> There is insufficient consistency and coordination of policies among the different Directorates-General of the European Commission, other EU institutions and EFTA towards the use of standards in support of legislation and policies (as is also often the case between national government departments). It is recommended that policies be reviewed so that inconsistencies, gaps and overlaps can be reduced. This should cover the whole standardisation process, from the preparation and delivery of mandates, through the monitoring of Technical Committee work to ensure the standard produced will meet the essential requirements of the mandate, to the formal adoption and publication of the standards. A closer cooperation is required between all relevant Directorates General.[40]

There has been some recognition at the political and legislative level of the specific circumstances relating to standardization in the ICT sector, e.g. the specificities of the ICT sector were recognized in Council Decision 87/95/EEC, which aimed to provide guidance for public procurement of ICT systems. It emphasizes the importance of interoperability and encourages reference to functional standards to achieve that objective. In its White Paper

[40] http://ec.europa.eu/enterprise/policies/european-standards/files/express/exp_384_express_report_final_distrib_en.pdf

"Modernising ICT Standardisation in the EU – The Way Forward" COM(2009) 324 Final (3/7/2009) , the Commission recognized that the EU legislative framework did not reflect the dramatic changes that had taken place in the ICT standardization landscape in the previous decade. During the process aimed at reviewing the European standardization system, some efforts were made initially to make ICT standardization the focus of a separate piece of legislation, but in the end ICT was included in the overall Regulation on standards, albeit with special mention, inter alia, of the special importance of interoperability for this sector (Blind & Jacobs, 2011). In the end, ICT is included in the overall 2013 Regulation on Standardisation, again with a special mention of the particular considerations. The main development from a legal point of view is that the new Regulation allows for the referencing of fora and consortia specifications in procurement and policy documents, thus formalizing practices that were already taking place. For this analysis, the main consequence is that ICT standardization continues to be viewed in the same way as other forms of standardization, albeit with certain specific considerations.

4.1.3 The political context – policy response to Smart Grid challenge

EU policy Action on Smart Grid takes place against a background of a decade of liberalization of the energy sector and is framed within the overall objective of mitigating climate change by moving to a low carbon society. The European Commission's 2006 Green Paper "A European Strategy for Sustainable, Competitive and Secure Energy" set ambitious energy and climate change objectives for 2020: to reduce greenhouse gas emissions by 20%, to increase the share of renewable energy to 20% and to make a 20% improvement in energy efficiency. Subsequent policy documents reflect the expectation that Smarter Grids support the realization of these targets.

The European SmartGrids Technology Platform (ETP) was instituted by the European Commission in 2005. In its first deliverable the ETP set out a vision for a future EU-wide electricity network which it defined as *flexible*, *accessible*, *reliable*, and *economic*.[41] While emphasizing the importance of continued liberalization of electricity markets, it also recognized the imperative for establishing "shared technical standards and protocols that

[41] https://op.europa.eu/en/publication-detail/-/publication/a2ea8d86-7216-444d-8ef5-2d789fa890fc/language-en

will ensure open access". Harmonized standards were seen as necessary to empower consumers to seamlessly switch between different providers (Ardito, Procaccianti, Menga, & Morisio, 2013).

In 2007, ETP unveiled its second publication, outlining a research framework with three central objectives: advancing smart grids to bolster Europe's competitive position, fostering deeper collaboration between Member States, and establishing explicit research aims. This guiding document, explicitly devoid of rigid descriptions, had as a principal objective to encourage R&D initiatives related to smart grids by both EU institutions and across Member States.

The third and final deliverable of ETP, known as the Strategic Deployment Document initially presented as a draft in 2008, and subsequently finalized in 2010. In addition to proposing funding for Smart Grid projects, the document identified key hurdles – technical and non-technical – that hinder Smart Grids development, and urged Member States to remove these barriers to fulfil the Sustainability Targets set for 2020 and 2050 (Ardito et al., 2013). The analysis concludes with a number of recommendations, including the need for EU-level regulation in order to reduce market fragmentation:

> "The European legislation for an open market in the electricity sector has been implemented in most Member and Associated States for several years. The resulting national legislation, however, varies and is fragmented. In particular, the degree of unbundling of network services from generation, supply and trading of electricity is still very diverse. Also, as a consequence of this, TSO and DSOs do not have clear incentives to evolve into service provider businesses. *Harmonized regulation in the Member and Associated States is needed to speed up the necessary changes*" [emphasis added].[42]

Real political impetus for the Smart Grid was provided by the adoption of the EU's Third Energy Liberalization Package, a legislative package for an internal gas and electricity market

[42] http://www.smartgrids.eu/documents/SmartGrids_SDD_FINAL_APRIL2010.pdf

in the European Union. The package was proposed by the European Commission in September 2007 and entered into force on 3 September 2009. Its main stated purpose is to further open up the gas and electricity markets in the European Union. It set an ambitious target for the deployment of smart meters, foreseeing 80% coverage of European households with smart meters by 2020. While no specific commitments were made for other segments, the development of Smart Grids is strongly recommended and provided a rationale for subsequent policy initiatives.

In November 2009, the European Commission established a high-level Task Force on Smart Grids with a mission "to advice the Commission on policy and regulatory directions at European level and to coordinate the first steps towards the implementation of smart grids under the provision of the Third Energy Package". The work of the Task Force was carried out in four separate Expert Groups, each dedicated to a specific aspect of advancing smart grid and tasked with formulating recommendations for actions to be taken by the European Commission (Ardito et al., 2013):

- EG 1: Functionalities of smart grids and Smart Meters;
- EG 2: Regulatory Recommendations for Data Safety, Data Handling and Data Protection;
- EG 3: Roles and Responsibilities of Actors involved in the Smart Grids Deployment;
- EG 4: Smart Grid aspects related to Gas.

In its final deliverable of December 2010[43], Expert Group 1 underlined the importance of developing standards for successful deployment along with a need for improving already existing standards. In addition, the task force noted the risk of several standardization bodies developing a potentially inconsistent set of standards. This suggestion led to the establishing of a Joint CEN/CENELEC/ETSI Working Group (JWG) on standards for smart grids, which was given the task of establishing detailed recommendations to standardization bodies.

During 2011, the European Commission took several steps aimed at speeding up the standardization process and in its actions it was supported by agreement at Member State

[43] EU Commission Task Force for Smart Grids, Expert Group 1: Functionalities of smart grids and smart meters, December 2010, available at:
http://ec.europa.eu/energy/gas_electricity/smartgrids/doc/expert_group1.pdf

level of the need to make progress. The European Council of February 2011 recognized the important role of standards for Smart Grids and invited Member States, in liaison with European standardization bodies and industry, *"to accelerate work with a view to adopting technical standards for electric vehicle charging systems by mid-2011 and for smart grids and meters by the end of 2012"*[44]. In March 2011, the European Commission issued Mandate M/490[45] requesting the three European Standards Organisations (ESOs), CEN, CENELEC and ETSI, *"to develop a framework to enable European Standardisation Organisations to perform continuous standard enhancement and development in the field of Smart Grids."* The final report of the JWG coincided with the publication of a Commission Communication on Smart Grids: from innovation to deployment (COM(2011) 202 of 12/04/11), which sets out the European Commission's policy in this area. In the Communication, the Commission noted that the ESOSs were almost a year behind on standardization deliverables and signalled the urgency of the situation by warning that *"if progress in the course of 2011 is not sufficient, the Commission will intervene to ensure that the deadline is met and the necessary standards are set, for example by defining a network code."*

After the launch of M490 to CEN, CENELEC and ETSI, the Commission participated in the Reference Group for Smart Grid Standards with the intention to monitor the progress and to ensure the adoption of new standards within the proposed timeframe (early 2012).

> The Commission has worked to ensure: synergies between energy and digital communications infrastructures are taken into consideration to minimise the economic and emissions costs; the environmental costs and benefits of "smart" functionalities are quantifiable; the emergence of an open and competitive market for smart grid technologies, products and services is not restricted by incompatible data formats or lack of interoperability;

[44] European Council, Conclusions on Energy, 4 February 2011, https://www.consilium.europa.eu/uedocs/cms_data/docs/pressdata/en/trans/119253.pdf

[45] European Commission Standardisation Mandate to European Standardisation Organisations (ESOs) to support European Smart Grid deployment, available at: http://ec.europa.eu/energy/gas_electricity/smartgrids/doc/2011_03_01_mandate_m490_en.pdf

While the purpose of this thesis is not policy evaluation, it is evident that the subsequent results of the standardization effort did not fully meet initial expectations. The lack of progress is highlighted in a 2014 Resolution by the European Parliament on Local and regional consequences of the development of smart grids, which includes a call for action:

> Recalls the 2011 Standardisation Mandate to support European smart grid deployment which was due for completion in 2012; welcomes the progress made under this mandate but stresses that further work is needed; asks that the Commission engage with the standardisation bodies in order to speed up the completion of their work and to issue a new mandate if deemed necessary;[46]

The delay in achieving desired outcomes have been attributed, at least in party, to the behaviour of actors involved in the standardization process. As noted by Uslar:

> "A lot of time in standardization is wasted discussing about input from third parties who try to influence the Smart Grid agenda with their products without actually solving the known problems which have been well documented." (Uslar, 2013, p. 231)

Experiences from pilot projects suggest that the problem is not that there is a lack of technology or standards:

> There are lots of standards available, there needs to be fewer, more common standards. This lack of common standards is a big problem for the Bornholm system – some components, for example, use Zigbee, some don't."[47]

It has been suggested that there has been a lack of top-down initiative:

[46] http://www.europarl.europa.eu/sides/getDoc.do?pubRef=-//EP//TEXT+TA+P7-TA-2014-0065+0+DOC+XML+V0//EN

[47] http://www.ukerc.ac.uk/support/tiki-download_file.php?fileId=2203

> However, there is no real initiative besides the First Set of Standards Group from the EU mandate M/490 and the NIST Priority Action Plans to actually address gaps in standards, introduce new work item proposals (or parts) to change the existing standards and have work leaders cover them."(Uslar, 2013)
>
> Stakeholders are currently trying to find their position and numerous new communities are being created, but in the absence of a controlling mind.[48]

This sentiment was shared by one of the experts interviewed, who stated:

> And I think that, again, it's up to the Commission to put the limits and the boundaries. And to be clear in what they want and how they want it. And from what I heard, the message that the standardisers are getting from the Commission is extremely confused… from a policy point of view I think that it could be interesting to see whether there is an overlap between the Commission Expert Groups and the Smart Grid standardization.

Another expert suggests that the reason for inaction was lack of understanding: "They [the US and EU] discuss standardization without really knowing what it is about".

The next section outlines the discursive context – its history and outstanding discourse features.

4.2 The discursive context

Chapter 2 defined the discursive context as an ensemble of all the discourses, found in both current and past debates, that can be associated with a specific policy problem. When constructing policy arguments, actors draw from these influences, which includes earlier writings, inherited assumptions, and ideological contexts. (Howarth, 2012). As a way to operationalize the concept of discursive context, and to assist in the subsequent analysis of policy documents that relate specifically to Smart Grid, a typology of standardization discourses is developed in this section. This typology allows us later to consider how Smart

[48] http://www.ukerc.ac.uk/support/tiki-download_file.php?fileId=2203

Grid standardization policy documents relate to other documents on standardization in the EU context. Specifically, this typology assists in identifying what dominant and alternative discourses are drawn upon by policy-makers for developing the narrative on Smart Grid standardization and for formulating what is subsequently seen as constituting proper policy action. This first step also allows us to discuss possible discourses that are available to policymakers but not drawn upon – what is referred to here as marginalized or silent discourses.

As described above in the background section of this chapter: while several policy texts recognize the ICT sector as a special case – where developments in the last decade or so have taken place largely outside of the European standardization system – top-level messaging about standardization does not necessarily distinguish between different types of standards. As will be shown below, one of the results of this is that the language of the New Approach still profoundly impacts the way that standards are being referred to by policy-makers in the EU, also in the discussion of ICT interoperability standards for the Smart Grid.

4.2.1 The legacy of the New Approach

A key factor to consider in the case of EU discourse on standardization is the legacy of the "New Approach", which was outlined for the first time in an EU Council Resolution from 1985[49]. Under the New Approach, EU legislation in the form of Directives defines "essential requirements", most often related to health, safety and environmental issues – of 32 New Approach Directives[50] only the Directives on Electromagnetic compatibility and Rail system interoperability refer specifically to compatibility or interoperability. Products must meet these requirements in order to be placed on the European market. While the three European Standards Organizations, CEN, CENELEC and ETSI enable these requirements to be fulfilled through the path of harmonized European Standards, actors may also use other ways to

[49] Council Resolution of 7 May 1985 on a new approach to technical harmonization and standards, available at: http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:31985Y0604(01):EN:NOT

[50] http://www.newapproach.org/Directives/DirectiveList.asp

show compliance with the "essential requirements" and the use of standards therefore remains voluntary.

The principles of the New Approach are expressed in institutional arrangements, and they were affirmed in the *New Legislative Framework* of 2008. The language of the New Approach continues to be a discursive influence whenever standards are mentioned in the EU policymaking context, especially outside the specialized community. Specifically, the discourse of the New Approach continues to have significant bearing on what sort of instrument a standard is seen to be and *what sort of problem is judged to be solvable through standardization.*

An important reason for the continuing appeal of the New Approach in EU policy texts is its perceived role in helping to complete the single market, perhaps the crowning achievement of the European Union.[51] Evidence of this way of viewing standardization is a Commission document that lists the New Approach as part of a trajectory towards integration, mentioned in the same breath as the *Cassis de Dijon* ruling,[52] and an official website dedicated to promoting awareness about the New Approach which claims that:

> The New Approach and European standardisation have contributed significantly to the development of the Single Market. The success of the European standardisation system, in removing technical barriers to trade, has played a vital role in ensuring the free movement of goods between Member States.[53]

This sentiment is echoed in a Commission document from 2000, indicating the enduring narrative of the New Approach:

[51] European Commission (2003), DG Enterprise: Vademecum on European Standardisation, Part I General Framework, available at: http://ec.europa.eu/enterprise/policies/european-standards/files/standards_policy/vademecum/doc/standards_directive_98_34_history_en.pdf

[52] http://ec.europa.eu/enterprise/policies/european-standards/files/standards_policy/vademecum/doc/standards_directive_98_34_history_en.pdf

[53] http://www.newapproach.org/

> *The single market is one of the great achievements of our time*. This economic space, where goods, services, capital and labour can circulate freely, provides a foundation for prosperity in the European Union as we move towards the 21st century. The European Union has developed original and innovative instruments to remove the barriers to free circulation of goods. *Among these, the New Approach to product regulation and the Global Approach to conformity assessment take pride of place* [emphasis added].[54]

The narrative of the use of standardization as part of the New Approach gains further powers of persuasion because it is presented as win-win scenario. According to policy documents the successes of the New Approach were achieved through the involvement of all of the stakeholders, while allowing for flexibility and for some Member State autonomy:

> The New Approach has been praised often for its success at the European level […] It has provided a common basis for nearly 30 countries that enables the free trade of sensitive products with a volume of some thousands of billions of Euros, providing a fair place for those directly involved to influence the system under a transparent, cost-efficient, politically credible, and democratic route such as the standardisation process.[55]

Of particular interest to this thesis, one of the underlying themes of which is the tension between government intervention and industry self-regulation, is that the New Approach is seen by EU policy-makers to illustrate the benefits of less intervention on the part of government:

[54] European Commission, Guide to the implementation of directives based on the New Approach and the Global Approach (2000), available at http://ec.europa.eu/enterprise/policies/single-market-goods/files/blue-guide/guidepublic_en.pdf

[55] http://ec.europa.eu/enterprise/policies/european-standards/files/standards_policy/vademecum/doc/standards_directive_98_34_history_en.pdf

The common thread between these complementary approaches is that *they limit public intervention to what is essential and leave business and industry the greatest possible choice on how to meet their public obligations* [emphasis added].[56]

Table 4.1 Typology of Discourses EU

Discourse	**Standout features**
"New Approach"	Standards seen as having played an important role in creating the single market. Standards represent a flexible way to achieve effective consumer and environmental protection. Invoked in more recent debates on standards as evidence that standardization has worked well as a policy instrument in the EU. Presents the use of standards as win-win: for consumers and for industry; for safety and for the environment.
Innovation and competitiveness	Emphasizes the need for standards to support innovation and competitiveness. Standardization is labelled as generally important in contributing to this agenda but little deliberation as to the specific mechanisms involved. Standardization is viewed as market- or industry-led, voluntary, and there is a need to speed up the standardization process to better serve the market and respond to the pressures of globalization.
Economics of Standards	Outlines the specific effects that standards have in the market, including the reduction of transaction costs, enhancing competition and reducing lock-in.
Standards to reduce diversity – interventionism as last resort	Has been used in specific cases: e.g. GSM standard, mobile phone charger, electrical vehicle battery charger, but not much mentioned in overall policy documents. Not seen as the first choice of policymakers but only after industry has failed to agree.

[56] European Commission, Guide to the implementation of directives based on the New Approach and the Global Approach (2000), available at http://ec.europa.eu/enterprise/policies/single-market-goods/files/blue-guide/guidepublic_en.pdf

As outlined in chapter 1, governance scholars have focused on the way that standardization is a part of a trend where regulatory functions are moving away from democratically elected bodies. This phenomenon was also emphasized by one of the experts interviewed:

> What we see is that … those new topics like Smart Meters like eHealth or whatever are addressed with a very fluid way of working. And we are very much into coordination, guidelines, and soft laws, and standards. And a bit less into traditional legislation.
>
> You can have a different way, but it is just that those new topics are coming at an age where there is a phobia of regulation as such.

Another result of the framing of standards primarily as an instrument to promote the completion of the Single Market is that Commission documents recognize the tension created by the New Approach between Member States and the EU – as opposed to any tension between the public and private sectors. Mentions of the need to ensure that standardization reflects all interests are quite marginalized, but there are some examples such as the opinion of the 2011 European Economic and Social Committee's Opinion on the Proposal for a Regulation on European Standardisation:

> "To this end, the Committee considers it essential that the ESOs and the Commission carry out preliminary checks to ensure that specifications adopted by international industry forums and/or consortia, to be used as a reference for the purpose of public procurement, have been developed in a neutral, fair and transparent manner with appropriate involvement of representatives of small and medium-sized enterprises, consumers, environmentalists, workers and organisations representing important social interests."

4.2.2 The innovation and competitiveness agenda

Since the mid-1990s standardization has been included in the broader "innovation" agenda of the European Union. This macro-discourse became dominant in many EU policy areas (James, 2012), especially following the conclusions of the European Council Lisbon presidency in March 2000 which communicated the aim to make the EU by 2010 "the most

competitive and dynamic knowledge-based economy in the world capable of sustainable economic growth with more and better jobs and greater social cohesion".[57] In recent policy debates on standardization, the agenda of innovation and competitiveness has been widely applied and it has now become the dominant context in which standards is mentioned (Hommels et al., 2013). This focus can be perceived from the titles of key documents relating to standardization, such as "*Competitiveness Council Conclusions on standardisation and innovation"*, "*Commission Communication Towards an increased contribution from standardisation to innovation in Europe",* and "*Standardization for a competitive and innovative Europe: a vision for 2020"*. In each case, standardization is bestowed with importance because of its contribution to innovation and competition.

The discourse of the innovation agenda is characterized by a high frequency use of a limited set of concepts related to innovation, competitiveness, speed and flexibility in a globalized world. The specific ways in which standardization contributes to innovation and competitiveness are typically not elaborated on. Discourse theory suggests precisely that a sign of a dominant discourse is that, "the utterance of just an element of either of these story-lines is understood by others in the context of their implicit knowledge of a particular story-line. So comprehensive understanding can be reproduced in by and large symbolic exchanges of references" (Hajer, 1995, pp. 119-120).

Thus a typical statement can be found in the 2008 Communication *"Towards an increased contribution from standardisation to innovation in Europe"*, in which the Commission calls for a reform to strengthen European Standardisation System, in order "to make it more reactive to innovation and more supportive to the competitiveness of EU enterprises."[58] Similarly, the Commission proposal of March 2010 for a new Europe 2020 economic strategy emphasizes innovation to make progress towards the EU's strategic objectives of smart, inclusive and sustainable growth and it is within that context that it mentions "speeding up the setting of interoperable standards" as an important element in providing the necessary conditions for businesses to innovate. The language is also echoed in the opinion of the 2011

[57] http://www.europarl.europa.eu/summits/lis1_en.htm

[58] Communication Com (2008)133, of 11th March 2008 http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:52008DC0133:EN:NOT

European Economic and Social Committee's Opinion on the Proposal for a Regulation on European Standardisation:

> The Committee supports the aims of the Commission's proposal, as a fast, efficient and inclusive European standardisation process represents not only a key pillar in the architecture of the single market, which is the fulcrum of European integration and the Europe 2020 strategy that seeks to achieve it, but also and above all one of the foundations of Europe's economic competitiveness and a driving force for innovation[…]
>
> The Committee is in no doubt as to the need to create a flexible and dynamic EU legislative framework so as to optimise the added value of European technical standardisation, the purpose of which is to foster competitiveness, innovation and growth.[59]

A related feature of this discourse is that standardization is seen to be both *for* and *by* industry. Hence the Commission Communication underlines that "[t]he actual use of standards remains voluntary, depending on the perception of different market players of their interests and their capacity to use them." Later on it "[re-asserts] the commitment to market-led standardisation and to the voluntary use of standards." And finally notes that "[t]he specific added value of standardisation with respect to setting technical specifications lies indeed in the voluntary cooperation of private and public actors."[60]

When policy documents recognise the potential value of standards for societal challenges, this recognition is also couched in terms of innovation. Thus the EESC Opinion states that "[a] stronger role for standardisation in support of innovation is important for the European

[59] European Economic and Social Committee (EESC) (2011) Opinion on the Proposal for a Regulation on European Standardisation, available at: http://eescopinions.eesc.europa.eu/eescopiniondocument.aspx?language=en&docnr=1379&year=2011

[60] COM(2008) 133 final COMMUNICATION FROM THE COMMISSION TO THE COUNCIL, THE EUROPEAN PARLIAMENT AND THE EUROPEAN ECONOMIC AND SOCIAL COMMITTEE Towards an increased contribution from standardisation to innovation in Europe

effort to address economic, environmental and social challenges."[61] In a similar vein, the Commission Communication Towards an increased contribution from standardisation to innovation in Europe states that: "[t]hough most standardisation occurs on the initiative of market actors, the EU expects standardisation to make an important contribution to the following priority actions for innovation."[62]

4.2.3 Influence from academic research on the Economics of standards

In addition to the two dominant discourses mentioned above, it is also possible to discern a discursive influence from what is here termed the economics of standards (see chapter 1 for existing academic conceptualizations of standards and standardization). While the innovation agenda described above is part of a world-view that emphasizes the importance of economic factors, a distinction can be made between the innovation agenda and the economics of standards discourse where the latter goes beyond the buzzwords of innovation and competitiveness to describe specific effects that standards have in the market. An example of this discourse can be found in the Commission Communication "Towards and increased contribution from standardisation to innovation in Europe:

> Standards that express the state of the art give innovators a level playing field facilitating interoperability and competition between new and already existing products, services and processes. Standards provide customers with trust in the safety and performance of new products and allow differentiation of products through reference to standardised methods;
>
> The development of new standards is also necessary to accompany the emergence of new markets and the introduction of complex systems, such as the expansion of the Internet;

61 European Economic and Social Committee (EESC) (2011) Opinion on the Proposal for a Regulation on European Standardisation, available at: http://eescopinions.eesc.europa.eu/eescopiniondocument.aspx?language=en&docnr=1379&year=2011

62 Commission Communication "Towards an increased contribution from standardisation to innovation in Europe" (COM(2008) 133 final of 11.3.2008)

> The use of standards contributes to diffusing knowledge and facilitating the application of technology; this may then trigger innovation, in particular non-technological innovation in the service sector.

It is somewhat telling that the above listing of the economic benefits of standards is prefixed by a statement that shows how the term "standard" appears to clash with a facile understanding of dominant concepts such as competition and innovation:

> Standardisation, usually bringing predictability and a level playing field, may be intuitively perceived as conflicting with innovation, which strives for change and exclusivity. However, as confirmed by the stakeholder consultation, dynamic standardisation is an important enabler of innovation.[63]

4.2.4 Standards for variety reduction: Commission intervention as last resort

An often-cited example of EU intervention into standardization is the success of the GSM standard. The achievement came about as a result of extensive Europe-wide collaboration among industry stakeholders, academia, and regulatory bodies. In the 1980s, the standardization of GSM technology was supported by the European Cooperation in Science and Technology funding, a precursor to today's EU research programs. The European Commission formally endorsed the GSM project, and in 1987, Member States approved the Commission's proposal to allocate the 900MHz band for GSM services. This landmark agreement is widely held as crucial in paving the way for rapid deployment of GSM technology throughout Europe. While Bekkers (2001) and Bekkers et al (2002) argue compellingly that the significance of the Commission's intervention has been exaggerated and that market adoption would have taken place regardless, it is nevertheless relevant to note that the policy discourse of the EU presents the GSM case as a success. Moreover, as is shown elsewhere, the GSM case was perceived by the US government as evidence of a more interventionist and ostensibly more successful standardization policy in the EU.

[63] Ibid.

In recent years, when the Commission has taken a more interventionist stand in bringing about standardization, it has been accompanied by a different language and a style to accompany this policy. The facts surrounding the standardization of the mobile phone charger are well known. It is interesting to us because it introduced a different sort of discourse and style. In February 2009, the then European Commissioner for Enterprise and Industry, Gunther Verheugen, received significant media attention as he threatened mobile phone manufacturers with regulation unless they could agree on a standard charger. Verheugen said he was personally tired of the accumulation of functioning-yet-useless chargers and concerned about the amount of electronic waste produced by consumers throwing away chargers when switching phones. He said he felt industry had had plenty of time to organize itself and that he finally felt compelled to intervene. Faced with this ultimatum, industry moved with some speed to settle on the Micro-USB connector, and in June 2009 the Commission could present a Memorandum of Understanding with producers, along with an instruction to the European Standards Organisations (ESOs) to develop a standard to facilitate implementation of the agreement. In an accompanying press release the Commission announced that, thanks to the intervention, there would be less hassle for consumers, and "a positive environmental impact."

In April 2013, after years of the Commission claiming the phone charger case to have been a success but resisting calls for extending the pressure to analogous areas, Commissioner Oettinger (Verheugen's successor) is putting similar pressure on industry to agree on a common charger for "small electronic devices".[64] There is a consistency in message and style of the two Commissioners – contrasting with the Commission's normal way of communicating on standards. The message is clearly targeted to a wider audience and to attract media attention. To make the message accessible it is presented as an interview between a journalist and the Commissioner. In the interview, Tajani uses personal language: he is "disappointed" with industry. To illustrate the problem, the short text is presented with a photo of the Commissioner standing next to a table with a multitude of chargers.

[64] http://ec.europa.eu/enterprise/magazine/articles/industrial-policy/article_11065_en.htm?nl_id=1028

The harmonization of chargers – first for mobile phones and now for other small electronic devices are isolated events in EU policymaking on standardization and they are indeed presented as exceptional. Thus the language employed by the Commissioners in these two cases has not been adopted as part of the normal approach to standardization. In the words of Tajani:

> We invite the industry to make proposals for common charging technologies, to agree among each other to place them on the market, and to report regularly to the Commission on market and technology developments. We intend to move ahead towards a common charger standard. *I always prefer voluntary agreements and would only very reluctantly move ahead with legislation* [emphasis added]. I am optimistic that we can go the easier way and avoid new legislation.[65]

Thus these two related instances – while standing out in their populist appeal – in fact confirm that the Commission's default position is to leave standardization to industry. For a Commissioner to be "tired" or "disappointed" with industry is in a way to deny that industry and public interests can legitimately differ and that there might be a role for government to play a consistently more active role – rather than intervening only when industry has failed to take on board societal interests.

Mentions of the need to ensure that standardization reflects all interests are quite marginalized in the communicative discourse, but there are some examples:

> "To this end, the Committee considers it essential that the ESOs and the Commission carry out preliminary checks to ensure that specifications adopted by international industry forums and/or consortia, to be used as a reference for the purpose of public procurement, have been developed in a neutral, fair and transparent manner with appropriate involvement of representatives of small and medium-sized enterprises, consumers,

[65] http://ec.europa.eu/enterprise/magazine/articles/industrial-policy/article_11065_en.htm?nl_id=1028

environmentalists, workers and organisations representing important social interests."

This section has described the discursive context with the aim to identify discourses, past and present, that can be associated with standardization and that are available to policymakers when constructing a policy argument in the EU context. One of the starting points of this thesis is that the challenge of Smart Grid is "not business as usual"(CEN/CENELEC/ETSI, 2011) for the standardization community. The next section considers how the challenge has been presented in the policy discourse.

4.3 Constructing Smart Grid standardization as a policy problem: Innovation and the legacy of the New Approach

The narrative that emerged is that standardization is generally best left to market players, the sheer scale and complexity of the Smart Grid calls for some form of coordination; the EU has a successful track record on standardization for policy objectives as illustrated by the New Approach experience. More specifically, the dominance of the innovation agenda in EU public policy in recent history has repercussions for the policy discourse that has emerged on Smart Grid standardization. In addition, and particular to the case of the EU, the legacy of the New Approach has a profound influence on how actors view the nature of standards as a policy instrument. It will be argued in what follows that the dominance of those two discursive influences has to a large extent defined what has been said about Smart Grid standardization in the official policy discourse in the EU.

This section explores how the justification of the non-discursive or behavioural action – intervention – was informed by existing dominant discourses – primarily by the innovation agenda. A structured and in-depth analysis of EU policy documents examines how the standardization process came to be characterized and – as a consequence of this characterization – how a policy response was articulated.

4.3.1 Continued dominance of the innovation and competitiveness agenda

The analysis of documents outlining the EU policy on Smart Grid standards reveals the enduring dominance of the innovation agenda discourse and its delegation of responsibility for standardization to industry. The threat of standardization leading to settling on inferior

technology is used to caution against intervention: "It is in any case of paramount importance that no regulatory scheme or requirement represents a barrier for the development in technology or application of necessary (new and "smart") solutions in the grid."[66] And in keeping with the view of standardization as best left to the private sector, the Commission expects industry to take the lead on standards for the Smart Grid, assuming a hands-off approach to its own role:

> Investors are still struggling to find the optimal model for sharing costs and benefits along the value chain. Neither is there clarity on how to integrate the complex Smart Grids systems, how to choose cost-effective technologies, which technical standards should apply to Smart Grids in the future, and whether consumers will embrace the new technology.

The way that standardization is mentioned in Smart Grid policy documents is characterized by an implied notion that because there is general agreement on the need for standards, if simply invited together, actors will be able to reach agreement on standards. According to this view, there is complexity in the effort but there is no suggestion that actors can have different interests. Thus the European Council of February 2011 recognized the important role of Smart Grids and invited Member States, in liaison with European standardization bodies and industry, "to accelerate work with a view to adopting technical standards … for smart grids and meters by the end of 2012".[67]

> In these situations, success will most likely be achieved through combining efforts and resources within a co-operative research, development and demonstration programme. In the absence of a central planning regime, this can only be accomplished if all stakeholders form a shared vision for

[66] EU commission Task Force for Smart Grids,Expert Group 3: Roles and Responsibilities of Actors involved available at: http://ec.europa.eu/energy/gas_electricity/smartgrids/doc/expert_group3.pdf

[67] Commission Communication, Smart Grids: from innovation to deployment, COM(2011) 202 12/04/11, available at: http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=COM:2011:0202:FIN:EN:PDF

> future grids and develop an implementation framework that is consistent with the liberalised business model. Smart Grid ETP 2006 (28)

While EU policy documents highlight the need for standards, they are relatively silent on their specific merits. The EU Commissioner for Energy, Günther Oettinger in his foreword to the Final Report of the CEN/CENELEC/ETSI Joint Working Group on Standards for Smart Grid is representative. It underlines the importance of Smart Grid for realizing a number of public policy goals, that standards are a prerequisite for the realization of this vision, and that we need those standards urgently. He mentions that the lack of standards is holding up investment hints at some specific effect that standards have, but this is not spelled out. This is understandable in a brief introductory statement, but the rest of the document remains silent on what standards actually do.[68]

> The development of smart grids is essential for Europe's energy policy. In order to integrate large-scale renewable energy generation, sustain security and resilience of the networks and realise energy savings we need an expanded and modernised network that makes best use of all the intelligent technologies available. European standards for smart grids, smart meters and charging interfaces with electric vehicles are a prerequisite to allow our industry to invest in and make use of smart grids. We need them as soon as possible: the longer it takes, the more investments are delayed.

Because the need for standards is taken for granted there is little attempt at educating the audience. In a similar vein, the Q&A document that accompanied the Commission Communication on Smart Grid: from Innovation to Deployment[69] contained this brief explanation about the need for standards:

[68] Standards for Smart Grids: Recommendations for smart grid standardization in Europe, extracted from the Final report of the CEN/CENELEC/ETSI Joint Working Group on Standards for Smart Grids, available at: ftp://ftp.cencenelec.eu/EN/News/Publications/SmartGrids.pdf

[69] Commission Communication, Smart Grids: from innovation to deployment, COM (2011) 202, April 2011, available at: http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=COM:2011:0202:FIN:EN:PDF

> Q. Why do we need common standards for smart meters and smart grids and when will they be available?
>
> A. Smart grids should integrate the actions of all energy suppliers and consumers connected to the grid and feature an intelligent monitoring system to track electricity flows in all directions in the EU. Common standards are necessary to guarantee the interoperability of all devices. European standards for smart meters and smart grids are expected by the end of 2012.[70]

4.3.2 Alternative discourses

Alternative perspectives are presented in the policy discussion, especially in the early days of policy deliberation, but they remain isolated in the discourse and ultimately are not included in final policy documents. The first publication of the European Technology Platform for Electricity Network of the Future (ETP) presents the smart grid as a win-win solution:

> In this way, research and innovation performance will be boosted and will lead to more growth, jobs and competitiveness for Europe. In addition, research and innovation will improve the sustainability of the EU, leading to win-win solutions for economic growth, social development and environmental protection.

There is seen to be no conflict between a shared vision and liberalized markets:

> A shared vision of the opportunities for all stakeholders remains an essential ingredient in successfully achieving efficient liberalised markets. Such a vision is fully compatible with a competitive commercial environment: it reduces investment risk; encourages the development of

[70] Q&A on the deployment of smart electricity grids and smart meters. MEMO/11/ April 2011, available at: http://ec.europa.eu/energy/gas_electricity/smartgrids/doc/20110412_memo.pdf

> common technical protocols and standards for open access; and avoids the likelihood of stranded assets and technology "dead ends".
>
> The process will require a trans-European approach along with harmonised frameworks and standards that promote innovation and its deployment.

Standards are needed to avoid situations lock-in:

> Establish shared technical standards and protocols that will ensure open access, enabling the deployment of equipment from any chosen manufacturer without fear of lock-in to proprietary specification. This applies to grid equipment, metering systems, and control/automation architectures.

Another example of this is the report by Expert Group 3 of the EU Commission Task Force on Smart Grids, where there is some evidence of economics of standards influence, linking interoperability standards to consumer switching costs and economies of scale: "Policy makers should assist in promoting harmonisation and standardization of data exchanges and customer processes at the European Union level *as this would facilitate supplier switches and allow economies of scale* [emphasis added]". Elsewhere it is specified that, "*Interoperability standards are key to ensure that customers do not face compatibility problems when switching suppliers, displays or some smart in home appliances."* [71]

The report also recommends government intervention in the form of regulation or active participation in standardization but these recommendations have not been taken on board by the Commission.

> Necessary legislation for imposing cross-industry standardization (energy and ICT) and […] will be required.

[71] EU commission Task Force for Smart Grids,Expert Group 3: Roles and Responsibilities of Actors involved available at: http://ec.europa.eu/energy/gas_electricity/smartgrids/doc/expert_group3.pdf

> Participate in Smart Grids discussions and cooperation activities among stakeholders and especially to consider an active cooperation with European and national standardisation organisations, grid operators and manufacturers, for example on open protocols and standards for information management and data exchange, in order to achieve interoperability of smart grid devices and systems […][72]

While policymakers continue to evoke the New Approach in order to hail the virtues of the European standardization system, crucially, as pointed out by the CEN/CENELEC/ETSI JWG report, the New Approach was based on legislation outlining essential requirements, whereas policymakers have not shown intention to legislate in the area of Smart Grid interoperability.[73]

A consequence of the enduring influence of the language of the New Approach is that ICT interoperability standards is seen in the same light as other types of standards, e.g. safety and environmental standards. Indeed, when standards are mentioned in an EU policy setting, it is most often with reference to their role in achieving harmonized safety of products. One of the findings of this analysis is that this lack of distinction between different types of standards has made communication about the effects of interoperability standards necessary for Smart Grid more confused. In EU policy documents, standardization, as part of the New Approach, becomes something wholly but vaguely good for consumers, the environment and the market. And it is something that the EU has a clear track record on, indeed the EU is presented as a role model to be emulated: "[The New Approach] has already been used as a basis for creating an international model for WTO/TBT's conforming technical regulations in the framework of the United Nations Economic Commission for Europe (UNECE)".

In addition, different DGs of the Commission contribute to the policy discussion on Smart Grid standards, which could contribute to incoherence. While EU Smart Grid policy, including

[72] Ibid

[73] http://www.etsi.org/WebSite/document/Report_CENCLCETSI_Standards_Smart%20Grids.pdf

the standardization aspect is a policy that falls within the remit of the DG for Energy, standardization generally has been the responsibility of DG Enterprise and Industry. Reflecting the special importance of standards for the ICT sector, DG Connect has also taken a growing interest in standardization – standardization is a highlighted area in the Digital Agenda and often mentioned in speeches by then Commissioner Neelie Kroes – but does not have a legislative remit in this area.

The way that EU policy documents are written allow for little evidence of direct intertextuality. Legislative texts typically reference only prior legislation or other Community documents. Reports by expert groups are written in a way that does not consistently reveal sources of thinking. Typically, only few references are provided and they mainly refer to Community documents that form the basis of the group's mandate. As an example, the report by Expert Group 3 referenced above lists a total of 9 references. Mainly references to previous EU policy documents. Consultation documents, expert groups and stakeholder platforms. There are only scant references to academic research or policy developments in other countries. An exception is when the Commission publishes the result of a consultation. Another exception is where an expert group fails to reach consensus and the viewpoints of individual organizations are provided in a footnote or an annex. The CEN/CENELEC/ETSI report does include an inventory of Smart Grid standardization road maps internationally, including those of the US, Japan and China.

4.4 Silent discourses

The following quotes provide a specific snapshot of a) the nature of the challenge of implementing the Smart Grid, and b) the state of roll-out in the EU as of March 2013:

> Smart grid, in many regards, doesn't involve a lot of technology that hasn't been in play for many years. What's different is the communications element, the information sharing.[74]

[74] Sam Sciacca, president of SCS Consulting , LLC, member of IEEE, quoted in: Intelligent Utility (Nov 11, 2012), "Industrial substations and bi-directional power flows: Solid state transformers coming, but standards guide current work", http://www.intelligentutility.com/article/12/11/industrial-substations-and-bi-directional-power-flows (accessed on 3 March 2013)

> The electrical transmission and distribution industry [in the EU] consists of both public and private ownership and is large scale and relatively strong financially. The supply side is strong as European manufacturers are leaders in electric grid technology and deployment of smart grid. *On the negative side, regulatory policy on standards and interoperability is weak and the decentralized nature of utility markets leads to difficulties in sharing of technology demonstration programs* [emphasis added].[75]

The sources of both quotes are from outside the EU policy-making community.[76] Without making any claim as to the validity or representativeness of the two comments, they are included here as a way to represent an outside view of the challenge of implementing the Smart Grid in the EU. Specifically, and for the purpose of argument, this snapshot could be used to make the following claim: implementing the Smart Grid is not so much about promoting innovation but more about the need for coordination and a strong regulatory policy on interoperability standards. A 2013 report by the European Commission's Research Centre indeed comes to a similar conclusion: "Key barriers appear to be policy-related, social or regulatory, rather than technical[.]", highlighting the lack of interoperability standards and of regulatory coordination.[77] Similarly, a report by McKinsey concludes that a critical impediment to the advancement and adoption of smart grids in the EU is the absence of a well-defined and coherent regulatory framework. The report foresees that the EU will face difficulties in building transnational systems and that despite the establishment by the EU Commission in 2009 of a Smart Grids Task Force, a key challenge for the EU will be aligning

[75] Electric Light and Power: "State of the Smart Grid, 2013" (March 2013): http://www.elp.com/blogs/views-of-the-smart-grid/2013/03/state-of-the-smart-grid-2013.html

[76] The first is a quote from a presentation given by a private energy consultant and the second is taken from a non-academic online magazine dedicated to the private energy sector.

[77] http://ses.jrc.ec.europa.eu/sites/ses.jrc.ec.europa.eu/files/documents/ld-na-25815-en-n_final_online_version_april_15_smart_grid_projects_in_europe_-_lessons_learned_and_current_developments_-2012_update.pdf

the initiatives of the many EU Directorates and other bodies currently charged with Smart Grid initiatives and aligning the policies of the Member States.[78]

In a comprehensive survey of the state-of-the-art of Smart Grids, including technical, management, security, and optimization aspects, along with an EU regulatory overview, Ardito et al conclude that:

> The biggest obstacle to standardization, and in general to smart grid implementation in Europe, from our point of view, is given by the complex situation of the European energy market, where regulated and liberalized regimes still coexist. In regulated markets, the main grid operator establishes a monopoly business that does not allow consumers to choose among different technologies.
>
> One of the facts that this survey has shown is that, from a technological point of view, there are plenty of solutions already available. Several management systems have been tested and are ready for deployment. However, another fact is evident: although many different standards exist, especially for data communication and protocols, few of them have been widely accepted for application in energy distribution networks. (Ardito et al., 2013)

The suggested remedy would be to adopt "a common view of the problem, focusing on interoperability and supporting the creation and affirmation of technology standards." (Ardito et al., 2013) Yet, as we saw in the previous section, this is not how the challenge came to be defined in the EU policymaking context.

4.5 Chapter summary

[78]http://www.mckinsey.com/~/media/mckinsey/dotcom/client_service/EPNG/PDFs/McK%20on%20smart%20grids/MoSG_Europe_VF.ashx

The EU has a policy of standardization that dates to the 1970s. This chapter has analysed the presence, absence, influence and interactions of different discourses in the Smart Grid standardization policy documents against its argumentative context of available discourses.

The typology of discourses developed shows that there exist in the EU is a range of available discourses on standardization. However, the narrative that developed on Smart Grid standardization draws on only a limited discursive repertoire. The result is a policy discourse where the outstanding features are:

- Necessary for the development of the Smart Grid
- Needed for industry to invest
- Focus on innovation
- Drawing on the experience of the "New Approach"

While behavioural action is taken – a mandate from the European Commission to the European Standards Organisations to develop standards for the Smart Grid – the challenge is not considered as novel or as something requiring an extensive information-seeking exercise. Instead the policy builds largely on existing institutional arrangements on standardization, with a focus on innovation and industry leadership and with references to the New Approach as evidence that the EU approach to standardization is something that has worked to great advantage in the past. The institutional setup is not challenged because "our institutions did well in the past and that they will prove their value now" (Hajer, 1996, p. 121).

As we have seen, a striking feature of this part of the empirical analysis is that despite the fact that EU Smart Grid policy documents place a very high priority on achieving an agreed set of standards, there is relatively little text dedicated to the nature and details of the challenge. This is in contrast to the quite substantial body of policy documents relating to standardization in the EU in general. In short, policy documents on the Smart Grid mention standards often and with a sense of urgency, but with little elaboration. Discourse theory suggests that the way certain discursive concepts are taken for granted and seen not to require explanation is a sign that a discourse has become dominant within a policy area. A

direct consequence is a policy process containing less in-depth discussion and where new ideas are not sought.

In the next chapter, the comparison of the EU and US case studies will allow us to draw out similarities and differences in the respective communicative discourses. Characteristics will be more noticeable. The second part of the chapter will analyse the findings through a different theoretical lens that draws on concepts from neo-institutionalism to explain differences between the two case studies.

5 Making sense of contrasting narratives – considering discourse through the lens of neo-institutionalist theory

"The practical world is a constant source of conceptual challenges, and it is right that we should try to reassess our concepts and ideas in the light of the manifest problems that empirical work identifies." (Sen, 2006, p. 30)

The case studies presented in chapters 3 and 4 of this thesis centred on discourse to understand how public policy response to the Smart Grid standardization challenge was constructed in the US and in the EU respectively. What emerges as a significant finding is that EU and US official policy discourses, though appearing similar at the outset, differed quite significantly in several aspects. Interestingly, and contrary to what might be expected based on the existing literature on standardization and public policy, the US federal government appears to have adopted a more explicitly interventionist stance than the European Commission, both in its discursive and behavioural action. This policy of intervention was legitimated by drawing on the discourses of economics of standards and antitrust literature, by emphasizing the exceptional nature of the Smart Grid standardization challenge, by frequently referring to the Smart Grid project as a national project of historical proportions, and by emphasizing the need to "future-proof" the significant amounts of public investment made.

By comparison, and despite calling the challenge "not business as usual", the EU policy discourse on Smart Grid standardization signalled less of a need for change from existing practice. The policy response was built on the notion that the existing standardization system functioned and that it served the EU well in the past. The challenge posed by the need to agree on a set of interoperability standards was seen as both urgent and of great

complexity and scope and therefore warranted some coordination effort by the Commission. However, given that the challenge to achieve interoperability was framed primarily as a technical issue this was seen mainly a matter of coordination to bring different sectors together in the process – and not about intervening directly to ensure a balance of interests or achieving specific outcomes. The size of public investments did not feature in the policy discourse; rather the focus was on the relationship between standards and innovation and on standards being needed for industry to invest in new technology. A result of this framing of the discourse was that standards – while acknowledged as being urgently needed – were seen as needing to come when industry players and technology were ready, and this was largely for the standardization community to determine. Consultation targeted existing stakeholders and policy arrangements and the story-line was framed in win-win terms, where it was seen in the best interest of all involved to agree on standards as soon as possible. As a result, the notion of trade-offs and competing interests were left out of flagship policy documents, although traces could be found in documents that served as input to the policy process. The typology of discourses presented in chapter 4 shows that the storyline that emerged drew on a limited number of available repertoires, marginalizing other discourses that have at some point or in some context been associated with standardization policy in the EU.

Despite a period of unprecedented focus on standardization by governments in the US and the EU, policy efforts in both cases ultimately delivered disappointing results. The aim of this comparative chapter is to explore a range of factors that may have contributed to this outcome. Section 5.1 builds directly on the findings in chapter 3 and 4. It employs concepts drawn from discourse theory to compare and contrast the policy narratives that developed in the US and the EU. Recalling the discussion in chapter 1 and the suggestion that standards have become increasingly crucial and urgent while reaching agreement has become more difficult, it considers to what extent policy responses acknowledge this dilemma. In subsequent sections of the chapter the analytical framework is then extended to include concepts drawn from neo-institutionalism. Section 5.2 considers the influence of institutional and policy legacies in the standardization domain as well as the overall characteristics of the political system using the concept of *policy style*. Section 5.3 focuses on exogenous events, situating the policy response to smart grid standardization in the

context of the overall saliency of energy politics and the global financial crisis. The concept of *policy entrepreneur* is then used in section 5.4 to understand the role played by NIST in the US and to evaluate its usefulness in the case of the EU.

It should be emphasized that there is no separate empirical investigation into formal institutions because the type of discourse analysis pursued in this thesis is not only about text, but also includes the context in which it occurs. The aim is rather to view the empirical material through a different lens and to consider factors that might help to make sense of the observed differences – and commonalities. In taking this approach, the thesis responds to authors like Stern (2014) and Sovacool and Hess (2017) who have called for a more interdisciplinary approach to advance the understanding of energy issues, arguing that "nothing advances theory better than tackling a practical problem by integrating different perspectives" (Stern, 2014). Separating discourse, institutions, and agency could at some level be viewed as arbitrary because also neo-institutionalists view institutions, at least partly, as *discursive* constructs, and actors as *discursive* agents. However, as discussed in chapter 2, applying neo-institutional theoretical concepts in a way that views institutions as separate to agents adds clarity and allows for critical thinking and further understanding about findings that at first appear puzzling (Bell, 2011). Considering the explanatory power of a combination of agency and structural factors is in line with the conceptual framework outlined in chapter 2.

5.1 Justifying government intervention in standardization – contrasting storylines

Chapters 3 and 4 analysed the official discourse that emerged around smart grid standardization in the US and the EU respectively. In this first comparative section, major differences between the two cases, as well as some important commonalities, are highlighted. Relatively early in the research it became apparent that the US policy discourse offered a richer source of material than what was available for the EU – there were simply more documents that focused on Smart Grid standards and that dealt with the challenge in more detail. A number of semi-structured interviews were conducted with European standardization experts to ensure that no significant insight was missed, but from the perspective of discourse theory the finding is in itself significant: it suggests that although

the smart grid challenge was described as “not business as usual” by the EU standardization community, it was not in the policy discourse considered as a novel challenge. The EU, which had a long-existing policy on standardization, relied primarily on an already established legal and policy framework. In contrast, perhaps partly because the US did not have a coherent system in place, or to make a stronger case for change, more effort was made to establish basic policy arguments for public involvement in standardization. This underlying difference will be considered further in section 5.2 when considering the influence of institutional factors on the policy discourse.

5.1.1 Economics of standards discourse

One aspect in which US and EU policy documents vary quite significantly is the extent to which they focus on the expected benefits of achieving a set of interoperability standards for the Smart Grid. Throughout, US official documents draw extensively and explicitly on the economics of standards discourse (table 1.1), including direct references to academic literature. A comprehensive account of the benefits expected from the agreement on standards for consumers and for public investment is used to legitimate the role of the public sector as a convener and as a catalyst. Key documents refer to and detail specific market effects of standards, including their role in facilitating trade, increasing competition, decreasing vendor lock-in, allow economies of scale, and building critical mass. In addition, US texts contrast these positive effects with the negative consequences of failing to achieve standardization. This use of contrasts to strengthen the appeal to action is further outlined below.

In the EU, while knowledge and use of the economics of standards discourse is evident in several policy documents on standardization policy in general, references to this discourse are few in the specific documents relating to standardization for smart grid. Flagship texts state in quite general terms that standards for smart grid are crucial and urgently needed. As regards specific effects of standards, in the few cases when they are mentioned, they relate primarily to the role of standards for innovation and the way standards help build critical mass to give industry confidence to invest and for markets to take off. This lack of details in the communicative discourse is at least partly a reflection of the fact that while there are numerous policy documents on the overall role of standardization in the EU, there are fewer on the specific role of standards for smart grid. The interpretation offered by

discourse theory is that there is not a perceived need in the Smart Grid context to revisit the basic arguments for standards because communication is mainly aimed at expert audiences. Smart grid standards are not considered to be of general interest and consequently there are no new audiences to persuade.

5.1.2 Trade-offs and competing interests

The introductory discussion in chapter 1 drew on insights from the systems engineering literature to outline various factors which make agreement on standards increasingly difficult. Liberalized markets lead to dispersed ownership and stakeholders with diverging goals and priorities. At the same time, in the absence of a central authority, the system relies on collaboration and voluntary action. A significant finding of chapter 4 is that this perspective is missing in the EU policy discourse which emphasizes instead the broad agreement on the need to make progress on standardization.

By not acknowledging that there are conflicts and that the "market" can be uncompetitive, the EU policy discourse on smart grid standards resembles the positive-sum game scenario of the "sustainable development" storyline described by Hajer (1995). The documents do not explore the basic contradiction of why government action should be needed when standardization functions well in its current setup. The overall view of standardization thus aligns with the characterization by Meyer (as cited in Brunsson and Jacobsson, 2000: 44), that "[t]he participants are, in their voluntary activity, simply doing reasonable social action given the prior and taken-for-granted scientized context." While the standards literature describes many reasons why standardization outcomes may be suboptimal (S. Greenstein & V. Stango, 2007, p. 4), EU policy documents appear to equate industry-led with a well-functioning "market". However, this impression of a concerted effort in the EU contrasts with Uslar's observation that, "a lot of time in standardization is wasted discussing about input from third parties who try to influence the Smart Grid agenda with their products without actually solving the known problems which have been well documented." (Uslar, 2013, p. 231)

Table 5.1 Comparing discourses - key similarities and contrasts

Storyline element	**US discourse**	**EU discourse**
Why are standards needed?	Standards are **crucial and urgent** for smart grid development	Standards are **crucial and urgent** for smart grid development
Why is government intervention necessary?	**Competing interests**: behavior of private actors does not always benefit the overall society	**Coordination challenge**: diverse communities need to be brought together
What is the role of government?	**Stronger role:** the government can act as an **"honest broker"**	**Limited role:** The government can **encourage dialogue** and coordination
Who is impacted?	**Society as a whole**: including industry, public sector organizations, and consumers	**Mainly industry** which needs standards to invest in new technology
What are relevant audiences?	Communication is made to a **wider set of audiences**, using non-technical language and more developed arguments	Communication is with **existing (expert) stakeholders**; the need for standards is communicated without supporting arguments
Is there a challenge to institutional arrangements?	Smart grid standardization requires some policy innovation but there is **no basic challenge to the system**.	Smart grid standardization requires some policy innovation but there is **no basic challenge to the system.**

In contrast, key US documents make a distinction between standards agreements and a perfectly functioning market. The influence of the antitrust discourse means that standardization activities can have a different outcome than is desirable for society. The possible uncompetitive aspects of industry agreements are recognized, for example by suggesting that federal and state officials would need to monitor smart grid and energy initiatives in order to protect consumer options and prevent anticompetitive practices (EOP,

2011, p.4). The pervasive influence of antitrust language was confirmed by a European expert interviewed who noted the influence in the US of the Department of Justice and a focus on competition. While the US policy discourse acknowledges possible challenges to achieving agreement and contain policy statements that accept and address conflicts, the antitrust perspective is arguable somewhat limiting. The uncompetitive behaviour and efforts by certain companies to lock consumers in is seen as the problem rather than the legitimate differences in goals and priorities that are inherent among the broad set of stakeholders involved. In addition, the influence from competition law also affects the potential role of the government with a focus on ex ante intervention and legal action rather than a more proactive role to facilitate agreement.

5.1.3 Who benefits from standards?

EU and the US policy discourse both recognize the urgent need for smart grid standards. Policy documents consistently identify standards as a prerequisite for large scale deployment and mention them near the top of priority areas for realizing the Smart Grid. Prefacing the final report of the JWG on standards for smart grid, the Commissioner in charge emphasized that standards were a prerequisite to allow industry to invest in and make use of smart grids and that they were needed as soon as possible in order not to delay those investments.[79] Similarly, in the US, the NIST roadmap emphasized the urgent need to establish protocols and standards, highlighting that deployment of smart grid elements were already underway and would be accelerated as a result of government grants and incentives, and warning that without standards sizable public and private investments could become obsolete prematurely and without measures necessary to ensure security.

Though the messaging above is similar, the statements also convey significant differences that can be found throughout in the policy documents: the EU discourse emphasizes that the policy is there to help industry invest whereas the US also mentions the substantial amount of public investment that have been made towards the building of the Smart Grid. This notion that smart grid standards in the US are portrayed a wider concern is an important

[79] Standards for Smart Grids: Recommendations for smart grid standardization in Europe, extracted from the Final report of the CEN/CENELEC/ETSI Joint Working Group on Standards for Smart Grids, available at: ftp://ftp.cencenelec.eu/EN/News/Publications/SmartGrids.pdf

finding and is evident not only in how the problem is characterized but also in the style and language used. Compared with the EU texts, US documents are written to appeal to general audiences and not just experts.

Take for example the regular use of contrast in the US discourse which is absent in EU documents. US policy texts frequently hold up the possibility of greatness if the country succeeds in building the 21st century grid and contrasts this with the threat of "balkanization" and "stranded investments" if interoperability through standards is not achieved. As outlined above, this rhetorical device is employed quite consistently in key US documents also by systematically outlining all the positive effects of standards, again contrasting this to the detrimental effects of the lack of standardization, including the substantial waste of public funds resulting from investment in technology that becomes obsolete, "balkanized" markets that would limit trade for US companies, and anti-competitive behaviour of firms leading to lock-in and increased prices for consumers.

In general, there is in the US discourse more frequent use of colourful metaphors such as "catalyst", "honest broker", "silos", the need to avoid "balkanization" and the "tower of Babel", etc. There are several possible explanations for this, one being a general difference in style and culture between the EU and the US (see 5.2.2). Also, because EU documents are drafted in a multilingual environment there can be a tendency to stay away from words that do not translate well. However, because the Commission has used this sort of populist appeal in other cases – notably with regards to standardizing phone chargers (see chapter 1), it can be argued that the difference is more to do with the specific case where the communication in the EU is targeting existing (expert) stakeholders whereas an effort is made in the US for more mainstream appeal. The differences can be further observed when analyzing the relevant webpages of NIST in the US and those of DG Energy, the ESOs and JRC in the EU. While the EU websites mainly present in brief terms what action is being taken, the NIST website is designed to present the challenge and to engage – for example through the Green Button initiative which is explicitly aimed at consumers, and by having material that explains the Smart Grid standardization challenge in layman language, including simple images and illustrations. The overall impression is that the US discourse is aimed towards

building a strong case for intervention, partly by reaching out to generalist audiences through the use of contrasts, metaphors and images.

Again, the main reason for drawing out these observed differences is not to evaluate which way of communicating is preferable. When presented with this particular finding – which showed a marked contrast between the communicative discourse in the EU and the US – experts from the European standardization community insisted that there was no need to elevate standardization to a higher level of politics and extending the policy discussion to new audiences. They suggested rather that the societal aspects were already exaggerated in policy documents and emphasized that in most cases standardization mainly concerns industry. Others agreed, however, that in the case of standards with a societal dimension there might be a need for an "honest broker".

5.1.4 Storylines accommodated within institutional arrangements

Recalling chapter 2, a new story-line can be formulated in a way that it can be accommodated within the existing institutional arrangements or that it challenges them (Hajer, 1995). Despite the differences outlined above, it is important to underline that in neither case is there a fundamental questioning of the practice of using voluntary industry standards to achieve Smart Grid interoperability. In fact, EU and US policy discourses are quite similar when it comes to their assertions that standardization should remain in the hands of the private sector. Accordingly, what needs justification in this context in both places is that government intervenes in the standardization process rather than the fact that industry standards are used to obtain societal objectives – a form of delegation of responsibility to private sector. Both the US and the EU emphasize the private, bottom-up, non-mandatory aspect of standardization. Although the US documents foresee a stronger role for government in bringing about standards for the Smart Grid, this was not sustained over time. Crucially, NIST's mandate was limited in time and did not amount to a fundamental re-evaluation of the respective roles of government and the private sector in standardization.

Thus, in neither case was the policy intervention formulated as a fundamental challenge to the existing arrangements and the first signs of policy failure did not lead to a repudiation of the system. In the US, while explicitly provided for in EISA, NIST only made one attempt to

submit standards to FERC for formal adoption: in 2010, when five families of standards were presented as ready for consideration by regulators. 9 months later, FERC claimed there was "insufficient consensus" to institute a rulemaking. Instead, it encouraged utilities, smart grid product manufacturers, regulators, and other smart grid stakeholders to actively participate in the NIST interoperability framework process. In Europe, a 2014 Resolution by the European Parliament recalled that the Standardisation Mandate to support European smart grid deployment had been due for completion in 2012 and called for more progress and the active involvement of the Commission including the issuing of a new Mandate. The Commission, however, did not respond to this policy failure with an evaluation of the process and now considers the mandate fulfilled.

5.2 Exploring the importance of institutional and political context

The previous section compared the communicative discourses of the US and EU on the Smart Grid standardization challenge, elaborating on the somewhat unexpected picture that emerged from chapters 3 and 4. As may be recalled, previous accounts of the relationship of public policy and standardization have tended to characterize the EU as more interventionist than the US government. The remainder of this chapter will explore a number of factors that might contribute to explaining such diverging storylines. Theoretically, and as a way to provide structure, the following sections draw on the conceptual framework developed in chapter 2. Broadly housed in a line of inquiry that has been described as discursive institutionalism (Schmidt, 2008, 2010), the approach focuses on how discourse is constructed within institutional and political contexts and takes into account the role of human agency. In this section, insights are first drawn from historic institutionalism in order to help in understanding how *policy and institutional legacies* (Béland, 2006) impact the on-going process of problem formulation. Additional insights offered by such concepts as *policy style* (Mazey & Richardson, 1993) are also considered. Subsequent sections will focus on the explanatory powers provided by the general political climate and the potential role of individual actors.

5.2.1 Institutional and Policy legacies

The approach taken in this thesis emphasizes the role of institutional and political contexts to understand how policy responses to the Smart Grid challenge have been constructed.

While rejecting an overly deterministic view, the theoretical framework developed in chapter 2 draws on neo-institutionalist writings in acknowledging that existing institutions and previous policies very often influence the conception of what the problems are and how they should be defined (Béland, 2005). *Institutional legacies* influence the behaviour and strategy of the involved actors (Pierson; Pierson and Weaver) and establish some groups as being the relevant stakeholders whose views need to be considered by policymakers (M Weir, 1992, quoted in Beland, 2009). Following the logic of availability, policymakers tend to draw lessons from not too distant *policy legacies* (Béland, 2006), often resulting in old policies being proposed to new problems. In addition, *policy feedback* means that decisions taken early in the process have implications further on.

Compared with the US, the EU standardization policy domain has historically been characterized by a higher level of institutionaliszation. The EU has a formal legislative framework on standardization whereas the US policy consists of a handful of documents that emphasize that standardization should be industry-led and bottom-up (Rachakonda et al., 2018). As established in the previous section, however, the more interventionist policy response by the US to the Smart Grid standardization challenge does not conform to the typical characterization of EU and US policy in this area. In particular what stands out is the prominent role played by NIST in the US process, compared with the EU decision to give a similar yet more limited role to the newly created Joint Working Group (JWG) of the three European Standards Organisations (ESOs) – CEN/CENELEC/ETSI.

As described in chapter 2, the Energy Independence and Security Act of 2007 NIST, a non-regulatory federal agency of the Department of Commerce, to coordinate the standardization effort and provided specific funding for the effort. While NIST had not previously played a significant role in ICT standardization, the fact that it was an established public body[80] with significant resources and a clear mandate enabled it to take an active role. The presence of a formal institution in combination with weaker institutionalization of the policy domain could also explain the broad engagement that took place in the US. There is no equivalent to NIST in the EU and as the Commission attempted to emulate the process

[80] NIST was founded in 1901, the same year as the establishment of the British Standards Institute (BSI). It has a staff of about 3400 and an annual budget around USD 1 billion.

already underway it gave a similar yet more limited role to the newly created JWG. While given a formal role in EU legislation and firmly established as relevant stakeholders, the ESOs are in fact private, non-profit organizations and thus from the outset had a weaker basis of authority for carrying out its assignment.

While very different in terms of constitution, resources, etc. these two bodies were given responsibility for a similar coordination task. For example, when progress on Smart Grid standardization was compared in an international context, it was the NIST roadmap and the JWG Final Report on Standards for Smart Grids that were compared. At international conferences, the JWG Chair – a Siemens employee – was called on to speak about the European standardization effort on the international arena. And when an agreement was signed on EU and US cooperating on Smart Grid standardization this was signed by NIST and the JWG[81] – not between NIST and DG Energy. However, compared with NIST, the ESOs lacked formal legitimacy and had fewer resources to fulfil a policy role.

This initial decision also produced policy feedback that had important consequences for the way that the problem continued to be defined. NIST had an interest in justifying the political aspects of its role and the need for an 'honest broker' from the public sector. The ESOs on the other hand, with mostly industry participation, had an interest in continuing to present the problem as one of a purely technical nature. As the previous section showed, the standardization challenge in the EU has been framed as a technical one and this creates incentives both for the Commission and the JWG to maintain a low-profile learning process within existing policy arrangements. While the EU has invested large amounts of public funds in Smart Grid projects, public investment in the Smart Grid does not feature extensively in the EU discourse. Because of the existing practice of the Commission to delegate to standardization organizations, it is not in its interest to bring attention to non-technical aspects of standardization. Such focus on potential problems would make the Commission vulnerable to criticism for having delegated such tasks in the first place.

[81] U.S., Europe Collaborating on Smart Grid Standards Development, September 13, 2011 http://www.nist.gov/smartgrid/grid-091311.cfm

As underlined by Baumgartner and Jones, the framing of a policy problem is significant because it also determines who is invited to be part of the decision-making process: "When [policy problems] are portrayed as technical problems rather than social questions, experts can dominate the decision-making process. When ethical, social or political implications of such policies assume center stage, a much broader range of participants can suddenly become involved" (Baumgartner and Jones, 1993). In the EU, one of the consequences of a communicative discourse that does not draw wider connections, e.g. between interoperability and consumer prices and public (taxpayer) investment, is that unless there is an issue specifically relating to the consumer, such as the Smart Meter interface, consumer groups are not seen to be implicated. This narrow view of what concerns the general public was mentioned by one of the experts interviewed for this thesis.

Table 5.2 Impact of institutional and policy legacies, policy feedback, and policy style

Neo-institutional concept	**US**	**EU**
Institutional legacy	**NIST is federal agency for standardization** founded in 1901	**No EU-level agency** for standardization
	Lower level of institutionalization of standardization as a policy domain: - Policy documents favor bottom-up standards - Government agencies interact with a multitude of SDOs	**Higher level of institutionalization** of standardization as policy domain: - Formalized system set down in European legislation - The three ESOs are given a formal role as European standardization bodies
Policy legacy	Overall policy favoring **bottom-up and industry-led**	Government-led policy in traditional sectors but favoring **bottom-up and industry led in ICT.**
Policy feedback	Initial decision contributed to continued **broader societal focus justifying government role.**	Initial decision contributed to continued **narrow industry focus justifying delegation to experts.**

Policy style	**Relatively open** to outside ideas and academic influence.	**Relatively closed** and corporatist**.** Consultation with limited group of experts.

The ESO's, acting as agents for the Commission, have a need to strengthen the basis of their authority. The way standardization organizations can do this is to emphasize the technical, neutral aspect of its work (Hallström, 2004). The resulting dynamic ensures that the problem remains technical in its definition. Comparing the NIST roadmap with the final report of the JWG, the latter contains fewer policy statements. In contrast, the decision in the US to give funding to NIST and a legislative mandate to drive the issue gave both means and an incentive to that organization to justify and bring attention to the importance of its work. In the US, the problem was formulated as one needing government coordination because of the recognition that industry players in the standardization arena can behave in ways that are counter to the public interest. Giving the role of coordinator to a public agency and providing this agency led to continued communication to justify the intervention of government.

It was mentioned above that a major difference between the cases is that the US communicative discourse on Smart Grid consists of significantly more material than what has been produced in the EU. Certainly resources play a big role in explaining this divergence, and is in itself a measure of the political importance placed on tackling the challenge. NIST is a government body that has 3400 staff and an annual budget of $567M (USD).[82] While the Smart Grid standardization effort – and the role accorded to NIST as a convenor – was indeed "unprecedented", NIST staff regularly participates in standardization activities to a greater extent than EU public officials. NIST had an existing department responsible for relations with universities. In addition, EISA authorized a budget of $5 million to the Institute to support its Smart Grid coordination activities for the years 2008 through 2012. The CEN/CENELEC/ETSI document mentions that the ESOs were not given a mandate based on

[82] http://www.acus.org/files/Wollman.pdf

legislation and that they were not been given a budget to communicate about the effort and to participate in processes at the international level.

It is also relevant to contrast the focusing effect of having NIST as the convenor of the Smart Grid standardization effort, with the somewhat complicating effect of the institutional setup within the European Commission. The challenge of policy coherence in general in the standardization policy domain has been described by Hommels et al (2013), and in the specific case of Smart Grid, DG Energy cooperated with the DG ENTR which has general responsibility for standardization policy. DG Energy in its work with Smart Grid policy did not make the issue of Smart Grid a problem that requires new inquiry. It borrowed its policy discourse from DG ENTR, but mainly the topline messages. Meanwhile, knowledge about the role of interoperability in ICT lies with DG Connect and knowledge about the public cost of lack of interoperability and possible uncompetitive behaviour of firms lies with DG Competition. The result of this complicated scenario was noted by one of the experts interviewed for this thesis.

Both in the EU and the US, history is evoked in the communicative discourse in order to legitimate policy choices. In the EU this is the history of the New Approach which provides legitimation for preserving current institutional arrangements. Central to the communicative discourse in the US is the role of NIST. US policy discourse presents NIST as having a long history of acting as an honest broker. Giving NIST the responsibility for coordinating the Smart Grid standardization effort thus becomes a natural act. However, NIST has not consistently been intervening directly in the standardization process. In fact, one of the European experts interviewed for this thesis complained about the difficulty in getting NIST involvement in trans-Atlantic efforts to coordinate standardization efforts. Somewhat paradoxically, the US did something novel but presented it as normal. In the communicative discourse of the EU, the procedure followed is also described as normal although the mandate given to the ESOs differed from typical New Approach practice.

5.2.2 Characteristics of the political system: policy style

A significant finding in the previous chapters was the strong discursive influence of academic research that was evident in US policy documents but absent in the EU communicative discourse. Specifically, key US documents draw heavily on the economics of standards and

antitrust literatures to make a stronger case for government intervention in the Smart Grid standardization challenge. The White House report is written in an almost academic style with hundreds of references. In contrast, of the two EU documents that deal specifically with Smart Grid standardization at some length[83], one of them lists 20 references, most of them other EU documents and no academic references. The second lists a total of 9 references and none of them academic.

Another difference is in the nature of the consultation process in developing the standardization roadmaps, where the number of participants involved in the US case far exceeds those involved in the EU context. NIST mentions that the number of organizations represented in the SGIP was over 800 and that thousands of people had contributed to the research report developed together with an outside contractor. In contrast, the process in the EU was characterized by close consultation with a significantly smaller set of stakeholders in the various designated expert groups.

Several factors may contribute to these observed differences. One explanation can certainly be found in the institutional setting and resources described previously.[84] Another explanation is offered by the concept of policy style. Several scholars have previously commented on the relative openness of the US federal government and a practice of consulting widely with outside experts (Béland, 2009). It has also been suggested that the US government is relatively open to new ideas originating from outside the government itself (M Weir, 1992). The US "parapolitical" landscape extends to established think tanks and academic institutions that typically operate independently from political parties and government entitites (McGann and Weaver, 2000). In contrast the EU policy style is more corporatist and characterized by more limited-scope consultation with known players, notably with industry organizations. Much of the input to the policy process is written by

[83] A majority of the EU documents included in the analysis contain only a few sentences stating the need for Smart Grid standards. The two main exceptions are the CEN/CENELEC Final report and the EU Commission Task Force for Smart Grids, Expert Group 3: Roles and Responsibilities of Actors involved in the Smart Grids Deployment.

[84] NIST had a department dedicated to maintaining relationships with academic institutions, and EISA granted NIST a 5-year budget to work specifically on Smart Grid that included reaching out to academia which led to cooperation with specific academic institutions which produced a series of conferences and publications aimed at informing the process led by NIST.

expert groups consisting of existing stakeholders. These documents take on a quasi-official status and there is less influence from academic research and outside experts.

5.3 Exogenous factors – Political Climate and Timing

This section considers the political context in which standardization on Smart Grid takes place. As outlined in the conceptual framework chapter, the political context includes a range of factors, including election outcomes, changes of administration, interest group advocacy or shifts in public sentiment. The influence of such factors can be discerned from the analysis of policy statements accompanying the pledging of funds (Guldbrandsson & Fossum, 2009). An important consideration for the purposes of this thesis is the overall political salience of the Smart Grid issue and the terms in which debate takes place, here captured in the extent to which it can be characterized in terms low- and high-level politics. Another consideration is the importance of temporality and extraneous events, specifically the effect of the financial crisis of 2007-2008, which came to impact the two cases in different ways.

5.3.1 The imperative of Smart Grid

As was mentioned in the introductory chapter, smart grid is attractive to policymakers because it is presented as solving the economic crisis (through "green innovation" and jobs) while at the same time taking action to tackle the problem of climate change. Smart grid is an important policy area but it is not (yet) polarized or highly contentious – in fact it can be criticized for being presented as a win-win project that politicians and industry can get behind without having to make serious adjustments. In particular, the need for interoperability based on standardization is hardly contested. While smart grid has some of the marks of a high profile issue – insofar as it is linked to climate change, jobs, and security – standardization for Smart Grid is not.

However, a number of factors contribute to making the issue more high profile in the US than in the EU. As we saw in chapter 4, the blackout of 2003 was a major driver behind US making forward strides on Smart Grid (Coll-Mayer, 2007). In the EU there was no similar experience with the basic function of the grid, making the Smart Grid fall into the category of nice to have, as opposed to being of critical necessity. This higher degree of urgency for modernization of the US grid was emphasized by one of the European experts interviewed

for this thesis who highlighted that the outdated grid and blackouts in New York and California made the problem much more salient.

The need for enhanced security has also been more central to the US debate on Smart Grid, which means that the standardization effort also makes frequent references to the security of the energy supply. The link to national security in the US case increases the imperative of an agreed set of standards. In fact, even those arguing for the general importance of the voluntary nature of standards have nevertheless made a strong case for making security standards mandatory.[85] In contrast, while security is certainly mentioned, the EU debate on Smart Grid takes place mainly within the context of making progress on climate change objectives, along with some focus on innovation and jobs. While those are important issues, there is less urgency, and the link with Smart Grid is less direct.

In the case of the US there is direct evidence of the Obama administration attempting to make investment in green technology a high-profile issue by making this link to national security and public investment. One indication is the report by the National Science and Technology Council (NSTC) entitled *A Policy Framework for the 21st Century Grid - Enabling our Secure Energy Future*, in which NIST's role in the Smart Grid standardization process features prominently. The NSTC, established by Executive Order on November 23, 1993, operates as a Cabinet-level Council and serves as the primary mechanism within the executive branch for harmonizing science and technology policy across the various components of the Federal research and development sector. Under the leadership of the President, the NSTC includes members such as the Vice President, the Director of the Office of Science and Technology Policy, Cabinet Secretaries overseeing substantial science and technology portfolios, and other key White House officials. The report was the result of 11 months of research process and it argued more strongly for the role of government in this process. An indication of the importance the White House granted this report is that the launch of attended by two Secretaries of State. This report clearly bolstered the role of NIST. Evidence of the influence of this document is for example the word "catalyst" used to describe the role of the government in the standardization process. This word did not appear

[85] http://www puc state tx us/electric/projects/34610/CPUC_PUCT_Comments_NIST_030711 pdf

in NISTs roadmap 1.0, but was included several times in the 2.0 version of the document. The result is a strengthened case for public intervention.

Table 5.3 Impact of exogenous factors

Exogenous factors	**US**	**EU**
Smart Grid saliency level	High	Medium
Impetus for making progress on smart grid	- Highly publicized blackouts blamed on outdated grid - Standards linked to security aspects of the grid	- Focused on the "smart" elements of the grid and the use of renewable resources. - Effect on consumers less direct.
The timing and impact of the global financial crisis	- Process already funded and underway and NIST - Recovery funding accelerated investments in smart grid and put more focus on the standardization effort	- Policy decisions took place as the crisis was unfolding - Commission delegated responsibility to save cost - Budgets to ESOs were cut

5.3.2 The financial crisis of 2007-2008

Several experts interviewed for this thesis mention the backdrop of the financial crisis and its impact on policy action in the standardization field. The timing of the crisis relative to the Smart Grid policy timeline had as a result that the impact played out differently in the US compared to the EU. In the case of the US, policy action on Smart Grid, and specifically the EISA allocation of a $25 million budget to NIST for the coordination of the standardization effort, was fixed before the financial crisis. In the aftermath of the crisis the focus of the communicative discourse became to justify the investment in Smart Grid and to emphasize the role of NIST and the standardization effort as a safeguard for the long-term value of public funds spent. This link between public funding and standardization is emphasized by Eisen, who states that, "ARRA funding also prompted calls for rapid development of interoperability standards, which put pressure on that process to move quickly." (Eisen,

2013, p. 118) A similar conclusion is reached in a Department of Energy reports which states that, "[a]ccording to NASPI, the SGIG synchrophasor projects have been a "forcing function" for helping to reduce by half the planned five-year standards development schedule."[86]

A related factor which contributed to making the need for standards more salient is the general need in the US context to justify public investments in the wake of the financial crisis. For the Obama administration it has been especially important to defend the stimulus package against criticism of being a waste of taxpayers' money. Thus we see frequent mentions in the US policy on standards to the fact that they secure future investments. This is part of a larger narrative of the Obama administration. This controversy over the "you didn't build that" seems foreign in the European context where public investment in infrastructure is taken for granted.

In the case of the EU, concrete policy action on Smart Grid came later than in the US, with major steps taken after the onset of the financial crisis. In the aftermath of the crisis, Community budgets were cut across the board, including operating grants to ESOs. One of the effects of the financial crisis was that the Commission tried some novel ways to move action forward through partnerships with industry. In addition to delegating responsibility for the Smart Grid standardization roadmap to the ESOs, another such initiative was the Multi-Stakeholder Platform on ICT Standardisation which was set up in 2011 to advise the Commission on the implementation of policies in this area. In the context of delegating coordination work to the private sector, there is an incentive for the Commission in its official discourse to legitimate this decision. The way to accomplish that is to emphasize that the standardization works well and that no large-scale public intervention is needed. The financial crisis thus had the opposite impact on the communicative discourse of the EU compared with the US.

In the EU, we have seen DG Enterprise in the past making similar attempts to raise the profile of standards and make them relevant to consumers. Examples are Verheugen's action to bring about a common mobile phone charger and the recent intervention by Tajani regarding

[86] Smart Grid Investment Grant Program, Progress Report (2012), available at http://energy.gov/sites/prod/files/Smart%20Grid%20Investment%20Grant%20Program%20-%20Progress%20Report%20July%202012.pdf.

the charging of small electronic devices. These efforts were communicated through media press releases and interviews and images showing the electronic clutter/waste created by a lack of interoperability. In contrast, the topic of Smart Grid standards on the website of DG Energy and the Standards Organisations give little information. There is no evidence of an effort to make the challenge more than a technical one.

5.4 Exploring the role of actors and agency

The approach taken in this thesis draws on aspects of neo-institutionalism to understand how actors are either constrained or aided by the institutional setting and by policy legacies (Béland, 2006). However, an overly deterministic approach is rejected by embracing the notion that, "social action originates in human agency of clever, creative human beings" (Hajer, 1995). To this end, this section explores the usefulness of Kingdon's concept of "policy entrepreneur" to emphasize the role that human agency can play in bringing about change, especially when there is a window of opportunity.

The overall focus on ideas and discourse in the theoretical approach of this thesis means that actors, regardless of their level of influence or authority, cannot simply power through whatever policy is perceived to be in their interest. The formulation of policy takes place within a framework of established ideas and norms that impact policy objectives and the type of policy action that can be employed to further those objectives. Suggestions for a way to deal with a new policy area or change to existing policy have to make sense to the policymakers and to audiences. To use a popular concept, in order to be persuasive, policy communication has to fit with existing "frames". For these reasons, while a focus on ideas is maintained throughout the thesis, the next section explores what additional insights can be gained from considering the impact of agency. A consideration of this factor should help explain the ways in which discourse can be part of a structural, conservative force but can also be used as a way to argue for change.

5.4.1 NIST and the National coordinator as policy entrepreneur

In the US case the concept of policy entrepreneur helps us understand the role played by George Arnold who was appointed national coordinator for Smart Grid standardization in

2009[87]. The appointment can be viewed as the creation of what Callon and Latour (1981, p. 271) call a "macro actor". At this time, the US Smart Grid effort was accumulating delay, just as the EU process would a couple of years later. One of the responses to this delay was to appoint a person whose responsibility it would be to drive the process, a decision which created accountability and focus.

To use Kingdon's terminology, George Arnold, acted as a policy entrepreneur in coupling a problem – "the need for an unprecedented standardization effort" – to a solution – "NIST has the experience and the track record to convene and act as an honest broker". As the appointed national coordinator for the Smart Grid standardization effort, he certainly would fulfil the first criterion which is claim to a hearing. As an engineer with three decades in the electro-technical field and with a past as Chairman of ANSI, President of IEEE, and Vice President-Policy for ISO, he also had a strong claim to a combination of technical know-how and contacts. As regards to his efforts and persistence, he has in numerous appearances at conferences and the publication of essays employed various other discursive devices to invoke the historic importance of the effort, linking it to energy security and the role or the US in the world.

Chapter 3 identified several attempts of "softening up" processes by NIST and by Georg Arnold personally. There is NIST's Green Button initiative to show the benefit of standards to consumers. NIST also has an extensive FAQ on standards written in non-specialist language and illustrated with simple images. There is also frequent invoking of history and the sense of a *grand projet*. In an article written by Arnold, he predicts that the Smart Grid will be one of the great engineering achievements of the 21st century. This statement is accompanied by a picture of children reading a history book. In presentations, congressional testimony, and in articles, Arnold has frequently made use of metaphors such as "silos" to describe the situation created by proprietary interfaces in the electric utility industry. Findings in chapter 3 support the notion that George Arnold increased the profile of the standardization effort. The NIST website and George Arnold in speeches and testimony refer to NIST as an "honest broker". The term implies that there are different interests at play and

[87] http://www.nist.gov/el/arnold.cfm

that because of the public interest involved there might be a need to interfere to ensure an outcome that is not dictated by one player. It also means that NIST can play an important part "on the ground" and play an active, steering role.

5.4.2 The JWG or the Commission as policy entrepreneur?

Building on the comparison between NIST and the JWG, the equivalent role to George Arnold's in the EU context would be the Chair of the JWG which in the period studied was held by Ralph Sporer, a Siemens employee. However, it is clear that although they have to some extent been called on to fulfil a similar role, they did not have the same source of authority. When the JWG Chair spoke about European progress at international conferences his role was more that of a rapporteur. Representing the private sector, he did not have a mandate to speak on policy matters.

Kingdon formulated his model based on extensive research on US policies and the concept of policy entrepreneur would seem more helpful to us in explaining US policy formation. However, as argued by Pollack (1997), the European Commission has the capacity to act as a policy entrepreneur since it possesses all the attributes typically associated with a policy entrepreneur according to Kingdon's framework, i.e. the Commission has "expertise, brokering skills, and the institutional persistence and has the additional advantage of the formal right of initiative and well-developed policy networks" (Pollack, 1997, p. 126). Studies concerned with a number of policy fields has identified the Commission as a policy entrepreneur, including social policy where Wendon describes the Commission "as a strategically sophisticated bureaucracy with the ability to expand its role and influence policy outcomes by acting as an "image-venue entrepreneur" (Wendon, 1998: 1350). Other examples where the Commission has been characterized as behaving as a policy entrepreneur by making strategic use of discourse are listed by Drauth and include maritime policy, telecommunications and environmental policy (Drauth, 2007).

The Commission has not taken on a strong leadership role in the case of Smart Grid standardization. In the communicative discourse we do not find in the EU much mention of the need for direct involvement of the Commission in standardization. While there are some exceptions – for example the EESC opinion mentioned that representation should be monitored to ensure that standardization does not get dominated by one player – these are

isolated comments, part of a marginalized discourse that is not reflected in central policy documents. While DG ENTR has stepped in to call for standardization in isolated cases such as the standardization of a common charger and electronic vehicle charging, these interventions are of an ad hoc nature and has not influenced the communicative discourse surrounding Smart Grid standardization.

5.5 Chapter summary

This chapter built on observations in the case studies that despite a prevailing notion that US approach to standardization is more hands off, policy documents show that when it comes to the Smart Grid effort, US policy documents communicate a stronger need for government intervention. As we saw in the previous chapter, both the EU and the US have recognized that the agreement of a set of interoperability standards is urgently needed and that this represents a complex undertaking. There is some divergence, however, as to how the nature of the challenge is understood: in the EU it is seen as a technical challenge only whereas the US problem definition includes the notion of competing interests. While standards tend to be seen as an area of interest only for technical experts, we see in the case of the US and NIST attempt to make the policy relevant to consumers and those outside of the specialized community: a 'softening up processes' described by Kingdon. The concept of high versus low profile politics (Béland, 2009) also helped us to explore those issues where the US linking of the Smart Grid to national security was made to increase the importance and urgency and to legitimize intervention.

The analysis shows that the innovation agenda is a key discursive influence on EU policy on Smart Grid standards. The process of Smart Grid standardization is portrayed as a market phenomenon, the policy relating to it displaying a language that blends trust in expertise and economic imperatives. As shown in the previous chapter, although the need for interoperability is consistently highlighted as an urgent pre-requisite, very little is written about the nature of this challenge. It is seen as large and technically complex. In policy documents the link between interoperability and benefits to the consumer/tax-payer is not made. The Commission has made statements about the need to encourage the coordination but there is no talk about trade-offs or conflicts involved in standardization. The policy decision to delegate to the ESOs was based on existing policy legacy of the New Approach,

which is in turn based on the notion that standardization is of a purely technical nature. Problematization and policy choice thus reinforce each other.

One of the main differences between the US and the EU is that there was more at stake politically in the US case. Because progress on standards was needed for Smart Grid deployment to be a success, the issue of standardization itself was lifted to a level of high politics to a degree different from the EU. In the US the significant funding of NIST meant increased communication around the effort, which included wider consultation of industry stakeholders, collaboration with academic institutions, and direct communication aimed at the general public. The direct involvement of the White House and the inclusion of standards in a high-level document contributed to raising the profile of standardization. Standards have not traditionally been an area of public contestation, but in the US, standards were made more politically salient by tying them to the concept of energy security and public stimulus funding in the wake of the financial crisis. The need in the US to justify public investment made it more important to make the point that standards ensure that such investments are not stranded.

The results of the comparative analysis are interesting because one might expect greater convergence. In both cases, the policy documents show that there is an awareness of international efforts and especially a tendency for the EU and the US to look at what the other is doing. It is also interesting because it has been argued, and is often presumed, that standardization in Europe is characterized by a greater degree of government involvement compared with the US (Marks & Hebner, 2004). From a normative stance, the findings would seem to put the US process in a more favourable light. Wider consultation, openness to outside ideas, and more effort put into producing well-researched policy documents would seem to increase the capacity for policy innovation. However, there are other aspects of the two systems that make such evaluation less straightforward. Political polarization in the US often means that an election can lead to complete policy reversal. The more bureaucratic, corporatist model of the EU can in the best case allow for incremental yet more persistent change.

The constant interaction between the factors identified in the conceptual framework becomes evident with regards to the study of Smart Grid standardization and is especially

noticeable in the way that existing policy continually influences problem formulation (the problem is made to fit with policy legacies). In some cases, the explanations appear to overlap. Take for example the finding that the compared to the EU, US policy discourse builds a stronger case for intervention and consists of higher-profile documents with carefully constructed arguments and more academic references. Several of the concepts drawn from neo-institutional theory seem to contribute to our understanding of this difference:

- There was less institutionalization of the standardization system thereby a need to establish a basic policy position on standardization
- NIST was given more resources and had an existing arrangement with academia
- The US has been characterized as having a policy style which is more open to ideas generated outside of government and existing policy arrangements
- Because of blackouts the modernization of smart grid was more salient, hence the need to take a stronger policy position
- Because of the stronger need to justify policy intervention in general, the US government puts more effort into producing policy documents and to support arguments with academic references

Ultimately, the ways that the two cases are similar possibly provides more insight. Recalling again the discussion in chapter 1, it is clear that the focus in both the US and the EU is on standards being crucial and urgent. There is less focus on what makes them difficult to agree on. In the EU, this problem is hardly mentioned, and in the US the anti-trust focus arguably misses the point.

5.6 Discussion

The significance of the findings presented in Chapter 5 extends beyond the mere discovery of intriguing and counterintuitive storylines. As approached in this thesis, policy discourse is not just words, it has political consequences. In recent years, scholars from a range of disciplines have increasingly turned to language and narrative analysis to gain further understanding about the dynamics of both policy stability and change, a key concern across the social sciences. Discourse analysis can expose how certain ways of thinking about an issue have become naturalized – reflected in taken-for-granted assumptions of policymakers and in institutional arrangements – and how they thereby act as a considerable constraint

on policy formulation and eventual outcomes. The potential for discourse as an enabling condition for policy change has also been highlighted in the literature. Seen through the lens of discourse theory, political change can take place through the emergence of new storylines that re-conceptualize general understandings about the nature of policy problems. Discourse in this way has the potential to make things happen by creating a sense of urgency and by aligning actors, institutions, and capital; finding the appropriate storyline hence becomes an important form of political agency (Hajer, 1995: 56).

The power of storytelling in politics lies in its ability to turn complex issues into clear and coherent messages that are likely to resonate with intended audiences. This is particularly crucial in areas characterized by technical complexity, such as standardization. At their most effective, storylines provide a "short, condensed, and often metaphorical expression" (Torfing 2011: 1884) of policy problems ways to address them. They reflect pragmatism and appear "anchored in common sense" (Molle 2007: 7), "sound right" to uncritical ears and reduce "discursive complexity". However, while policy storylines need not be "true" to be functional, they must nevertheless tie the different elements of a policy challenge together in a "reasonably coherent and convincing narrative" (ÓTuathail quoted in Quach, 2004, p. 16). Challenges and costs associated with achieving the desired outcome must be anticipated and, crucial for the current investigation, they need to be interpreted in a way that allows for an internally consistent and reasonable justification for the policy intervention.

The starting point for this investigation, informed by discourse theory, is that policy intervention in the standardization presents a contradiction, or tension, that needs to be negotiated and legitimated. In both the EU and the US, the status quo was a policy stance favoring delegation of ICT standardization to the private sector. This status quo, further elaborated in chapters 3 and 4, was supported by policy language that reflected common-sense narratives and macro-social ideas about the appropriate roles of industry and government with regards to innovative technologies and markets. Against this background, a compelling and coherent narrative to justify a departure from the status quo would need to introduce some new element or a re-conceptualization in some way (not necessarily "true"), either of the nature of industry-led standardization and its participants, or of the

legitimate role of government itself. Significantly, discourse theorists like Norman Fairclough (1992, 2003) have suggested that the in-depth study of documents that describe departures from established arrangements – by exploring both what is taken for granted and what needs to be explained, and how tensions and contradictions are negotiated – can reveal important insight about policy change and stability.

An intriguing finding of this thesis – contrary to what might have been expected based on the existing literature – is that the US emerged as more interventionist, both in its discursive and non-discursive actions. The US storyline around smart grid standardization drew on a number of discourses to create a storyline that conveyed both a greater sense of urgency and a more robust and compelling justification for intervention than in the EU. The use of antitrust discourse introduced the notion of competing interests, which opened up for the role of NIST as an "honest broker". A sense of urgency, as well as the sense of a wider societal concern, was established by emphasizing that sizable investments, both public and private, were already underway and risked becoming technological “dead-ends”. The storyline provided the necessary structure and legitimacy for stronger non-discursive action, including more substantial funding of NIST’s effort and the explicit linking of funding to standards compliance.

In contrast, and despite calling the smart grid initiative "not business as usual," EU policy discourse focused mainly on the unprecedented level of complexity involved, keeping the characterization of standardization as a neutral, technical process. This continuity of definition provided a relatively weak justification for intervention, keeping the Commission's role logically to that of a convener of various stakeholders. The Joint Working Group created by the European Commission, reflected this conception of the problem as mainly about the need to coordinate to avoid overlapping activity. Largely absent from the discourse was any notion of diverging interests among the stakeholders involved, which precluded further regulatory intervention. Public sector funding of Smart Grid projects, though significant, was not highlighted, and standards were seen to be needed mainly to promote industry investment. When serious delays in the standardization process became apparent, these were noted but causes were not sought or articulated. In the end, the EU based its final

deliverable on the Smart Grid roadmap published by NIST and considered its assignment completed.

In seeking to explain these divergent storylines, institutional, political, and human agency factors add understanding, but their presence do not lead to predetermined outcomes. Examples of such factors include the existence in the US of NIST, a government agency that had the resources and capabilities to take on the role of coordinating standardization, whereas no such entity existed in the EU. Yet the EISA had funded NIST in 2007 and it was only when the process was accumulating delays a few years later that a concerted effort was made to provide a narrative that would boost NIST's role and give impetus to the process. This finding lends support to Hajer's (1995) notion that "institutions are only powerful in so far as they are constituted as authorities vis-à-vis other actors through discourse". Similarly, while the cutting of budgets can be used to explain the more limited investment in the policy effort in the EU, this circumstance cannot fully explain why there was little effort in the EU to redefine the problem and why policy intervention was presented with relatively few words to support it. The creation in the US of a National Coordinator who could communicate the narrative appears to be a significant difference, as does the possibility for policy actors and documents to draw on an existing narrative that had been developed by the OTA in the 1990s, seemingly for such an occasion. As has already been noted by several scholars, no clear idea of policy intervention has been developed for the era of ICT standardization which has taken place largely outside of the European Standardization System.

While emphasizing the value of discourse analysis, this thesis stops short of arguing that storylines are themselves the cause of policy change. Rather they should be seen as a "cause in circumstances" (Grewal, 2008) where they can serve to reconceptualize problems and chart new institutional paths instead of simply following old ones (Schmidt, 2002, p. 212). In particular, the literature has emphasized exogenous events (crises) as a necessary trigger for policy change, given that the status quo is protected by numerous practices. Yet the direction of change is by no means predetermined. Using Kingdon's (1995) vocabulary, policy entrepreneurs recognize and use "windows of opportunity" to change discursive and institutional patterns and bring in new arenas and actors. At the same time, discourse and

institutional arrangements set limits to human action. It is this dialectic interplay of exogenous factors, discourse, and human agency to shape policy that can help to explain both change and stability.

Ultimately, a new storyline can be viewed as necessary for change, but its emergence should not be taken to mean a paradigm shift. To be institutionalized and materialized, new policy discourses must also align with dominant macro discourses, such as those related to market capitalism, innovation, and sustainable development. And in the absence of an exogenous crisis or repeated policy failure, pragmatic long-term solutions are often sought within the existing institutional arrangements. Thus, we see that in the US, a storyline was devised helped to create momentum for NIST. However, at a crucial moment, FERC announced it would not adopt the first set of standards presented by NIST claiming "insufficient consensus". The government-as-honest-broker narrative came into conflict with a prevailing understanding which held that standards could not be imposed but need to be the result of a bottom-up industry process. The "social robustness" of the US narrative was put to the test in terms of its alignment with societal views on standardization procedures and the appropriate role of the government, but it ultimately did not pass. While the storyline provided a temporary momentum, NIST's mandate and funding to lead the effort was for a limited time and the momentum was lost.

It has been said that the mere mention of standards will cause the eyes of most people to glaze over. Only by becoming attached to more high-profile issues can we expect more engagement of policymakers with standards and the possibility of changing inherited assumptions. The window of opportunity created by a period of heightened smart grid saliency has now closed. Theoretical insight from both discourse theory and historical institutionalism suggests that for standardization policy to change, a new and compelling storyline needs to be ready for the next time a window of opportunity opens. Such a policy narrative needs to go beyond the "government versus market" dichotomy to imagine how government mandated interoperability standards can coexist with a competitive marketplace.

In shedding light on how a limited understanding of the dynamics and interests involved in standardization contributed to a failure of the Smart Grid standardization effort, the findings

of this thesis provide insight which is applicable beyond the comparative case study carried out in this thesis. A feature of the modern information society is that the achievement of important societal objectives hinges on a voluntary industry coming together to agree and implement standards. Standards are being increasingly used to implement legislation and policies in a wide range of areas, especially in the EU. They are also key to attempts to solve important challenges through the large-scale application of ICTs (Smart Transport, Smart Homes, Smart Cities). Using a discursive-institutionalist approach to compare policy intervention in the EU and the US, the analysis has shown that the taken-for-granted views about standards stand in the way of developing effective change narratives that consider real-world difficulties related to standardization. A discussion of the wider implications of these findings continues in the final chapter.

6 Policy change without crisis? Implications for Smart Grid standards and beyond

We (the human race) are now in possession of a great deal of hard information about ourselves, but we do not use it to improve our institutions and therefore our lives. (Doris Lessing, Prisons we choose to live inside)

The question is, as usual, why it matters (Mc Closkey, 1985: 185)

How was the need to develop Smart Grid standards constructed as a policy problem and what consequences did this have for policy intervention in this area? This final chapter presents key findings and how they relate to this central research question and the themes set out at the start of this thesis. Section 6.1 first summarizes the overall approach of this research and the components of the conceptual framework which resulted in six guiding sub-questions. The subsequent 3 sections details how the framework assisted in answering these questions, considering first discourse, then the institutional and political context, and finally human agency. Section 6.5 pulls the strands of the framework together to consider how it contributed to answering the main research question. Section 6.6 considers some of the limitations of the current research, which should be balanced against the contributions it makes, which are presented in section 6.7. This final section opens out into a discussion of wider academic debates and controversies, considering what the findings say about what is seen as the proper roles for industry and government in bringing about standards needed to meet ambitious public policy objectives. Finally, this chapter considers some future directions in which research might go from where this thesis leaves off.

6.1 Understanding Smart Grid standards policy in context – a discursive-institutionalist approach

In seeking to answer the main research question, this thesis built a conceptual framework broadly housed in the tradition of discursive institutionalism (Schmidt, 2008, 2010). Concepts were drawn from discourse theory and various strands of neo-institutionalism to focus on policy narratives within their political and institutional settings: dominant discourses or cognitive paradigms act to restrict how a policy problem is understood and formulated, but policy actors are also able to introduce new discourses that can bring about change – especially when the political and institutional context allow a window of opportunity. Specific concepts were selected with the aim to better explain endogenous change while at the same time recognizing the enduring effects of institutions. The concepts of "policy legacy" and "policy feedback" (cf. Skocpol, 1992; Baumgartner & Jones, 1993; Pierson, 1994; Skowronek, 1997, Béland, 2006) were used to explain the relative stability of policy. The concept of policy style captured how certain regularities and general characteristics of the political system have a bearing on which actors are able to influence policy, and determine whether policy advice is sought from new communities, e.g. academia, which can also introduce new discourses.

Overall the approach aims to follow Sovacool and Hess who have advised researchers to use a variety of strategies in order "to avoid over-commitment to theory to the point that it biases the interpretation of qualitative data" (2017, p. 740). Considering the main research question through the different conceptual lenses provided by the framework led to the formulation of 6 sub-questions that have guided the research. The following three sections outlines how these questions were answered.

6.2 Policy as discourse: constructing contrasting storylines

Question 1: What dominant and alternative discourses are drawn upon to create the official story-line on Smart Grid standardization policy?

To answer this question, a comprehensive narrative study of primary policy texts was undertaken and presented in Chapters 3 (US) and 4 (EU). The policy narratives that emerged from the analysis were presented with a focus on identifying discursive continuity and

change. Significant emphasis was placed on developing the discursive context – which includes previous debates and all discourses that have been associated with standardization policy in the recent and not so recent past. It then identified what discourses were drawn on in constructing the storyline on Smart Grid standardization. This two-stage approach made it possible to consider the extent to which new discourses were brought in and also which discourses were marginalized in the process.

An important premise of this thesis is that the challenge of Smart Grid constituted a significant departure from "business as usual" for the standardization community (CEN/CENELEC/ETSI, 2011, p. 6). The political imperative of realizing the Smart Grid put an unprecedented focus on standardization – giving standards a new political importance and requiring policymakers to "do something" in an area where established practice is to let industry "get on with it". Discourse theory suggests that the focused study of such a period has the potential to be especially illuminating to the researcher, revealing ideological orthodoxy in that which is taken for granted in policy texts, along with implicit and explicit references to other discourses as a way to justify behavioural action in the form of a specific policy intervention.

EU Smart Grid narrative draws on a reduced range of available discourses, thus setting limits on legitimate policy intervention

The typology of available discourses showed that in constructing the narrative on the Smart Grid standardization challenge, EU official policy documents draw on only a limited range of possible discourses. Chapter 3 identified the innovation discourse as the dominant influence in the construction of the narrative of Smart Grid standardization. This discourse, which is characterized by a preference for industry self-organization, was complemented by the discourse of sustainable development, which features win-win scenarios and the absence of conflict. In the resulting storyline, interoperability standards are identified as a prerequisite for Smart Grid and as a significant technical and coordination challenge. And while EU policy documents express the willingness to take some action in order to bring about Smart Grid standards, the legacy of the "New Approach" has the effect that standardization is seen as something that the EU has already figured out.

Beyond initial statements calling the effort unprecedented and signalling its importance and urgency, there is relatively little evidence of an effort to describe the nature of the challenge and to bring in new ideas and influences. The documents present standardization as a process whereby private sector experts produce neutral decisions. Despite sizeable public investment at national and EU level, standards are defined to be *for* industry and *by* industry. Smart Grid standards are presented as win-win – good for industry, good for the environment, good for innovation. There is little mention of possible conflicts. While the first step of the analysis showed the availability of alternative discourses – mainly related to the prominent role of standards in the completion of the single market – those are not drawn upon in policy documents relating to Smart Grid standards but are silent.

The result of defining the problem in terms of technical complexity with industry as the main stakeholder – leaving the possibility of diverging interests out – is that it limits the type of policy intervention that can be seen as logical and justified. The Commission's role is limited to that of a convener, bringing together groups that have not previously worked together. It cannot legitimately intervene in a process which is ultimately better managed by the stakeholders themselves.

US Smart Grid narrative draws on a wider range of discourses to carve out a role for the government as an honest broker

The storyline that developed in the US signals more of a break with recent policy, which had been characterized by a clear preference for industry-led standardization. While the narrative takes this delegation to industry as the default position, policy documents show a significant effort was made to present standards for Smart Grid as a special case that requires the government to act as convenor or "catalyst". Consistent with the processes described in discourse theory, US policy documents draw on new and past discourses in creating this narrative. Clear influences from the economics of standards discourse can be identified and vivid efforts are made to frame of "Smart Grid" as a *grand projet* with parallels drawn to the building of the electricity grid in the 20th century. The economics of standards discourse provides a direct link between standards to consumer benefits and public investment, and influences from competition law introduces the notion of competing interests and the possibility that industry-led efforts may lead to suboptimal outcomes.

These new perspectives combine to provide a clear justification for government leadership in the standardization effort.

US narrative employs discursive devices to reach new audiences

Evident in the US case are also efforts to elevate the topic and increase the potential audience, by linking standards for Smart Grid to more salient issue areas such as national security, and through the use of rhetorical devices – most importantly the repeated use of colourful metaphors such as describing NIST as an "honest broker", and pointing to the risk of "balkanization" and "stranded assets" if efforts to agree on interoperability standards fail. As elaborated on in chapter 2, discourse theory places special significance on the use of metaphors, with Monin and Monin (1997 p 57) stating that, "those who will control the metaphors will ultimately control the action: and those who change the metaphors will ultimately change the action." In addition, the rhetorical device of contrasting the benefits of standardizing with the risks of not reaching an agreement, including the waste of sizable public investments is used throughout the US policy discourse. The result is an effective case for a departure from the normal policy of laissez-faire to an active role of NIST as a convener in the process. In the EU, the language used is less colorful. While the term Smart Grid standards appears with a similar frequency, there are fewer in-depth documents produced than in the US, and there is a relative absence of publications aimed at non-specialists.

Question 2: To what extent does the story-line challenge existing institutional arrangements?

Chapter 2 emphasized as significant the extent to which change narratives challenged existing institutions and noted the tendency for pragmatic solutions to be sought within the existing arrangements. With this in mind, despite the significant and at first glance surprising differences between EU and US policy discourses, both regarding the expected effects of standards and the role of government in promoting their adoption, the prospects for lasting policy change in either case are at present unclear. Clearly, the policy narrative that presents in EU documents, in which there is little acknowledgement of conflicting interests – a sort of "politics without adversary" (Laclau & Mouffe, 1985) – would render a change in policy unlikely. But also in the case of US, existing macro narratives favouring market-based solutions and pluralism act as a strong inhibitor on government intervention.

The communicative discourse of the US federal government on smart grid standardization appears as only a temporary departure from the status quo. Key texts from both the White House and NIST – the body tasked with coordinating the standardization effort – draw on some of the existing discourses but also introduce and develop on other discourses to create a new and vivid narrative to legitimize and make urgent the need for policy intervention in the field of standardization. Yet EISA funded NIST to lead the smart grid standardization for five years only. In 2012, responsibility was handed back to industry. While succeeding in making a strong argument for government intervention, the story developed in policy documents can be criticized for over-simplification and for failure to outline a practical policy alternative beyond a five-year plan. With policy interest in Smart Grid standardization winding down since 2013, this research supports the prediction that a crisis or repeated policy failure would seem to be needed to bring about fundamental discursive change.

Diverging storylines support the notion that policy problems are constructed

According to Hajer (1995), if we accept the theoretical assumption that policy is constructed we should expect to find variation in international comparisons. The research has validated this assumption by showing how, in response to a similar challenge, two very different narratives developed in the EU and the US. Indeed, if we look more closely beyond the very recent past, we can see that government interest/intervention in standardization has gone in waves and that standards sometimes have been coupled with higher-level issues relating to competing economic interests. For instance, the EU made extensive use of product and environmental standards for achieving the Single Market. This activity in turn prompted fears in the US that the EU would have more influence over international standards and that European companies would have an edge in export markets. This fear served as an impetus to the OTA report in 1992 which developed a case for more intervention in interoperability standards because of their role in the digital world:

> Some standards will likely be more important from a national perspective than others. In a global, information-based economy, networking technologies provide a basis for productivity and economic growth. These technologies will become the basis of an infrastructure for all economic activity. If networks fail to interconnect for lack of standards, the Nation

> could suffer considerable economic loss and national security might also be jeopardized. Thus, while government may have a relatively small interest in the development of certain product standards, its stake in others, such as standards for interoperability, will be high (OTA, 1992).

Interestingly, the message that developed at the same time in the EU was one emphasizing the need for less government intervention in highly innovative sectors – in order to better compete with the US. Crucially, while the European Standardization System has served European integration well, several commentators have noted that standardization policy has not evolved to play a significant role with regards to digital standards.

Notion that EU is more interventionist should be re-evaluated

The existing literature on standards and public policy has tended to contrast EU and US, finding the former to be more hierarchical and with the government more likely to intervene. In such comparisons, a link is drawn between standardization practices and the Varieties of Capitalism framework (Tate, 2001) as exemplified by Mattli and Büthe's (2003) characterization of "an American (U.S) system of standardization, which is fragmented, market driven, and characterized by a high degree of internal competition, and a markedly more hierarchical and highly coordinated system in Europe, which is also publicly regulated and subsidized". While there are exceptions to such characterizations, e.g. de Vries et al (2017) find that in the machinery sector, the EU New Approach is more flexible and conducive to innovation than the more detailed technical regulations and compulsory third-party certification imposed in the US, the prevailing understanding remains that of a more formal-hierarchical structure of the European standardization system and a more pluralistic and hands-off approach in the US. Thus while Wiegmann et al (2019) presents a more nuanced framework for categorizing standardisation processes - committee based, market based and government based - ultimately the authors' conclude that different standardisation cultures can be linked to Varieties of Capitalism.

This thesis shows that such general characterization does not fully capture the dynamics of government intervention in the standardization process, especially in the ICT sector which, as Blind and Jakobs point out (2011), have developed outside of the New Approach (subsequently the New Legislative Framework) in the EU, and have been subject to a more

laissez-faire approach in both the US and the EU (van de Kaa and Greeven, 2017; Hoogerbrugge et al, 2023). In the case of Smart Grid, although both the US and the EU emphasize the private, bottom-up, non-mandatory aspect of standardization, the US documents have nonetheless foreseen a more active role for the federal government (through NIST) in bringing about standards for the Smart Grid. The official policy discourse describes the public sector as a "convener" and as a "catalyst", identifying a number of key areas, including Smart Grid, in which it should take a *"convening and/or active engagement role"* to *"ensure a rapid, coherent response to national challenges."* Furthermore, in the US, EISA makes standards compliance a prerequisite for receiving government funding, and the NIST roadmap mentions the importance of publicly endorsing the standards in order to promote uptake. In the EU, while singling out the Smart Grid as an area of special focus, the European Commission has so far limited its role to that of issuing period requests for the development of standards and the monitoring of progress.

Overall, the availability of a storyline, developed already in the early 1990s and adapted to the Smart Grid challenge, appears to enable the US to build momentum and establish a rationale for policy intervention. However, this rationale appears as a sort of carve-out or exception to a general rule and is not formulated to challenge or permanently alter public policy relating to standardization. This effort was aided by a relative openness of the system but limited by a stronger macro-level bias in favour of industry self-regulation and against government intervention. The following section considers the explanatory power of the concepts drawn from neo-institutionalism and provides further understanding of discursive and behavioural action in the field of standardization for the Smart Grid and beyond.

6.3 Making sense of contrasting narratives – political and institutional context

Question 3: To what extent has the imperative of making progress on Smart Grid created a political mood, a window of opportunity for policy entrepreneurs to bring in new discourses and create new story-lines?

Exogeneous event impacts change

Two exogenous factors made the development of Smart Grid standards more salient in the US, and might be said to have combined to create a window of opportunity (Kingdon, 1995) for policy change. The first of these factors was the urgent need to update the basic functioning of the grid, which was quite outdated and which had experienced highly publicized blackouts. The Energy Independence and Security Act of 2007 reflected this urgency and it gave NIST a clear mandate and, perhaps more significantly funding, to develop a set of interoperability standards. In contrast, despite uneven development, the starting point in the EU was less defined by a sense of crisis. The focus instead was to stimulate innovation through the funding of pilot projects and to highlight best practice. Modernizing the grid was more about meeting ambitious goals for the use of renewable energy than about the basic provision of electricity.

The specific impact of an exogenous event depends on when it occurs in the policy cycle

Secondly, the timing of the financial crisis of 2008 impacted the US and the EU in different, even opposing ways. In the US, EISA was already in place with a decision to step up activity on Smart Grid and a budget agreed for NIST to coordinate the development of standards. In the wake of the crisis, the American Recovery and Reinvestment Act (ARRA), signed in to law by President Obama in February 2009, allocated $4.5 billion of public funding to Smart Grid projects. ARRA put increased pressure on the development of standardization because of the fear that public funding would be invested in equipment that could soon become obsolete. The need to justify sizeable public investment in the modernization in the Grid became a part of a larger narrative where the White House needed to justify stimulus spending, thereby raising the profile of the standardization effort. In the EU, the Smart Grid standardization effort was a few years behind. Experts interviewed for this thesis point to the financial crisis resulting in a cut in budgets for standardization. As a result, the European Commission has tried to promote and encourage standardization through new forms of partnerships with industry, not just on Smart Grid, but also in other areas such as cloud computing. Because of the reduction in resources, experts indicated that some of this is work done with limited public investment, with most of the work delegated to industry representatives and the Commission taking a less active role.

Question 4: How have policy legacies and the level of institutionalization within the standardization policy domain (e.g. New Approach) influenced the response to the Smart Grid standardization challenge? Question 5: With regards to the broader characteristics of the political system, can the concept of policy style help us explore which actors and discourses are influential in the development of a policy response Smart Grid standardization?

The existence of important policy legacies and the openness of the system will either inhibit or encourage the development of a new story-line

The concept of policy legacy, as well as some broader characteristics of the political system, shed further light on the context in which narratives were constructed. The lack of an existing coherent policy framework for standardization combined with the US tradition of consulting more widely and the tradition of soliciting input from academia led to the involvement of many more actors and to the production of policy documents that drew heavily on the economics of standards literature. In the EU, the starting point was a coherent standardization system that was deemed in large part to be working well. In the EU, most of the documents that outline policy options are not written by the Commission itself but by existing stakeholders – an overwhelming majority of them representing industry – participating in so-called expert groups. There is little evidence of attempts at seeking input from a wider range of contributors, nor of trying to reach new audiences.

There is also evidence that the initial setup of the policy intervention created policy feedback that both reflected the problem definition and subsequently reinforced it. Having been assigned the role of coordinating the standardization effort, NIST had an interest in justifying the political aspects of its role and the need for an 'honest broker' from the public sector. The ESOs on the other hand, with mostly industry participation, had an interest in continuing to present the problem as one of a purely technical nature, keeping the social learning process as low-profile (Béland, 2006)

6.4 Agency

Question 6: How does the concept of policy entrepreneur help us understand the role that NIST and the National Coordinator have played in shaping the US discourse on Smart Grid standards?

Personal appointment can have focusing effect but source of authority matters

The conceptual framework also considered the role of agency, specifically the concept of "policy entrepreneur". This was seen as a useful concept mostly in the case of the US and NIST/George Arnold, the National Coordinator. Once EISA made funds available to NIST to coordinate the response, NIST (and from 2009 George Arnold personally) was able to act as a policy entrepreneur. During his years as National Coordinator he took an active role, communicating widely on the need for interoperability standards and promoting NIST as an "honest broker". While the European Commission has previously acted as a policy entrepreneur in a wide range of policy areas, it did not adopt such a role in promoting Smart Grid standardization. Instead, the responsibility for coordination and developing the standardization roadmap was delegated the European Standardisation Organisations (ESOs). To some extent the Chair of the Joint Working Group of Cen/CENELEC and ETSI mirrored that of the National Coordinator in the US. However, in contrast to George Arnold who was a public official with a clear mandate and communication budget, the JWG Chair, a Siemens employee, could not speak with the same sense of authority, and indeed limited presentations to the reporting of results and have not attempted to shape the agenda. The literature shows how the legitimacy of standardization organizations is tenuous. This will be further explored in section 6.5 below.

Partly stemming from the urgency of a more outdated electric grid and because it did not have a policy framework to fall back on, the US system would appear more open to try new policy solutions, but what we have seen does not constitute third-level change that leads to lasting institutional change (Hall, 1993). EISA only provided funding for NIST until the end of 2012 and contained wording to the effect that federal involvement would only be necessary for a limited time. This meant that George Arnold left the role as National Coordinator in

February 2013[88] and NIST handed back responsibility for the standardization process to the private sector with SGIP transitioning from government to a private sector body to be funded with membership fees. Significantly, though authorized under EISA to do so, FERC decided not to mandate NIST smart grid standards.[89] Reportedly FERC received a lot of pushback from members of industry who argued that standards should remain voluntary.

The literature suggests windows of opportunity open only occasionally before closing again. In order to promote a policy solution, actors need to be ready to move swiftly To be sure, discussions on Smart Grid continue and it is still seen as an important, but the limelight appears to be taken by new initiatives – for example policy discussions on Internet of Things (IOT) and Edge Computing, which overlap with some features of the Smart Grid. For all the unprecedented focus on standardization for the Smart Grid repeated failure seems necessary to make lasting policy change possible.

6.5 Limitations of the research

A more general outline of the limitations of qualitative, interpretive research in terms of design and methods is provided in chapter 2. However, even within the research paradigm, this work could be critiqued for focusing mainly on the macro-level of politics. Wodak (2009) notes the tendency for researchers of politics to focus their studies on the "frontstage", where politicians construct their ideal images and positive selves, while overlooking what happens "backstage" – which is of course more difficult to access.

While agreeing that the analysis of the discursive practices of both "frontstage" and "backstage" would give a more complete picture of the different interests and power struggles involved, this thesis has quite consciously focused on the analysis of official policy documents as an expression of prevailing conceptions about the standardization process and the actors involved, which are seen to define the limits of legitimate policy intervention. Thus the main focus has not been to understand the process by which a policy discourse

[88] Dr. George Arnold to Take on New Role as Director of the Standards Coordination Office February 20, 2013 http://www.nist.gov/smartgrid/garnoldnew.cfm

[89] http://geospatial.blogs.com/geospatial/2011/07/ferc-decides-not-to-mandate-nist-smart-grid-standards.html

develops "but rather to identify what is allowed to stand uncontested, unquestioned and taken as an indisputable premise for the ensuing discussion – and for political decision-making" (Jensen, 2012). What is "selected" to be included, and what excluded, given prevailing conceptions of the nature of standardization and the proper role of government has been viewed as worthy of inquiry.

While direct observation of the policy process was often not practically possible, the trustworthiness of the research has been enhanced through triangulation of methods, data, and, as suggested by Sovacool and Hess (2017), of theory. In this case, the corpus of data was improved through the direct observation of the discourses employed by policymakers through participation in conferences and through prolonged exposure to the standardization policy community, mainly in the EU context. Expert interviews were included with the aim of enhancing confidence in the findings. However, research involving interviews may introduce another significant challenge to the objective of enhancing trustworthiness, namely the potential for respondent biases. For example, respondents may tailor their responses to align with what they perceive the researcher expects to hear and create overly favourable depictions of situations that may not be entireley positive. In the case of standardization, Tamm-Hallström (2004) has argued convincingly that there is a particular need for participants to convey an image of the process characterized by technical neutrality and lack of controversy.

In general discourse analysis tends therefore to favour "naturally occurring" discourse, i.e. "discourse that is not produced through the instigation of the researcher." (Wood & Kroger, 2000, p. 57) This is because critical discourse analysis is not just descriptive but is concerned with how discourse is shaped by inherited assumptions and the effects discourse has on systems and knowledge and beliefs "*neither of which is normally apparent to discourse participants"*. (I. Fairclough & Fairclough, 2011).

Another limitation of this research relates to the possibility of generalizing the findings, as discussed in chapter 2. Hajer's response to this general critique of case studies and interpretive research, suggests that significance need not lie in generalizability but the extent to which a controversy was emblematic, a metaphor for a deeper disturbance, and that "when it subsided it left traces in new institutions, discourses and practices (Howarth,

2015).” While the study is limited by ending in 2014 – further research could explore the extent and depth of these traces in more recent policy debates where standards play a crucial role, e.g. cybersecurity and ethical AI - this thesis has expands the body of literature on public policy and standardization and it offers new theoretical insight and recommendations that can be of value to researchers, policy-makers, and practitioners. The applicable implications for research, policy, and practice are highlighted in the following section.

6.6 Towards a standardization policy in support of societal challenges

While the empirical research carried out in this this thesis is quite specifically focused, the findings relate to a number of broad themes that were introduced in the two opening chapters. This concluding section links back to the literature introduced in chapters 1 and 2, it considers some larger issues and the wider significance of the research. Specifically, it reflects on how the research has contributed to the literature on standardization. It also considers the broader implications of these findings for other areas where meeting societal objectives depends on the large-scale applications of ICT and the prospects of achieving large digital infrastructure projects in an age of liberalization and pluralism. It also considers how the research has contributed to the growing social science literature concerned with energy transitions.

Chapter 1 of this thesis reviewed the literature on standardization policy and pointed to what was termed the “paradox of standards”, the fact that standards are playing an increasingly important role in the networked society but that few outside the specialized community are aware of their importance and functions. An important aim of this thesis has been to contribute to the knowledge about standards by expanding the “conceptual map” (Lasswell, 1970) that can be used to analyze public policy related to standardization. Following the recommendation of Sovacool and Hess (2017) to use a variety of approaches to study the energy transition, this thesis has explored the potential of discourse theory and neo-institutionalism for understanding a policy of intervention in bringing about standards for the Smart Grid.

By showing how two quite different narratives developed to solve a similar challenge, this thesis has lent support to the theoretical idea that policy problems are indeed constructed (Hajer, 1995), and it has contributed to knowledge by drawing attention to what is left out of current policy discussions. At the same time it acknowledges that what is presented here cannot be a complete account and that more effort is needed to structure a deliberative context in which to make better policy. This is especially important in an area such as standardization, which is characterized by technical complexity, and which seldom draws the sustained attention of the general public. As the development of standards become more important because of their role in delivering solutions to societal challenges, further critical analysis is needed into the actors, processes and institutions involved in bringing them about.

As previously stated, it is often assumed that the EU is more willing to intervene in standardization. However, that has not been the case in the area of ICT nor in the case of Smart Grid. The reason why the EU has been viewed as more interventionist is the link between legislation and standardization in the New Approach, but outside of regulated sectors and the processes using a standardization mandate, the EU does not have a practice of direct participation in standardization. A major finding of this thesis is therefore that the view of standardization in the EU vs the U.S. needs to be re-evaluated. In fact, through NIST, the US government has significant knowledge about standardization and an institutional basis for involvement when given a mandate to do so.

In fact, over the last century, US and EU governments have at times and in certain sectors taken on a more interventionist role in standardization (Tamm-Hallström, 2004; Yates and Murphy, 2019). In historic cases including standardization of steel wire sizes and during the railway gauge wars, Velkar (2008) shows that achieving standardized measurements required pressure from the government for industry organizations to come together. In these cases, policy intervention became possible only when it was recognized that the lack of interoperability not only had a direct effect on the market but also affected citizens. Crucial was also the recognition that there were winners and losers in the process of deciding on common measurements.

In more recent policy history we have the example of the EU's New Approach, a regulatory instrument where standards were used to achieve environmental and consumer protection policy goals. The specific area of ICT interoperability standards, however, with its particular trajectory, has a low level of institutionalization, and it has not been seen as a natural area of government regulation. While the academic literature on standards has demonstrated that the interests of actors engaged in standardization are not always aligned with the public interest, the overall framing of the ICT sector as a sector of innovation and growth has favored a laissez-faire approach to standardization.

Can we expect a change in standardization policy as interoperability becomes increasingly crucial for realizing societal objectives, such as the energy transition? Discourse theory suggests that attention is paid to the extent to which policy narratives challenge the existing institutional setup, emphasizing that solutions are often accommodated within existing policy arrangements (Hajer, 1995). In the EU, although the Commission has historically proven itself capable of policy intervention in standardization, the absence of the notion of conflict in the Smart Grid standardization storyline makes lasting institutional change an unlikely outcome. In the US, although a narrative of intervention was constructed and communicated, the wider political context and meta narratives are real obstacles which makes wholesale change outside of the area of security standards unlikely.

Thus while the comparative case study conducted for this thesis revealed some interesting differences, there are still important similarities. In both the EU and the US, there is recognition at the political level about special situations where standardization needs to take place for important societal objectives. In neither case, however, has there been a change to the level as academics suggest is needed for societies to adapt to climate change and the challenge of energy transition.

The introductory chapter engaged with insights from the systems-of-systems literature and the challenge of building large infrastructure systems within the context of liberalized markets and without top-down decision-making. It pointed to a tension between government intervention and industry self-regulation where a delicate balance needs to be struck. The purpose of questioning the current setup in standardization has not been to argue for government intervention as a matter of course. Rather the research points to the

growing societal importance of standards and suggests that public policy on standards should be better informed. The storylines that developed around smart grid standardization acknowledges this tension implicitly, but ultimately do not engage with it conclusively. New narratives need to be developed to support new ways of dealing with policy problems.

The empirical analysis undertaken in this thesis covers the period between 2007 and 2014, when the term Smart Grid became more salient. A defining feature and challenge of Smart Grid is that it seeks to apply digital to energy and as a consequence it brings together sectors and actors with different characteristics. While the energy sector has historically been heavily regulated although it has recently gone through several decades of liberalization, the regulation of the ICT sector, on the other hand, has from the start been more light touch, and the enduring effects of this on Smart Grid standardization policy has been demonstrated in this thesis. However, some have described 2018 as the beginning of the "tech-lash" era with the sector being increasingly scrutinized and the target of policy and regulatory initiatives. A potentially fruitful avenue for future research would therefore be to consider other areas where ICT standards are needed to solve societal challenges and whether the advent of this new, less sanguine view of high-tech companies and new technology has an effect on the policy discourse. Such research could also gain from considering policy failure and a policy learning perspective.

At a fundamental level, this thesis is concerned with understanding factors that affect the ability of political systems to adapt and respond to challenges that require more than incremental policy change – such challenges include those posed by climate change, energy transitions, and the advent of the digital society. Chapter 1 identified a growing social-scientific literature, which is engaging critically with technology-centric accounts of the Smart Grid and its potential. Much of the focus has centered on consumer acceptance and resistance as crucial factors that impact the potential of new technologies. In its focus on the policy narratives that arose to meet the challenge of developing a set of interoperability standards, this thesis has identified additional non-technical barriers to making progress on Smart Grid, and in doing so has made a contribution to the literature that provides social science perspectives on the energy transition.

In shedding light on how a limited understanding of the dynamics and interests involved in standardization contributed to a failure of the Smart Grid standardization effort, the findings of this thesis thus have an impact beyond the comparative case study carried out in this thesis. A feature of the modern information society is that the achievement of important societal objectives hinges on voluntary industry collaboration. Further thought needs to go into imagining new ways to negotiate a balance between market and policy intervention and the role of government. Crucial to such conceptualizations are narratives that recognize the possibility of conflicts; policies that only foresee win-win scenarios would seem doomed to fail.

Bibliography

American Recovery and Reinvestment Act, Pub. L. No. 111-5 § § 405(3), 144 Stat. (2009).

Ardito, L., Procaccianti, G., Menga, G., & Morisio, M. (2013). Smart Grid Technologies in Europe: An Overview. *Energies, 6*(1), 251-281.

Arnold, G. W. (2011a). Challenges and Opportunities in Smart Grid: A Position Article. *Proceedings of the IEEE, 99*(6), 922-927.

Arnold, G. W. (2011b, January 31, 2011). *Opening Remarks.* Paper presented at the FERC Technical Conference.

Bacchi, C. (2000). Policy as Discourse: What does it mean? Where does it get us? *Discourse: Studies in the Cultural Politics of Education, 21*(1), 45-57.

Baumgartner, F. R., & Jones, B. D. (1993). *Agendas and Instability in American Politics*. Chicago: University of Chicago Press.

Bekkers, R. (2001). The development of European mobile telecommunications standards. An assessment of the success of GSM, TETRA, ERMES and UMTS. Eindhoven, Universiteit Eindhoven.

Bekkers, R., Verspagen, B., & Smits, J. (2002). Intellectual property rights and standardization: the case of GSM. Telecommunications policy, 26(3-4), 171-188.

Béland, D. (2005). Ideas and Social Policy: and Institutionalist Perspective. *Social Policy and Administration, 39*(1).

Béland, D. (2006). The Politics of Social Learning: Finance, Institutions, and Pension Reform in the United States and Canada. *Governance, 19*(4), 559-583.

Béland, D. (2009). Ideas, institutions, and policy change. *Journal of European Public Policy, 16*(5), 701-718. doi:10.1080/13501760902983382

Bell, S. (2011). Do We Really Need a New 'Constructivist Institutionalism' to Explain Institutional Change? *British Journal of Political Science, 41*(4), 883-906.

Bellantuono, G. (2014). Comparing Smart Grid Policies in the USA and EU. *Law, Innovation and Technology, 6*(2).

Besen, S. M., & Johnson, L. L. (1986). *Compatibility Standards, Competition, and Innovation in the Broadcast Industry*. Retrieved from

Besen, S. M., & Saloner, G. (1988). *Compatibility Standards and the Market for Telecommunications Services*. Retrieved from

Billig, M. (1996). *Arguing and Thinking: A Rhetorical Approach to Social Psychology*. Cambridge: Cambridge University Press.

Black, J. (2005). What is Regulatory Innovation? In J. Black, M. Lodge, & T. Mark (Eds.), *Regulatory Innovation: A Comparative Analysis* (pp. 8-11): Elgar.

Blind, K. (2004). *The Economics Of Standards: Theory, Evidence, Policy*: Edward Elgar.

Blind, K., & Jakobs, K. (2011). *ICT standardisation policy in Europe - Recent past, presence, and future(?)*. Paper presented at the 7th International Conference on Standardization and Innovation in Information Technology (SIIT).

Blyth, M. (2002). *Great Transformations: Econcomic Ideas and Institutional Change in the Twentieth Century*. Cambridge: Cambridge University Press.

Borraz, O. (2007). Governing Standards: The Rise of Standardization Processes in France and in the EU. *Governance, 20*(1), 57-84. doi:citeulike-article-id:1058884

Bowen, G. A. (2005). Preparing a Qualitative Research-Based Dissertation: Lessons Learned. *The Qualitative Report, 10*(2), 208-222.

Boyatzis, R. E. (1998). *Transforming qualitative Information: Thematic Analysis and Code Development*. Cleveland: Sage.

Bridgman, T., & Barry, D. (2002). Regulation is evil: An application of narrative policy analysis to regulatory debate in New Zealand. *Policy Sciences, 35*, 141-161.

Brunsson, N., & Jacobsson, B. (2000a). The Contemporary Expansion of Standardization. In N. Brunsson & B. Jacobsson (Eds.), *A World of Standards* (pp. 1-16). Oxford: Oxford University Press.

Brunsson, N., & Jacobsson, B. (2000b). *A World of Standards*: Oxford University Press.

Busch, L. (2011). *Standards: Recipes for Reality*. Cambridge, MA and London: The MIT Press.

Büthe, Tim (2010) "Global Private Politics: A Research Agenda," Business and Politics: Vol.12: Iss. 3, Article 12

Callon, M., & Latour, B. (1981). Unscrewing the big Leviathan: how actors macro-structure reality and how sociologists help them to do so. In K. Knorr-Cetina & A. V. Cicourel (Eds.), *Advances in social theory and methodology: Towards an integration of micro- and macro-sociologies* (pp. 277-303). Boston: Routledge & Kegan Paul.

Cargill, C. (2011). Why Standardization Efforts Fail. *The Journal of Electronic Publishing, 14*(1, Summer 2011).

Cargill, C., & Bolin, S. (2007). Standardization: a failing paradigm. In S. Greenstein & V. Stango (Eds.), *Standards and Public Policy*. Cambridge: Cambridge University Press.

Cargill, C. F. (1989). *Information Technology Standardization Theory, Process and Organizations*. Rockport, MA: Digital Press.

Carroll, B. W., & Jones, R. J. E. (2000). The Road to Innovation, Convergence or Inertia: Devolution in Housing Policy in Canada. *Canadian Public Policy, 26*(3).

Cawson, A., & Holmes, P. (1995). Technology Policy and Competition Issues in the Transition to Advanced TV Services in Europe. *Journal of European Public Policy, 2*(4), 650-671.

CEN/CENELEC/ETSI. (2011). *Final Report of the Joint Working Group on Standards for Smart Grids* Retrieved from ftp://ftp.cencenelec.eu/CENELEC/Smartgrid/SmartGridFinalReport.pdf

Chiao, B., Lerner, J., & Tirole, J. (2007). The rules of standard-setting organizations: an empirical analysis. *The RAND Journal of Economics, 38*(4), 905-930.

Contreras, J. L. (2012). Standards, Patents, and the National Smart Grid. *Pace Law Review, 32*(3), 641-675.

Conzelmann, T. (2008). A New Public-Private Divide?Co- and Self-Regulation in the EU. In B. Kohler-Koch & F. Larat (Eds.), *Efficient and Democratic Governance in the European Union*: University of Mannheim, Germany.

Crouch, C. (2011). *The strange non-death of neoliberalism*. London: Polity.

Cusumano, M., Mylonadis, Y., & Rosenbloom, R. (1992). Strategic Maneuvering and Mass-Market Dynamics: The Triumph of VHS over Beta. *The Business History Review, 66*(1). doi:citeulike-article-id:8294905

Davies, D., & Dodd, J. (2002). Qualitative research and the question of rigor. *Qualitative Health Research, 12*(2), 279-289.

Delimatsis, P. (Ed.). (2015). The law, economics and politics of international standardisation (No. 21). Cambridge University Press.

den Butter, F., Groot, S., & Lazrak, F. The Transaction Costs Perspective on Standards as a Source of Trade and Productivity Growth. In *Tinbergen Institute Discussion Paper*.

Drauth, C. M. (2007). *The power of discourse: the Commission as a policy entrepreneur in EU energy policy*. Retrieved from

Dudley, G., & Richardson, J. (1996). Why does policy change over time? Adversarial policy communities, alternative policy arenas and British trunk roads policy 1945-95. *Journal of European Public Policy, 3*(1), 63-83.

Egyedi, T. M., & Blind, K. (2008). Introduction. In T. M. Egyedi & K. Blind (Eds.), *The dynamics of standards* (pp. 1-12). Cheltenham, UK: Edward Elgar.

Egyedi, T. M., & Spirco, J. (2011). Standards in transitions: catalyzing infrastructure change. *Futures, 43*(9), 947-960.

Egyedi, T. M., & Verwater-Lukszo, Z. (2005). Which standards' characteristics increase system flexibility? Comparing ICT and batch processing infrastructures. *Technology in Society, 27*(3), 347-362.

Eisen, J. B. (2013). Smart Regulation and Federalism for the Smart Grid. *Harvard Environmental Law Review, 37*, 101-156.

EOP. (2011). A Policy Framework for the 21st Century Grid: Enabling Our Secure Energy Future. In. Washington D.C.: Executive Office of the President, National Science and Technology Council.

European Commission. (2008). *Communication: Towards an increased contribution from standardisation to innovation in Europe*. Retrieved from https://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=COM:2008:0133:FIN:EN:PDF

European Commission. (2011). *Smart Grid projects in Europe: lessons learned and current developments*. Retrieved from Luxembourg:

Fairclough, I., & Fairclough, N. (2011). Practical reasoning in political discourse: The UK government's response to the economic crisis in the 2008 Pre-Budge Report. *Discourse & Society, 22*(3), 243-268.

Fairclough, N. (1992). *Discourse and Social Change*. Cambridge: Polity Press.

Fairclough, N. (2003). *Analysing Discourse: Textual Analysis for Social Research*. London: Routledge.

Farrell, J. (2007). Should competition policy favor compatibility? In S. Greenstein & V. Stango (Eds.), *Standards and Public Policy*. Cambridge: Cambridge University Press.

Farrell, J., & Saloner, G. (1985a). *Economic Issues in Standardization*. Retrieved from

Farrell, J., & Saloner, G. (1985b). Standardization, Compatibility, and Innovation. *The RAND Journal of Economics, 16*(1), 70-83. doi:citeulike-article-id:1761901

Farrell, J., & Saloner, G. (1985c). Standardization, Compatibility, and Innovation. *Rand Journal of Economics, 16*(1, Spring 1985), 70-83.

Feagin, J. R., Orum, A. M., & Sjoberg, G. (1991). *A Case for the Case Study*. Chapel Hill and London: The University of North Carolina Press.

Feijóo, C., Gómez-Barroso, J. L., & Karnitis, E. (2007). More than twenty years of European policy for the development of the information society. *Netcom, 21*(1/2), 09-24.

Finlayson, A. (2004). Political science, political ideas and rhetoric. *Economy and Society, 33*(4), 528-549.

Fischer, F., & Forester, J. (1993). Editor's introduction In F. Fischer & J. Forester (Eds.), *The Argumentative Turn in Policy Analysis and Planning*. Durham and London: Duke University Press.

Fomin, Vladislav V.; Pedersen, Mogens K.; and de Vries, Henk J. (2008) "Open Standards and Government Policy: Results of a Delphi Survey," Communications of the Association for Information Systems: Vol. 22 , Article 25. DOI: 10.17705/1CAIS.02225 Available at: https://aisel.aisnet.org/cais/vol22/iss1/25

Fowler, R. (1991). *Language in the News: Discourse and Ideology in the Press*. London: Routledge.

Goldstein, J., & Keohane, R. O. (1993). *Ideas and Foreign Policy: Beliefs, Institutions, and Political Change*. Ithaca, N.Y.: Cornell University Press.

Grant, W., & Wilson, G. K. (Eds.). (2012). *The Consequences of the Global Financial Crisis - The Rhetoric of Reform and Regulation*. Oxford: Oxford University Press.

Greckhamer, T., & Cilesiz, S. (2014). Rigor, Transparency, Evidence, and Representation in Discourse Analysis: Challenges and Recommendations. *International Journal of Qualitative Methods, 13*(1), 422-443.

Greenstein, S., & Stango, V. (2007). Introduction. In S. Greenstein & V. Stango (Eds.), *Standards and Public Policy* (pp. 1-17). Cambridge: Cambridge University Press.

Greenstein, S., & Stango, V. (2007). *Standards and Public Policy*. Cambridge: Cambridge University Press.

Grewal, B. S. (2008). *Neoliberalism and Discourse: Case Studies of Knowledge Policies in the Asia-Pacific.* (PhD), Auckland University of Technology,

Grindley, P. (1995). *Standards Strategy and Policy: Cases and Stories*. Oxford: Oxford University Press.

Guldbrandsson, K., & Fossum, B. (2009). An exploration of the theoretical concepts policy windows and policy entrepreneurs at the Swedish public health arena. *Health Promotion International, 24*(4), 434-444.

Hajer, M. A. (1995). *The politics of environmental discourse : ecological modernization and the policy process*. Oxford [England] ;: Clarendon Press.

Hajer, M. A. (1996). Ecological modernisation as cultural politics. In S. Lash, B. Szerszynski, & B. Wynne (Eds.), *Risk, Environment and Modernity: Towards a New Ecology* (pp. 246-268): Sage.

Hajer, M. A. (2005). Coalitions, Practices and Meaning in Environmental Politics: From Acid Rain to BSE. In D. R. Howarth & T. Jacob (Eds.), *Discourse Theory and European Politics: Identity, Policy and Governance*. Basingstoke: Palgrave MacMillan.

Hajer, M. A., & Wagenaar, H. (2003). Editors' Introduction. In M. A. Hajer & H. Wagenaar (Eds.), *Deliberative Policy Analysis: Understanding Governance in the Network Society*. Cambridge: Cambridge University Press.

Hall, P. A. (1993). Policy Paradigms, Social Learning, and the State: The Case of Economic Policymaking in Britain. *Comparative Politics, 25*(3), 275-296.

Hall, P. A. (2010). *Politics as a Structured Process in Space and Time*. Paper presented at the Annual Meeting of the American Political Science Association, Washington, D.C.

Hall, P. A., & Taylor, R. C. R. (1996). Political Science and the Three New Institutionalisms. *Political Studies, XLIV*, 936-957.

Hallström, K. T. (2004). *Organizing international standardization: ISO and the IASC in quest of authority*. Cheltenham, UK: Edward Elgar.

Hammersley, M. (2007). The issue of quality in qualitative research. *International Journal of Research & Method in Education, 30*(3), 287-305.

Hansen, L. (2005). *Security as Practice*. London: Routledge.

Hansen, L. (2006). *Security as practice: discourse analysis and the Bosnian war.* London Routledge.

Héritier, A., & Eckert, S. (2008). New Modes of Governance in the Shadow of Hierarchy: Self-regulation by Industry in Europe. *Journal of Public Policy, 28*(01), 113-138.

Higgins, W., & Hallström, K. T. (2007). Standardization, Globalization and Rationalities of Government. *Organization, 14*(5), 685-704. doi:10.1177/1350508407080309

Hoogerbrugge, C., van de Kaa, G., & Chappin, E. (2023). Adoption of quality standards for corporate greenhouse gas inventories: The importance of other stakeholders. International Journal of Production Economics, 260, Article 108857. https://doi.org/10.1016/j.ijpe.2023.108857

Hommels, A., Egyedi, T. M., & Cleophas, E. (2013). Policy Change and Policy Incoherence: The Case of Competition Versus Public Safety in Standardization Policies. *Journal of European Integration, 35*(4).

House, W. (2011). *A Strategy for American Innovation: Securing our Economic Growth and Prosperity*. Retrieved from Washington:

Howarth, A. (2012). *Discursive intersections of newspapers and policy elites: A case study of genetically modified food in Britain, 1996-2000.* [Doctoral Thesis, London School of Economics].

Ipakchi, A., & Albuyeh, F. (2009). Grid of the Future: Are We Ready to Transition to a Smart Grid? *IEEE Power & Energy*(March 2009).

Jakobs, K. (2023). ICT Standardisation Management: A multidimensional perspective on company participation in standardisation committees. [Doctoral Thesis, Erasmus University Rotterdam].

James, S. (2012). The Origins and Evolution of the Lisbon Agenda. In P. Copeland & D. Papadimitriou (Eds.), *The EU's Lisbon Strategy: Evaluating Success, Understanding Failure* (pp. 8-28). London: Palgrave Macmillan UK.

Jeffcut, P. (1994). The interpretation of organization: A contemporary analysis and critique. *Journal of Management Studies, 31*(2), 225-250.

Jensen, L. C. (2012). *Norway on a High in the North: a discourse analysis of policy framing.* (PhD), University of Tromsø,

Jones, P., & Hudson, J. (1996). Standardization and the cost of assessing quality. *European Journal of Political Economy, 12*, 355-361.

Jordan, A. G., & Richardson, J. J. (1983). Policy Communities: The British and European Policy Style. *Policy Studies Journal, 11*(4), 603-615.

van de Kaa, G. (2009). Standards battles for complex systems: empirical research on the home network (No. EPS-2009-166-LIS).

van de Kaa, G., & de Bruijn, H. (2015). Platforms and incentives for consensus building on complex ICT systems: The development of WiFi. Telecommunications Policy, 39(7), 580-589.

van de Kaa, G., & de Vries, H. J. (2015). Factors for winning format battles: A comparative case study. Technological Forecasting and Social Change, 91, 222-235.

van de Kaa, G., Greeven, M.J. Mobile telecommunication standardization in Japan, China, the United States, and Europe: a comparison of regulatory and industrial regimes. Telecommun Syst 65, 181–192 (2017). https://doi.org/10.1007/s11235-016-0214-y

van de Kaa, Geerten. "Standards adoption: A comprehensive multidisciplinary review." Heliyon (2023).

Katznelson, I. (2003). Periodization and Preferences: Reflections on Purposive Action in Comparative Historical Social Science. In J. Mahoney & D. Reuschemeyer (Eds.), *Comparative Historical Analysis in the Social Sciences*. New York: Cambridge University Press.

Kern, F. (2009). *The politics of governing 'system innovations' towards sustainable electricity systems.* University of Sussex,

Kingdon, J. W. (1995). *Agendas, Alternatives and Public Policies* (2nd ed.). London: Longman.

Knoke, D. (2004). The Sociopolitical Construction of National Policy Domains. In C. H. C. A. Henning & C. Melbeck (Eds.), *Interdisziplinäre Sozialforschung:Theorie und empirische Anwendungen*. Frankfurt: Campus Verlag.

Laclau, E., & Mouffe, C. (1985). *Hegemony & socialist strategy: towards a radical democratic politics*. London: Verso.

Lemley, M. A. (1996). Antitrust and the Internet Standardization Problem. *Connecticut Law Review, 28*, 1041.

Lincoln, Y. S., & Guba, E. G. (1985). *Naturalistic Inquiry*. Beverly Hills, CA: Sage.

Majone, G. (1989). *Evidence: Argument and Persuasion in the Policy Process*. New Haven and London: Yale University Press.

Majone, G. (1998). Europe's 'Democratic Deficit': The Question of Standards. *European Law Journal, 4*(1), 5-28. doi:citeulike-article-id:2772958

Marks, R. B., & Hebner, R. E. (2004). Government/Industry Interactions in the Global Standards System. In S. Bolin (Ed.), *The Standards Edge: Dynamic Tension*. Michigan: Sheridan Books.

Mattli, W., & Büthe, T. (2003). Setting international standards: technological rationality or primacy of power?. World Politics, 56(1), 1-42.

Mazey, S., & Richardson, J. (1993). Conclusion: a European policy style? In S. Mazey & J. Richardson (Eds.), *Lobbying in the European Community*.

McBeth, M. K., Shanahan, E. A., Arnell, R. J., & Hathaway, P. L. (2007). The intersection of Narrative Policy Analysis and Policy Change Theory. *Policy Studies Journal, 35*(1), 87-108.

Meadowcroft, J. (2009). What about the politics? Sustainable development, transition management, and long term energy transitions. *Policy Sciences, 42*(4).

Meijerink, S. V. (2005). *Understanding policy stability and change: The interplay of advocacy coalitions and epistemic communities, windows of opportunity, and Dutch coastal flooding policy 1945-2003*. Retrieved from Nijmegen:

Merrien, F.-X. (1997). *L'Etat-providence, Que Sais-Je*. Paris: Les Presses Universitaires de France.

Mintrom, M., & Vergari, S. (1996). Advocacy Coalitions, Policy Entrepreneurs, and Policy Change. *Policy Studies Journal, 24*(3), 420-434.

Neumann, I. B. (2008). Discourse analysis. In A. Klotz & D. Prakash (Eds.), *Qualitative methods in international relations: a pluralist guide*. Houndmills: Palgrave Macmillan.

NIST. (2012). *NIST Framework and Roadmap for Smart Grid Interoperability Standards, Release 2.0*. Retrieved from

Noam, E. M. (1986). *The Political Economy of ISDN: European Network Integration vs. American System Fragmentation*. Paper presented at the XIV Annual Telecommunications Policy Research Conference, Airlie, VA.

OTA. (1992). *Global Standard: Building Blocks for the Future*. Retrieved from

Padgett, D. K. (1998). *Qualitative methods in social work research: Challenges and rewards*. Thousand Oaks, CA: Sage.

Padgett, D. K. (2004). *The qualitative research experience* (D. K. Padgett Ed.). Belmont, CA: Wadsworth/Thomson Learning.

Page, S. E. (2006). Path Dependence. *Quarterly Journal of Political Science, 1*, 87-115.

Patton, M. Q. (1980). *Qualitative evaluation methods*. Beverly Hills, CA: Sage.
Peters, G. (1998). *Comparative Politics, Theory and Method*. New York: New York University Press.
Przeworski, A., & Teune, H. (1970). *The Logic of Comparative Social Inquiry*. New York: Wiley-Interscience.
Ragin, C. C. (1987). *The Comparative Method: Moving Beyond Qualitative and Quantitative Strategies*. Berkeley and Los Angeles, California: University of California Press.
Reddy, N. M. (1990). Product of self-regulation: a paradox of technology policy. *Technological Forecasting and Social Change, 38*(1), 43-63.
Rein, M., & Schön, D. (1996). Frame-critical policy analysis and frame-reflective policy practice. *Knowledge and Policy, 9*(1), 85-104.
Rothstein, B. (2005). *Social Traps and the Problem of Trust*. Cambridge: Cambridge University Press.
Rubin, A., & Babbie, E. (2001). *Research methods for social work* (4 ed.). Belmont, CA: Wadsworth/Thomson Learning.
Ruef, A., & Markard, J. (2010). What happens after a hype? How changing expectations affected innovation activities in the case of stationary fuel cells. *Technology Analysis & Strategic Management, 22*(3), 317-338.
Sabatier, P. A. (1988). An advocacy coalition framework of policy change and the role of policy-oriented learning therein. *Policy Sciences, 21*(2-3), 129-168.
Schmidt, V. A. (2008). Discursive Institutionalism: The Explanatory Power of Ideas and Discourse. *The Annual Review of Political Science, 11*, 303-326.
Schmidt, V. A. (2010). Taking ideas and discourse seriously: explaining change through discursive institutionalism as the fourth 'new institutionalism'. *European Political Science Review, 2*(1).
Sen, A. (2006). Conceptualizing and Measuring Poverty. In D. B. Grusky & R. Kanbur (Eds.), *Poverty and Inequality* (pp. 30-46). Palo Alto, CA: Stanford University Press.
Shapiro, S. A. (2003). Outsourcing Government Regulation. *Duke Law Journal, 53*, 389-434.
Siciliano, J. (2009, March 25, 2009). Administration pursuing major interagency plan to deploy Smart Grid. *Energy Washington Week*.
Simpson, S. (2000). Intra-institutional rivalry and policy entrepreneurship in the European Union: The politics of information and communications technology convergence. *New Media & Society, 2*(4), 445-466.
Slayton, R. (2013). Efficient, Secure Green: Digital Utopianism and the Challenge of Making the Electrical Grid "Smart". *Information & Culture: A Journal of History, 48*(4), 448-478.
Slayton, R. (2016). Framing Computer Security, 1966-1992. In T. Misa (Ed.), *Communities of Computing: Computer Science and Society in the ACM* (pp. 282-323). New York: ACM Press.
Sovacool, B. K., & Hess, D. J. (2017). Ordering theories: Typologies and conceptual frameworks for sociotechnical change. *Social Studies of Science, 47*(5), 703-750.
Stakeholders look to jump-start stalled Smart Grid standards. (2009, January 21, 2009). *Energy Washington Week*. Retrieved from http://insideepa.com/Energy-Washington-Week/Energy-Washington-Week-01/21/2009/menu-id-93/Page-1.html
Steinmo, S., & Thelen, K. (1992). Structuring Politics: Historical Institutionalism in Comparative Politics. In S. Steinmo, K. Thelen, & F. Longstreth (Eds.), *Structuring*

Politics: Historical Institutionalism in Comparative Politics. Cambridge: Cambridge University Press.

Stephan, H. R. (2015). *Discourse coalitions and unconventional gas in Scotland: Risky 'dash for gas' or vital 'bridge' to a low-carbon future?* Paper presented at the 10th International Conference in Interpretive Policy Analysis, Lille.

Stern, P. (2014). Energy: We need all hands on deck. *Nature, 513*(33).

Stone, D. (2002). *Policy Paradox: The Art of Political Decision Making* (Revised edition ed.). New York: W. W. Norton.

Streeck, W., & Thelen, K. (2005). *Beyond Continuity: Institutional Change in Advanced Political Economies*. Oxford: Oxford University Press.

Swann, P. G. M. (2010). *The Economics of Standardization: An Update*. Retrieved from

Swanson, J. (2008). Economic Common Sense and the Depoliticization of the Economic. *Political Research Quarterly, 61*(1), 56-67. doi:10.1177/1065912907306469

Tashakkori, A., & Teddlie, C. (2003). *Handbook of Mixed Methods in Social and Behavioral Research*. Beverly Hills, CA, London and New Delhi: Sage.

Tate, J., 2001. National varieties of standardization. In: Hall, P.A., Soskic, D. (Eds.), Varieties of Capitalism. Oxford University Press, Oxford, pp. 442–473. http://dx.doi.org/10.1093/0199247757.003.0014

Teivainen, T. (2002). Overcoming Economism. *Review, 25*(3), 317-342.

Tosh, J. (2008). *Why History Matters*. London: Palgrave Macmillan.

True, J. L., Jones, B. D., & Baumgartner, F. R. (1999). Punctuated-Equilibrium Theory, Explaining Stability and Change in American Policymaking. In P. A. Sabatier (Ed.), *Theories of the Policy Process*. Boulder: Westview Press.

Updegrove, A. (2009). How we'll get the job done: and interview with NIST's Dr. George W. Arnold. *Standards Today, VIII*(3), 1-8.

Uslar, M. (2013). Looking Ahead: The Future of Smart Grid Communications and Standardization. In *Standardization in Smart Grids*. Berlin, Heidelberg: Springer.

Utility Standards Board. (2008). Smart Grid: Interoperability and Standards - An introductory review. In.

Van Gorp, B. (2010). Strategies to take subjectivity out of framing analysis. In P. D'Angelo & J. A. Kuypers (Eds.), *Doing News Framing Analysis: Empirical and Theoretical Perspectives* (pp. 84-109): Routledge.

Velkar, A. (2008). *Markets, Standards and Transactions: Measurements in Nineteenth-Century British Economy.* (PhD), The London School of Economics and Political Science.

de Vries, H. J. (2002). Standardization—mapping a field of research. Sherrie. Bolin (Ed.), The standards edge, 99-121.

de Vries, H. (2015). Governance of electrotechnical standardisation in Europe. Retrieved from http://hdl.handle.net/1765/78344

de Vries, H.J., Nagtegaal, B.& Veenstra, S. (2017). Transatlantic Harmonisation of Standards and Conformity Assessment – A Business Perspective. In: Kai Jakobs & Knut Blind (Eds) EURAS Proceedings 2017 – Digitisation: Challenge and Opportunity for Standardisation. Aachen: Wissenschaftsverlag Mainz, pp. T39-T58.

de Vries, H.J., Jakobs, K., Egyedi, T., Eto, M., Fertig, S., Kanevskaia, O., Klintner, L., Koch, C., Mijatovic, I., Mirtsch, M., Morone, P., Orviska, M., Riillo, C. & Scaramuzzino, G. (2018). Standardization: Towards an Agenda for Research. International Journal of Standardization Research. 16. 52-59. 10.4018/IJSR.2018010104.

de Vries, H. J., 2019, EIA 2019-079-LIS ed. Rotterdam: Erasmus Research Institute of Management (ERIM). 60 p. (Inaugural Address Series; no. EIA 2019-079-LIS)

Weir, M. (1992). *Politics and Jobs*. Princeton, NJ: Princeton University Press.

Weir, M. (2006). When does politics create policy? The organizational politics of change. In I. Shapiro, S. Skrowonek, & D. Galvin (Eds.), *Rethinking Political Institutions: The Art of the State*. New York: NY University Press.

Wendt, A. (1987). The Agent-Structure Problem in International Relations Theory. *International Organization, 41*, 335-370.

Werbach, K. (2009). Higher standards regulation in the network age. *Harvard Journal of Law and Technology, 23*(1), 179-225.

Wiegmann, P. M., de Vries, H. J., & Blind, K. (2017). Multi-mode standardisation: a critical review and a research agenda. Research Policy, 46(8), 1370-1386. https://doi.org/10.1016/j.respol.2017.06.002

Wilson, E., J., & Stephens, J. C. (2009). Wind Deployment in the United States: States, Resources, Policy, and Discourse. *Environmental Science & Technology, 43*(24), 9063-9070.

Wodak, R. (2009). *The Discourse of Politics in Action: Politics as Usual*. New York: Palgrave Macmillan.

Wood, L. A., & Kroger, R. O. (2000). *Doing Discourse Analysis: Methods for Studying Action in Talk and Text*. Thousand Oaks, CA; London; New Delhi: Sage.

Yates, J., & Murphy, C. N. (2019). Engineering rules: Global standard setting since 1880. JHU Press.

Yin, R. K. (1994). *Case Study Research: Design and Methods* (2 ed.). Thousand Oaks, London and New Delhi: Sage.

Annex I

Title	Author	Type	Date	Key document
Vademecum on European Standardisation	European Commission, DG Enterprise		1 March 2004	1
Vision and Strategy for Europe's Electricity Networks of the Future	European SmartGrid Technology Platform, European Commission, DG Research	Strategy Document	2006	2
Action Plan for European Standardisation	European Commission, DG Enterprise	Strategy document	December 2009	3
Meeting minutes of the 1st Steering Committee meeting of the Task Force for Smart Grids	European Commission, DG Energy and Transport	Meeting minutes	13 November 2009	4
Meeting minutes of the 5th Steering Committee of the Task Force for Smart Grids	European Commission, DG Energy and Transport	Meeting minutes	23 April 2010	5
Expert Group 1: Functionalities of smart grids and smart meters	EU Commission Task Force for	Report, Final Deliverable	December 2010	6

	Smart Grids, Expert Group 1			
Standardisation Mandate to European Standardisation Organisations (ESOs) to support European Smart Grid deployments M/490 EN	European Commission, DG for Energy	Standardisation mandate	1 March 2011	7
Roles and Responsibilities of Actors involved in the Smart Grids Deployment	EU Commission Task Force for Smart Grids, Expert Group 3	Task Force report/deliverable	04 April 2011	8
EC Communication: Smart Grids: from innovation to deployment	European Commission, EN document	European Commission Communication	12 April 2011	9
Final report of the CEN/CENELEC/ETSI Joint Working Group on Standards for Smart Grids	CEN/CENELEC/ETSI Joint Working Group on Standards for Smart Grids	Final report	4 May 2011	10
Terms of Reference of the Smart Grid Coordination Group	CEN-CENELEC-ETSI Smart Grid Coordination Group	Terms of Reference	May 2011	11

EC Communication: A strategic vision for European standards: Moving forward to enhance and accelerate the sustainable growth of the European economy by 2020	European Commission, EN document	European Commission Decision	1 June 2011	12
Commission Decision of 28 November 2011 setting up the European multi-stakeholder platform on ICT standardisation (2011/C 349/04)	European Commission, OJ	Commission Decision	28 November 2011	13
Smart Grid projects in Europe: Lessons learned and current developments	European Commission, Joint Research Centre	JRC Reference report	2011	14
Assessing Smart Grid Benefits and Impacts: EU and U.S. Initiatives	European Commission Joint Research Centre (JRC) and US Department of Energy (DOE)	Joint report	2012	15
CEN-CENELEC-ETSI Smart Grid	CEN-CENELEC-ETSI	Framework document	November 2012	16

Coordination Group – Framework Document				
Preliminary draft of the annual Union work programme on European standardisation	European Multi-Stakeholder Platform on ICT Standardization, DG ENTR	Information document, work programme	13 June 2013	17
Draft Opinion on Making the internal energy market work	Committee of the Regions	Committee of the Regions Opinion	3-4 July 2013	18

Title	Author	Type	Date	Key document
Standards and Certification: Proposed Rules and Staff Report	Federal Trade Commission (FTC), Bureau of Consumer Protection	Report	1978	1
Global Standards: Building Blocks for the Future	US Congress, Office of Technology Assessment	Report	March 1992	2
Electronic Enterprises: Looking to the Future	US Congress, Office of Technology Assessment	Report	May 1994	3
Federal Participation in the Development and Use of Voluntary Consensus Standards and in Conformity Assessment Activities	Executive Office of the President	OMB Circular A-119	1998	4
To Promote Innovation: The Proper Balance of Competition and Patent Law and Policy	FTC	Report	2003	5

Energy Independence and Security Act of 2007	US Congress	Legal act	2007	6
Antitrust Enforcement and Intellectual Property Rights: Promoting Innovation and Competition	FTC and the Department of Justice (DoJ)	Report	2007	7
GridWise Interoperability Context-Setting Framework	GridWise Architecture Council (GWAC)	Report	March 2008	8
Smart Grid Policy Statement and Action Plan	Federal Energy Regulatory Commission (FERC)	Policy Statement and Action Plan	19 March 2009	9
NIST Framework and Roadmap for Smart Grid Interoperability Standards, Release 1.0	NIST	NIST special publication 1108	January 2010	10
Smart Grid Architecture and Standards: Assessing Coordination and Progress	George Arnold (NIST)	Testimony: House Committee on Science and Technology, Subcommittee on Technology	2010	11

		and Innovation		
Challenges and Opportunities in Smart Grid: A position article	George Arnold (NIST)	Proceedings of the IEEE	2011	12
Opening remarks	George Arnold	Paper presented at FERC technical conference	31 January, 2011	13
A Strategy for American Innovation: Securing our Economic Growth and Prosperity	National Economic Council, Council of Economic Advisers, and Office of Science and Technology Policy	Report	February 2011	14
Blueprint for a Secure Energy Future	The White House	Report	March 30, 2011	15
A Policy Framework for the 21st Century Grid: Enabling our secure energy future	Executive Office of the President: National Science and Technology Council	Report	June 2011	16
Smart Grid Interoperability Standards	Federal Energy Regulatory	Order	July 19, 2011	17

	Commission (FERC)			
NIST Framework and Roadmap for Smart Grid Interoperability Standards, Release 2.0	NIST	NIST special publication 1108R2	February 2012	18

Annex II

Use of QDA software

The HyperRESEARCH software allows you to view the coded element and to view it in context thus assisting in meeting some of the challenges, including transparency. The display shows an intermediary step in the data analysis and the line of reasoning. The code window contains a list of the codes and a description of the highlighted code increases the rigour (Boyatzis, 1998). It allows for constant comparison with other instances of the code, another way to improve rigour. It should again be emphasized, however, that this software is merely a tool. It is the researcher that analyses and makes decisions. As Fowler (1991) argues that "critical interpretation requires historical knowledge and sensitivity, which can be possessed by human beings but not by machines" (p. 68).

HyperRESEARCH allows for various frequency reports, showing for example how many times a code has been applied in a document and across the entire corpus. As an example, HyperRESEARCH can show that the frame "anti-competitive behaviour" in the case of the EU rarely features. Across all the texts analysed in the EU case, this code is applied only two times, once in a document by the Smart Grid stakeholder expert group 1, and once in a document prepared by the European Social and Economic Committee. The code does not appear in any of the documents that spell out the official position of the European Commission on Smart Grids. The Smart Grids Communication mentions that the work is delayed but does not offer an explanation for this delay. The interpretation is that this discourse is marginalized or silent in the context of standards for Smart Grid. In the US, however, this code features regularly, including in one of the main policy statements about the Smart Grid issued by the White House (see fig. 1). Again, reporting numbers as a way to back up a claim should not be interpreted as an adoption of the epistemology of quantitative analysis.

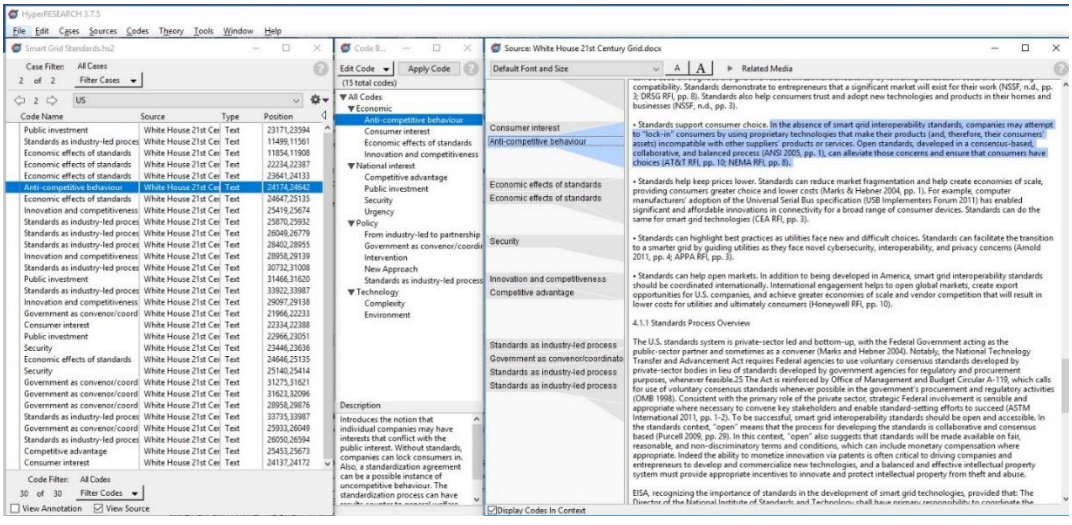
For illustration, table 1 lists two sets of documents, listed in table 1 along with their publication dates. The documents are roughly comparable because of their focus and timing.

Table 1 Comparing two sets of EU and US documents

EU document	Publication date	US document	Publication date
EC Communication: Smart Grids: from innovation to deployment	April 2011	A Policy Framework for the 21st Century Grid: Enabling our secure energy future	June 2011
Final report of the CEN/CENELEC/ETSI Joint Working Group on Standards for Smart Grids	May 2011	NIST Framework and Roadmap for Smart Grid Interoperability Standards, Release 1.0	January 2010

A frequency report shows that the word "interoperability" appears 122 times in the NIST document with the Final Report of the Joint Working Group shows, and only 52 times in the JWG document. Again, the precise number of occurrences is not crucial, but prompts further analysis by the researcher. Another example: while both documents are aimed at a more technical audience. The NIST document have a significantly higher number of data units coded "policy" and "economy" than does the one produced by the JWG.

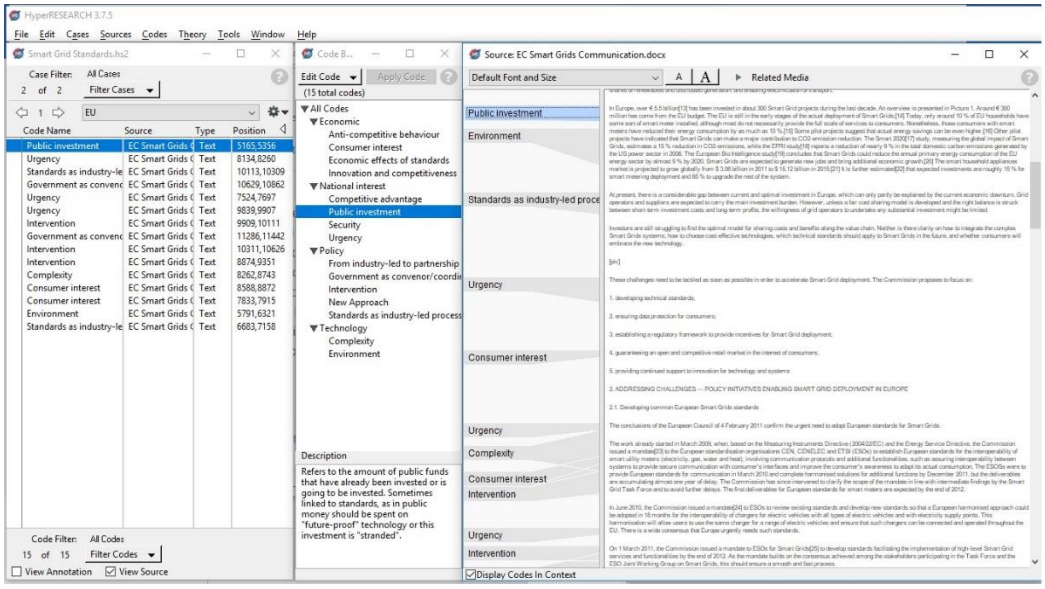
Fig. 1 Coding of "A Policy Framework for the 21st Century Grid: Enabling our secure energy future"



Again, comparing the European Commission's Communication "Smart Grids: from innovation to deployment" of April 2011 with the White House's paper "A policy framework for the 21st century grid" of June 2011. The Commission's paper is 12 pages long, and the one published by the White House is 108 pages. The Commission document mentions the need for standards and the ongoing work in about 500 words, whereas the US document has about 1700 words on these topics. This information can be used to substantiate claims made in the thesis that US documents have more to say about the role of standards.

Another example of a finding, while the code "public investment" does feature in a few EU documents (see fig. 2), closer analysis shows that there is no link made between standards and the need to "future proof" public investment. Rather, the data unit coded public investment appears in a different part of the document from the part on standards. However, in texts about Smart Grid in the US, the role of standards is made more central to the delivering of Smart Grid benefits.

Fig. 2 Coding of EC Communication: Smart Grids: from innovation to deployment



Curriculum Vitae

Sachiko MUTO was born in Copenhagen, Denmark, on 23 May 1975. She is a Senior Researcher at RISE Research institutes of Sweden and Chairperson at OpenForum Europe, a Brussels-based think tank focused on open technologies.

Sachiko is currently a visiting researcher/external PhD Candidate at TU Delft, Department for Technology, Policy and Management, and a former Visiting Research Student at the Center for Science, Technology and Medicine at UC Berkeley.

Education

2001 – 2002	**MSc European Politics and Policy**, London School of Economics, degree awarded with "Merit"
1997 – 2000	**Honours Bachelor of Arts**, University of Toronto, Canada, degree conferred "With Distinction"; Majors: International Relations and Political Science

Work Experience (abbreviated)

2022 – present	Senior Researcher, RISE Research Institutes of Sweden
2022 – present	Chairperson at OpenForum Europe
2016 – 2021	CEO at OpenForum Europe
2008 – 2016	Director, Government affairs, OpenForum Europe
2003 – 2004	Research Assistant, Birkbeck College, University of London,
2002 – 2003	Robert Schuman Scholar, European Parliament DG IV (Research)

2001 – 2002	Research Assistant, London School of Economics

Other Activities

2023	Programme Committee member, OpenForum Academy Symposium, 28 November, TU Berlin: https://symposium.openforumeurope.org/#speakers
2023	Guest editor for IEEE Software Special Issue on Open Source software in the public sector (forthcoming, see CFP at: https://www.computer.org/digital-library/magazines/so/cfp-open-source-software
2012 – 2014	Visiting Research Student, Center for Science, Technology, Medicine & Society, UC Berkeley

Publications

Linåker, J., Robles, G., Bryant, D., & Muto, S. (2023). Open Source Software in the Public Sector: 25 years and still in its infancy. IEEE Software, 40(4), 39-44.

Muto, S., Rudmark, D. & Östling, A. (2023) En jämförande analys av Mobility Data Specification och alternativa standarder – lärdomar för det svenska transportsystemet. RISE Rapport 2023:55, http://urn.kb.se/resolve?urn=urn:nbn:se:ri:diva-65642.

Linåker, J., Lundell, B., Servant, F., Gamalielsson, J., Muto, S., & Robles, G. (2023). Public Sector Open Source Software Projects - How is development organized? *ArXiv, abs/2304.06093*.

Blind, K.; Böhm, M., Grzegorzewska, P., Katz, A., Muto, S., Pätsch, S., Schubert, T. (2021). The impact of Open Source Software and Hardware on technological independence, competitiveness and innovation in the EU economy, Final Study Report. Brussels.

Muto, S. (2017). From laissez-faire to intervention: Analysing policy narratives on interoperability standards for the smart grid in the United States. Energy Research & Social Science, vol 36, pp. 111-119.

Egyedi, T. & S. Muto (2014). Standards for ICT – a green strategy in a grey sector. In: Kai Jakobs (Ed.), Modern Trends Surrounding Information Technology Standards. IGI, pp. 127-14

Egyedi, Tineke and Sachiko Muto (2013). 'Standardization as ecodesign at sector level', in Appelman, Jaco H. and Osseyran, Anwar and Warnier, Martijn (Eds.). Green ICT & Energy: From smart to wise strategies. London: CRC Press, pp. 53-64.

Egyedi, T.M., S. Muto & T.V. Guseva (2013). Стандартизация в сфере ИКТ: «зеленая» стратегия', Компетентность, ТЕХНИЧЕСКОЕ РЕГУЛИРОВАНИЕ, 6/107/2013, 4-15.

Egyedi, T. and S. Muto (2012). Standards for ICT – a green strategy in a grey sector. International Journal of IT Standards & Standardization Research, 10/1, pp.35-48

Egyedi, T. and S. Muto (2012). Standards for ICT – a green strategy in a grey sector. International Journal of IT Standards & Standardization Research, 10/1, pp.35-48

Egyedi, T. & S. Muto (2011). Standards for ICT – a green strategy in a grey sector. Proceedings of the 7th International Conference on Standardization and Innovation in Information Technology (SIIT 2011). K. Blind & K. Jakobs (Eds.). Mainz Publishers, Aachen, Germany, pp. 59-68.

Egyedi, T., & S. Muto (2010). Interoperabiliteitstandaarden voor ICT: Een groene strategie in een grijze sector, in: Valerie Frissen & Mijke Slot (Eds.), Jaarboek ICT en Samenleving 2010, 7de editie: De duurzame informatiesamenleving, Gorredijk: Media Update, pp. 221- 239.

Conference papers

2015	4S Annual Meeting, Denver, abstract: http://4sonline.org/ee/files/program_w_abstracts.pdf
2013	4S Annual Meeting, San Diego, abstract: http://4sonline.org/files/program_abstracts_0919.pdf
2012	4S/EASST Annual Meeting, Copenhagen, abstract: (http://www.4sonline.org/files/program_prelim_abstracts_120918.pdf)
2011	SIIT, Berlin (http://projects.inno.tu-berlin.de/siit2011/docs/SIIT_2011_Final_Program.pdf)
2011	ISIE, 6th International Conference on Industrial Ecology, Berkeley, abstract available at: http://isie2011.berkeley.edu/ISIE2011_conference_program.pdf
2010	3rd International CMI conference, Green ICT, abstract: http://conf.cmi.aau.dk/2010/CMI_Conference_draft_program_2010.pdf

Smart Grid Standards Policy in Context

A discursive-institutionalist analysis of government intervention in the European Union and the United States

Sachiko Muto