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Meijer, Frits; Visscher, Henk

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Are building regulatory systems in European countries climate proof?

Frits Meijer

OTB Research for the Built Environment, TU Delft

f.m.meijer@tudelft.nl

Henk Visscher

OTB Research for the Built Environment, TU Delft

h.j.visscher@tudelft.nl

Abstract

Demands on the energy performance of new and existing buildings hold a prominent place in the regulations of all European countries. The influence of EU policy goals and contents of EU Directives reverberate strongly in the energy regulations. Goals set by the European Union are that all newly built constructions must have a zero energy level by 2020 and that the total building stock must be energy neutral by 2050. The Energy Performance of Buildings Directive and the Energy Efficiency Directive are designed to give Member States the regulatory tools to develop and strengthen energy performance regulations. There are indications that the current (energy) regulations alone are inadequate to realize the energy saving goals set by the EU and its Member States. The goals can only be reached by more strict and supportive governmental regulations. That does not only mean formulating more stringent demands. It also poses new challenges to the way the construction process is organized and the regulations are enforced and the roles and responsibilities of constructors (building and installation companies). In the quality control procedures focus should be put on the quality of the building as it is built and preferably as it is going to be used. The question is if current quality control frameworks are organized adequately in European countries to meet these demands. To give a beginning of an answer to this question we look at the regulatory systems of seven European countries (England & Wales, Ireland, Germany, France, the Netherlands, Norway, and Sweden) where private building professionals already play a dominant role in the quality control process. The paper zooms in on the robustness and focus of the quality control process and the demands that are made on building and installation companies with respect to meeting the quality demands. It appears that current building regulatory systems are not yet geared completely with the future demands.

Keywords: building regulations, quality control, European Union, housing quality

1. INTRODUCTION

Traditionally quality control of construction work in Europe has been a governmental responsibility. In most European countries local authority building control has been issuing planning or building permits and were responsible for plan approval, site-inspections and checks on completion of constructions. During the last decades however these building control tasks have been outsourced more and more to private parties. The main driving force behind this development has been the wish of governments to deregulate. The shift of responsibilities to private parties should not only improve the quality of construction works but it could also streamline administrative procedures and processes. In the eyes of the policymakers this leads to a win-win situation: less regulation, leading to a qualitative better building stock through optimised (cheaper and faster) quality control procedures. It is exactly because of these reasons that the Dutch government is on the brink changing its quality control system of constructions towards a more private model (MBZK, 2015). In the Netherlands the discussion to change the quality control system has been going on for many years. The dominant line of policy of subsequent governments has been “privatise if possible and keep it public when necessary”.

Simultaneously with the strong wish to deregulate, new quality goals emerged that require regulatory governmental intervention. The reduction of energy use and environmental impact of construction have been the most important new policy goals the last decades. The European Union and its Member States have implemented regulations and enforcement schemes that should ensure very energy efficient new buildings and have introduced instruments to improve the energy performance of the existing building stock. On a European level the Energy Performance of Buildings Directive, the EPBD (2010/31/EC) and the Energy Efficiency Directive (EED – 2012/27/EU) have been the dominant frameworks for the Member States to fit in their national regulations. So although the general deregulation trend in Europe has led to less governmental intervention in the building sector, in the field of energy efficiency the number of regulations has increased and became more stringent.

Recent studies show that the (energy) regulations are probably inadequate to realize the energy saving goals set by the EU and its Member States (summarized in Visscher et al, 2016). To reach the goals, more strict and supportive governmental regulations are needed. That does not only mean formulating more stern demands. It also poses new challenges to the way the quality control process of constructions is organized and the regulations are enforced. The roles and responsibilities of (private) quality controllers and builders are an essential part of this. This paper explores if the regulations and the quality control processes in the ‘average’ European building regulatory system are fit for the task that lies ahead. Section 2 focusses first on the research project(s) the paper is based upon. The subsequent section 3 characterises the essentials of the systems in England & Wales, Ireland, Germany, France, Norway, Sweden and the Netherlands. In the closing sections 3 and 4 the results are discussed and the main conclusions are drawn.

2. Research approach

For many years OTB – Research for the Built Environment, Delft University of Technology, has been involved in studying alternative visions on building regulatory systems in international comparative projects. Recently we have been involved in a study for the DG Internal Market to (Ecorys and Delft University of Technology, 2015). For the Dutch government we recently compared the proposed Dutch quality control system with those in some selected European countries: England and Wales, France, Germany, Ireland, Norway and Sweden. In these countries the roles, tasks and responsibilities were analysed of public and private parties in assuring and guaranteeing the technical quality of construction works. Starting point was our existing dataset on building regulatory systems in Europe. Additional and updated information about the quality control systems was inventoried via desktop research. Relevant regulatory documents and other sources were analysed. The project started in the fall of 2015 and was finished in the spring of 2016 (Meijer et al, 2016). Within the boundaries of this paper the highlights of the research are presented.

3. OUTLINES OF THE CONTROL SYSTEMS OF OTHER COUNTRIES

This section summarises the research results for the seven European countries. Attention is paid to the nature of the quality control and the roles and responsibilities of the building professionals. Focus lies on the quality control of the technical demands. In all countries only municipalities can grant planning permission for the construction or modifications of new and existing buildings.

3.1 England & Wales

Minor construction work in England & Wales is exempt from technical building control. For the construction of relatively simple work the application of a building notice is sufficient. All other construction plans are subject to a quality control procedure. For the technical quality control of these plans, applicants can choose between local authority building control (LABC) or a private Approved Inspector. This dual quality control system has been in operation for more than 30 years. Approved Inspectors have to be certified and registered before they can act. There are no legal obligations concerning the way quality control should take place (e.g. concerning methods and giving an account of the control results). Nonetheless both public, as well as private controllers, have voluntarily committed themselves to the Building Control Performance Standards. These standards give guidelines how qualitative good building control should be performed (DCLG, website). The quality control process has a clear beginning and ending. LABC has to give building approval and issues a completion certificate at the end of the procedure. Approved Inspectors have to inform LABC that they are involved of the quality control of a construction at the begin and the end of the process (Meijer et al, 2016). Builders have to comply with the general rules concerning materials and workmanship. There are no

general recognition or certification schemes for contractors or builders. However specialist installers can join a Competent Person Scheme. When recognised or certified (depending on education and practical experience) these installers can self-certify certain types of building work (e.g. glazing, heating systems), For these works building regulations approval is not needed. It is assumed that the work meets the requirements (Planning Portal, website). In practice many installations are being placed by these competent persons. Although there is no certainty that all these competent persons deliver adequate work, the certification framework in which they have to operate give certain basic assurances. At least their workmanship, capabilities and experiences have been tested before they are going to operate in practice. In general all parties responsible for a construction project (e.g. owner/applicant, advisor, designer, builder or installer) must ensure that the work complies with all applicable requirements of the Building Regulations. Indemnity and warranty insurance schemes should protect the building owner for financial risk in case of defects and failures. There are no regulations that apply to a post occupancy testing of for instance if the regulations are being met. Between 2007 and 2010 owners had to provide a Home information Package before a property in England and Wales could be put on the open market for sale. This requirement has been suspended from May 2010 on and was formally repealed in the beginning of 2012. As in all other Member States EU legislation still requires building owners to provide an Energy Performance Certificate (or energy label) at the moment of a transaction.

3.2 France

For technical control a public-private construction supervision system has been in operation in France for almost forty years. Three categories of construction works are distinguished. Renovation activities and small risk-free works are exempt from any control procedure. Simple building activities (up to a certain floor area) have to be reported to the municipality. Once the work is finished the municipality has to be notified, after which a completion certificate will be issued (Meijer et al, 2016). All other construction need a building permit and are eligible for a regular procedure. The complexity of the plan defines the quality control procedure. For relative uncomplicated works (like a house) a registered architect has to declare that the plan meets the regulatory demands. When the building is completed a notification has to be sent to the municipality before it can be taken into use. In practice these works are hardly being controlled during construction either by municipalities or private controllers (Deman, 2013). For complex construction works with a higher risk quality control by private control organisations is obligatory. Control starts in the phase of plan approval and continues until completion. After plan approval the control organisation has to deliver an initial technical report with his findings. Before construction starts a control or inspection plan has to be drawn up. Private controllers are legally liable to control the structural safety and the safety of persons. Site inspections are held at random. After completion the private controller has to deliver an end report on the technical control. Public and high-rise buildings must have a user permit before they can be used (MLHD, website). The private control organisation has to be certified and accredited and must be independent of the applicant/building owner. Organisations can be certified for various control scopes (e.g. all regulations, only fire safety regulations, regulations for installations etc.). A decisive factor behind this system is the French insurance and guarantee

system for building works (Meijer et al, 2016). The relevant law (dating from 1978) dictates that every building professional involved with a construction project must have appropriate guarantee insurances (e.g. covering professional indemnity). Builders and contractors have to be registered otherwise there is no certainty that they can meet the guarantee provisions.

3.3 Germany

To map the German situation we focussed on the regulation of North Rhine Westphalia. The German model can be best described as being a mix between public and private quality control. Municipalities are formally responsible for issuing the (building and completion) permits and the quality control procedure. Recognised or registered building professionals however play an important role in the system. First of all a certified and registered architect and/or structural engineer must submit the permit application and usually takes care of plan approval. In addition – depending of the construction type and control scope – a state recognised expert (*Prüfsachverständige*) must be involved in the quality control process. State recognised experts have to be independent and comply with strict demands on education and practical experience (Building Code of NRW, 2015). Procedure wise Germany distinguishes construction works that are exempt from building control, works that must follow a ‘simplified’ procedure and works that are eligible for the regular permit procedure. Many minor construction works are exempt from building control. If there is a zoning plan in place dwellings of a medium or lower height could also be built without a building permission. Beforehand though evidence must be delivered to the municipality (certified by the architect and the state recognised expert) that the building plan meets the essential demands. The simple permit procedure applies to the construction of low rise residential buildings and other low risk buildings. Local building control does not check plans if designers certify that they comply with the building regulations. The structural design must be calculated by a qualified structural engineer and his design must be proofed by a state recognised expert. No completion certificate is being issued. The regular building permit procedure applies to the remaining construction works. The building application (and the supporting documents) must be signed by a certified architect or engineer. Normally a state recognised expert verifies compliance with the technical requirements (especially structural stability and fire safety). For the construction phase a contractor and a – independent-site manager has to be appointed. Both the builders as the other building professionals have to meet statutory insurance requirements regarding liability. During construction, building control is exercised by local building control and the site manager. Building authorities usually delegate site inspections on structural stability to a state recognised expert. The completion of the shell and the completion of the building have to be reported to the local building control authorities so it can be checked. If satisfied the local authority issue a completion certificate. (Meijer et al, 2016).

3.4 Ireland

Ireland has recently (2014) changed its system to an almost entirely private system of quality control. In the new system competent private building professionals are responsible for the quality control of construction works. The system includes all kinds of new responsibilities and

roles. Applicants for building approval must submit a Commencement Notice and ensure themselves that supervision during construction is carried out by a certified independent party: an Assigned Certifier. Some (simple) works are exempt from this obligation. This applies to construction works that do not need a planning permission or a fire safety certificate, like regular maintenance activities and or the construction of small extensions. In all other cases the applicant or building owner has to submit a Commencement Notice. Besides the inclusion of a certificate of design compliance, proof must be delivered that an Assigned Certifier is going to inspect and certify the works and a builder has been hired to carry out the works. Furthermore the certifier and the builder must declare that they will meet the regulations. Finally the Commencement Notice must be accompanied by an inspection notification framework and an inspection plan. After completion of the project, both the certifier as the builder must certify that the completed construction complies with the demands of the Building Regulations (DECLG, 2014). Shortly after the new regulations came in to force, it came apparent that for the construction of one-off dwellings and extensions on existing houses. the costs of quality control were highly disproportionate. This has led to an amendment to the system. The mandatory requirement for statutory certificates of compliance for these constructions was removed. Owners and self-builders have the choice to opt-out of the statutory certification and are allowed to demonstrate by other means that the work is going to meet the demands. At the same time the government announced the development of a new local authority quality control process for single dwellings and residential and commercial buildings (Meijer et al, 2016). The effects of this change (on the number of applications or the construction quality) is yet unknown. For building professionals inclusion on statutory registers is the primary means of establishing competency. For architects and engineers these registers already are in operation. The register for builders should be in place shortly. Furthermore building professionals must ensure that they are adequately covered for liabilities (DECGL, website).

3.5 Netherlands

In April 2016 the new law on Quality Assurance of buildings has been sent to the Dutch Parliament (MBZK, 2015). This law will change the quality control system of construction work in the Netherlands fundamentally. All control activities on compliance with the technical building regulations will be transferred from public authorities to private parties. In the new system the list of exemptions containing the risk-free construction works also will be extended. Besides that a new category 'Technical control free construction works' will be introduced. These are the same construction works as the exemptions, only difference is that these works have to get planning permission. All other construction works will be classified in three groups according to their complexity and possible consequences in case of failure. Class 1 contains for instance one family housing. Hospitals and high rise buildings are assigned to class 3. The technical quality control of these construction works will be carried out by private parties. An independent Admission Organisation is going to assess and recognise these private quality controllers and their quality control instruments. Municipalities stay responsible for checking planning and aesthetic issues. In the new system an applicant has to notify the municipality about his plans and the way quality control is going to be arranged. The appointed private controller carries out plan approval and makes an inspection plan and takes care of the control

during the construction phase. At the end of the process the quality controller declares that the building meets the technical demands (IBK, 2014) and a completion file has to be delivered to the owner or applicant. To strengthen the position of the 'building consumers' the liability of builders (e.g. for hidden faults) will be sharpened in the Civil Code. A decade ago the initiative was taken by the government to introduce a Building File. This document should describe the condition of the building in relation to the building requirements, should help consumers to make their choice between buildings, and could function as a manual for use and maintenance. Although the Dutch government welcomed the idea, the concept did not get enough support at that time of the most important interest groups of the building sector. In the new system a completion file has to be delivered at the end of the quality control process. This could bring the Building File concept back to life.

3.6 Norway

In the 1990's Norway (1997) changed its public quality control system drastically. The new system was largely based on self-certification by approved building professionals (architects, engineers and builders). These enterprises could self-certify their own construction works and that of others. In practice it quickly appeared that this new model proved to be highly ineffective. The main problems were that self-certification by building professionals was inadequate and that local authorities failed to supervise the private parties (World Bank Group, 2013). From 2012 on a new regulatory framework has come into force. The essence of the system (self-certification) has not changed, but the checks and balances to assure the quality of the quality control process have been sharpened considerably. The demands and supervision on both quality as independence of control have become stricter. Building professionals have to meet demands on education and practical experience. Norway makes a distinction between construction works that need a permit and risk-free works that are exempt from a permit and a procedure. The other projects require an application and building permission. The other construction works are eligible for the quality control procedure (KoRD, 2015). All parties involved (applicants, designers, engineers and builders) have to be approved by the central government as a responsible enterprise. All roles have to be filed in properly before the authority issues a building permission (DiBK, website). The process starts with an obligatory preliminary consultation meeting where the parties involved decide about an inspection plan. This inspection plan is used during the construction and completion phase. For critical building elements (e.g. structural components, fire safety, energy efficiency and the building envelope) in more complex constructions independent private control is obligatory (Meijer et al, 2016). At the end of the construction process the controller/applicant has to make a completion report and file an application to the municipality for a completion certificate. At completion the applicant and builder has to supply the user or occupant of the building with an user and maintenance manual of the building. A last interesting feature in Norway is that local authorities have the statutory duty to make a strategic policy plan about building control. Certain elements have to be addressed in that plan, like prioritising the supervision and control on certain areas. Those priority areas could be certain construction types or certain technical requirements. The national ministry has the right to give the municipalities orders to set these priorities. In the period 2013-

2014 the local authorities had, by ministerial order, to check if all construction projects carried out in their municipality met the minimum energy performance requirements.

3.7 Sweden

The general rule in Sweden is that for a work needing building approval there must be at least one private person/party involved that controls the quality during construction. The demands on the private controller are established in the Law of Building and Planning 2010. The quality controllers must be certified before they can operate in practice (Boverket, website). Sweden also recognises various categories of construction works. Besides construction works that are exempt, Sweden distinguishes a category works that in principle is exempt, but mainly because of planning reasons has to be reported to the municipality before construction can start. For the construction and renovation/adaptation of single single-family and semi-detached houses, the requirements are also generally less stringent (Deman, 2013). When private quality control is necessary an inspection plan has to be made and a technical meeting has to be organised. All parties involved must attend this technical meeting. Only if the municipal building committee agrees with the inspection plan the building permit is issued. The municipality building committee controls the essential elements (structural and fire safety, sustainability, insulation and health issues) of the intended construction plan during plan approval. During construction a certified independent quality controller has to take care of the inspections. The applicant/ owner and the builder stay responsible for an adequate quality control process. No specific demands are made on the builder with respect to registration or practical experience. The building regulations expect that a builder complies with the regulations. Liability-issues of the various building professionals involved in a project are usually arranged in standard contracts. After completion an end meeting is held that establishes if all the agreements and commitments have been met that were stipulated in the approved inspection plan. If the municipal building committee is satisfied a written notice is issued to the applicant/owner. This written notice is comparable with a completion certificate.

4. Discussion

4.1 Focus on the as built situation

The main goal of a quality control system is to assure that buildings – after they have been constructed - meet the regulatory quality demands. Traditionally the countries studied, focussed their attention on the beginning of the process. Applicants had to submit a plan. During plan approval the drawings and calculations were controlled by local authorities and after the issuing of building approval, construction could start. During construction and at completion the progress and end result were inspected, but emphasis laid on the building approval phase. The countries that are included in this project all have developed systems where the checks and balances have been more evenly distributed throughout the building process. During the process qualified architects and engineers (e.g. Germany and France), qualified builders (e.g. Norway, France, Ireland) and qualified controllers (all countries) have to make sure that constructions meet the demands. After completion controllers, and sometimes builders too, have to report

their experiences and the results of the inspections before the local authority issues a completion certificate. With these kinds of procedures in place the chances are fair that buildings meet the intended minimum quality. At the same time all countries have been trying (and still are trying) to streamline and simplify their quality control procedures for construction works. Without exception, the countries studies, decided that deregulation and privatisation was the way forward. This has led to a greater emphasis on the responsibility of building owners and the transfer of actual quality control from municipalities to private parties.

4.2 Emphasis on energy regulations

As we have sketched above the emphasis of quality control has moved from the design phase to the as built situation. Strict regulatory demands are made on the requirements that should be tested and sometimes the way it should be controlled. As we have seen in the country descriptions these demands always focus on the control and inspection of the structural and fire safety requirements. What is more, these statutory demands on control and inspection always apply to complex constructions. In most countries dwellings are outside the centre of the quality control attention. An example of this is France, where due to the insurance and guarantee system, the structural and fire safety of complex constructions is inspected thoroughly and adequately. Dwellings are hardly controlled by professionals, because the insurance risks are lower. More in a broader sense one can argue if a regulatory system that is heavily funded on insurance regulations is helpful in the face of climate change. The height of the energy use and the sustainable quality of construction does not affect insurance heights and is no driving force to realise a better environmental quality.

The high potential and expected energy savings in buildings increases the need for accurate quality control. As we just have sketched this theme still does not get the attention it deserves in the regulatory developments. However the regulatory infrastructure is already available and more attention for energy and sustainable requirements can be easily incorporated in the current regulatory framework. The first step would be to give energy requirements the same status as currently is being done with structural or fire safety requirements. Private quality controllers should be made explicitly responsible to check these requirements. Only in Norway quality controllers are statutory obliged to control the energy efficiency of complex constructions. Also steps could be made on another policy level. Again in Norway (but for instance also in Ireland) statutory demands are made on municipalities to prioritize supervision on the control of certain requirements. In the period 2013-2014 the national Norwegian ministry ordered municipalities to check if all construction projects met the minimum energy performance demands.

4.3 Demands on building professionals

Other interesting developments are the growing demands on the quality and workmanship of builders and installers. All countries have incorporated various forms of guarantees in their systems to make sure that builders and contractors deliver what they are supposed to do. In England individual installers can certify their own work when they are recognised as competent persons. In France builders have to be registered before they can be qualified for insurance and

thus can operate in practice. Ireland is working on a register of builders. In Norway persons and parties who want to perform construction work and building control tasks can be approved and in all cases have to declare that they are fit for the task. In Sweden the builder must appoint a certified site manager who is responsible for the quality control. On top of this, all countries have strict rules for building defects insurances. With these developments a step is made to a further professionalization of builders. However for a successful transition to energy neutral constructions more stern demands must be set on the knowledge and skills of the building professionals. They will have to use new techniques and improve the quality and accuracy of the work. Maybe the English and Welsh Competent Person Scheme could be an example how to deal with the growing need for accurate quality control. This Competent Persons Scheme specifically focuses on construction elements that matter regarding the energy performance of buildings (e.g. windows, glazing and installations). Further study will be needed to determine the accuracy and effectiveness of this scheme.

4.4 Statutory post occupancy monitoring is missing

Regulatory attention for post occupancy monitoring is completely absent in the countries studied. Some countries have had in the recent past some regulations and guidelines relating to the user phase of constructions. The Home information Pack in England and the Building File in the Netherlands have been mentioned in this paper. Due to political considerations and the fact that parties involved did not support the instrument, the initiatives were stopped. Generally the instruments were considered to be too much of a burden and too expensive. Currently in most countries the quality control procedure ends with the delivery of a completion file. Norway makes even regulatory demands with respect to a user and maintenance manual. Besides that building owners all over Europe have to provide an Energy Performance Certificate when they rent out or sell their buildings because of European regulations. While it may be not foreseeable that post occupancy monitoring will be incorporated in the building regulatory systems of countries, the current practice seems to provide at least a basis for post occupancy monitoring. Besides that the growing big datasets with the actual energy use in buildings provide a wealth of information about the effects of the energy regulations on the actual use of occupants.

5. Conclusions

This paper pictures the state of the art of quality control systems for constructions in seven European countries. What can be noticed in the countries is that the balance slowly shifts from public control and enforcement towards a more dominant role of private parties and building professionals. This development goes hand in hand with the materialisation of more robust and reliable certification and accreditation schemes to guarantee the quality and qualifications of building professionals. With respect to the scope of quality control we see a strong focus on control of the design to monitoring of the building process and testing of the quality of the final building. Post occupancy monitoring is nowhere an established part of the building regulatory system. With respect to the contents it can be noticed that statutory demands on control (when present) usually are focussed on structural and fire safety issues. Of course attention is paid to the check of the energy performance requirements, but the priority in general does not seem to

be high. All along the line more simple constructions (e.g. dwellings) are controlled to a far lesser extent. The leading question in this paper was if current quality control frameworks are adequately organized in the light of the regulatory needs related with the expected climate change. In organizational terms the framework looks adequate enough to make the regulations more climate proof. What is needed is the political will and determination to give the energy and sustainable requirements the same status as for instance the demands on structural or fire safety. The last decades the themes energy saving and climate change have been dominating the political agenda. It seems merely a question of time before the regulatory framework will be adapted. In the end however it is also about the question how the systems function in practice. In our future research we intend to lay emphasis on these practical experiences. Only then a more definite and more balanced judgement can be made about the climate 'proof-ness' of quality control systems for construction in the various countries.

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