Façade Leasing Demonstrator Project: Business Delivery Report

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Facade Leasing Demonstrator Project

4.2.6.FLD D3. Business Delivery Report

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Facade Leasing Demonstrator Project Business Delivery Report

Annex 4.2.6. FLD D3

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Scientific partners:

Industry partners:

0. Executive Summary

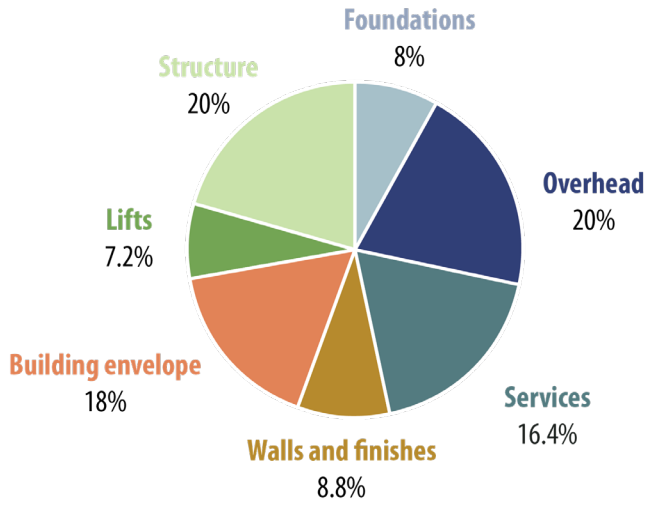
Incentivising investment and long-term collaboration in high-performance facade projects.

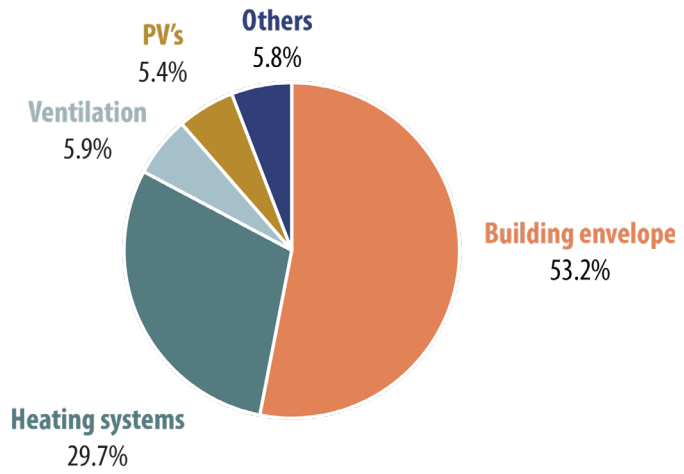
This technical report is an annex to the Facade Leasing Demonstrator Project 2018 performance report (4.2.6.FLD.D1). For general information on the Facade Leasing research project, its process, and objectives please refer to the aforementioned document.

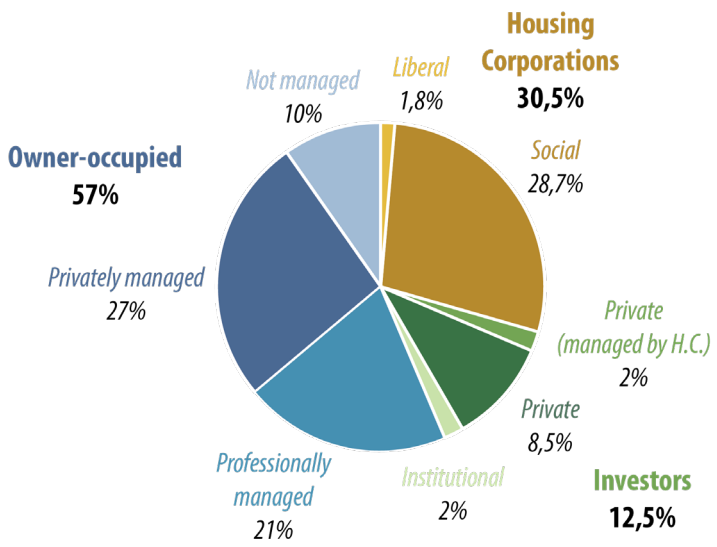
This technical delivery report focuses on the economic and business model aspects of the FLD project. As has been mentioned before, the innovation behind the Facade Leasing research project lies not so much in the creation of new, energy-efficient facade technologies, but rather the creation of new investment and management processes leading to a more widespread and effective use of available and upcoming technology.

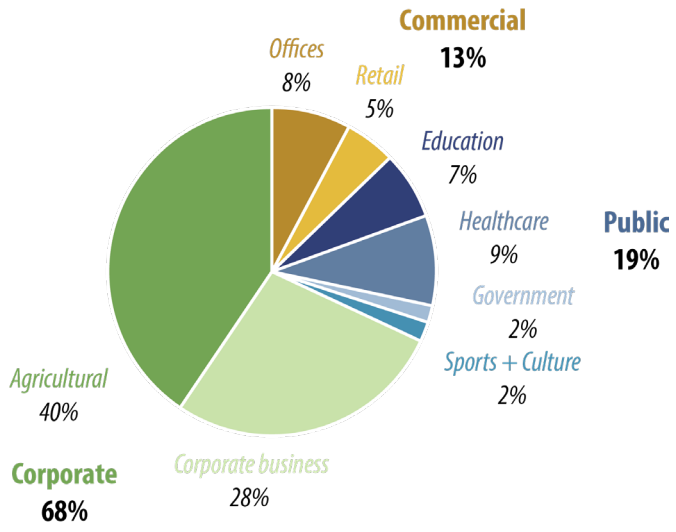
The present report starts by describing the large, and growing, market for economically viable facade renovation solutions. The research presently focuses on the Dutch non-residential, (semi-)publicly owned market, which has been identified as an ideal early adopter, but extrapolations are made to other European segments in the “Upscaling” chapter. The report then presents the work done by the research and practice consortium of the FLD project represented by real estate owners/ operators, facade fabricators, financial institutions, and other key stakeholders towards the definition of a promising business and financial model for the contracting of Facades-as-a-Servioce.

1. The global economic and energetic challenge of building energy renovations









Comparison of initial cost breakdown for a new construction (left) and a deep energy renovation project (right). Based on data from:

Dall'O, G., et al. (2013). "Improvement of the sustainability of existing school buildings according to the Leadership in Energy and Environmental Design (LEED)® Protocol: A case study in Italy."

Klein, T. (2013). Integral Facade Construction. Towards a new product architecture for curtain walls. (Doctoral dissertation, Delft University of Technology), TU Delft

Parker, D. and A. Wood (2013). The Tall Buildings Reference Book, Routledge.

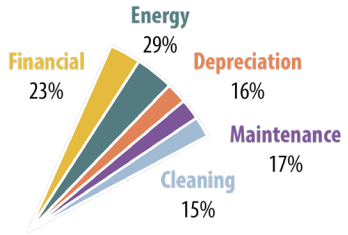
Breakdown of residential and non-residential property per sub-sector in the Dutch real estate market. Based on data from:

BZK (2012). Het functioneren van VvE's: update 2012 en verbetervoorstellen. Arnhem, Ministerie van Binnenlandse Zaken en Koninkrijksrelaties.

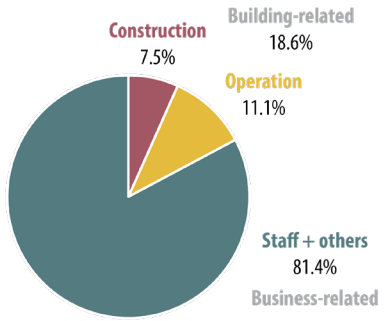
Janssen, I., et al. (2017). Benchmark Gemeentelijk Vastgoed. Tilburg - 's-Hertogenbosch, TIAS School for Business & Society en Republiq.

Baines, T. and H. Lightfoot (2013). Made to Serve: How manufacturers can compete through servitization and product service systems, John Wiley & Sons.

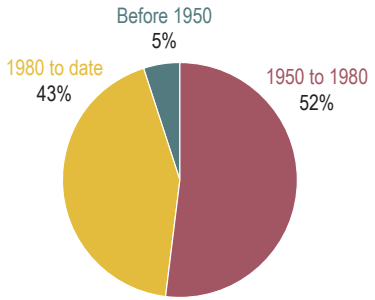
Stahel, W. R. (2016). "The circular economy." Nature News 531(7595): 435.



Typical building operating cost breakdown over 30 years.*



Typical building-related costs in relation to overall business expenses over 30-years.*



*Building stock of 14 publicly-funded Dutch universities by period of construction**.*

** de Jong, P. and M. Arkesteijn (2014). "Life cycle costs of Dutch school buildings." Journal of Corporate Real Estate 16(3): 220-234.*

*** den Heijer, A. C. (2011). Managing the University Campus: Information to support real estate decisions. Delft, Eburon Academic Publishers.*

Particularly i n advanced industrialized economies, the last few years have seen the development and growth of a number of performance-based contracting models, or product-service systems. These models shift the value proposition in a business transaction, from the single delivery of material products to the ongoing delivery of performance services. Such a transition not only makes sense from a business perspective - as service-delivery tends to generate a considerably larger profit margin and client retention than product sales - but also from a Circular Economy perspective - as products and their embodied materials become a means to an end instead of the end itself (Baines & Lightfoot, 2013; Stahel, 2016).

The Facade Leasing research project, initiated in 2014, has been working on the development and implementation of models to facilitate this transition in the specific case of facades for new buildings and deep energy renovations. The reason for choosing such a complex technological product is simple, the facade and integrated building services represent a large part of a building project's initial investment (30% to 40% for a new building, 50% to 90% for a deep energy renovation project (Dall'O Et Al., 2013; Klein, 2013; Parker & Wood, 2013)). Such systems also have a determinant effect on the building's operational costs, particularly energy and maintenance.

The research project has focused on the specific target market of Dutch (semi-)public, institutional real estate owners and operators, particularly publicly-funded universities. Public clients, as a whole, are responsible for the management (and related procurement) of about 20% of the Netherlands' non-residential building stock, a ratio similar to that of other European countries. Public procurement is also frequently described as the ideal early adoption platform for innovation, for a number of reasons: It is not driven by financial gains and profit, as the commercial procurement sector tends to be; It responds to "common good" values such as social and environmental responsibility; It is subject to wider scrutiny and criticism as it entails the investment of public money; It is defined by a long-term planning horizon that can span more than one human generation, rather than the span of a single financial payback projection.

Publicly-funded universities, in particular, are subject to internal and external pressures to innovate. Not only are they subject to constant changes in student enrollment, educational requirements, housing demands, technical changes, among many others, they are also expected to lead the way into a sustainable future by applying (as early adopters) the knowledge they generate.

Publicly-funded universities in the Netherlands are meanwhile representative of a wider problem faced across the European Union: the simultaneous obsolescence of a large fraction of the building stock. An analysis of 14 large, publicly-funded universities in the Netherlands shows that over half their building stock was built during the post-second world war period between the 1950's and 1970's (den Heijer, 2011). These figures are similar to those which can be found across a number of European real estate sectors, both residential and non-residential. The 50- to 70-year technical service-life of building envelope components means this massive volume of buildings will require deep energy and functional renovation in the coming decade or two. This represents a daunting challenge in terms of financial, material, and human resource investment.

2. The Facade Leasing schematic model

The basis for the Facade Leasing model is the redistribution of activities related to the design and engineering, construction, financing, management, and end-of-service reprocessing of the facade and its integrated systems among a number of key stakeholders. These activities are assigned on account of each party's core professional capabilities, and addressing their core business incentives.

A number of economic challenges for all stakeholders are addressed by the adoption of such a model. Suppliers of facade systems gain competitive advantage and increase the value of their product-service offerings, resulting in higher profit margins and financial stability during times of economic downturn. The experience of a number of Dutch facade fabricators and system suppliers during the 2008 Global Financial Crisis - when between a quarter and a third of all members of the Dutch Metal Facade Industry Branch Organisation (VMRG) ceased operations due to bankruptcy or mergers (Cleton, 2015) - still acts as a reminder of the importance of deriving a higher fraction of revenue from ongoing contracts such as maintenance and cleaning, rather than new projects.

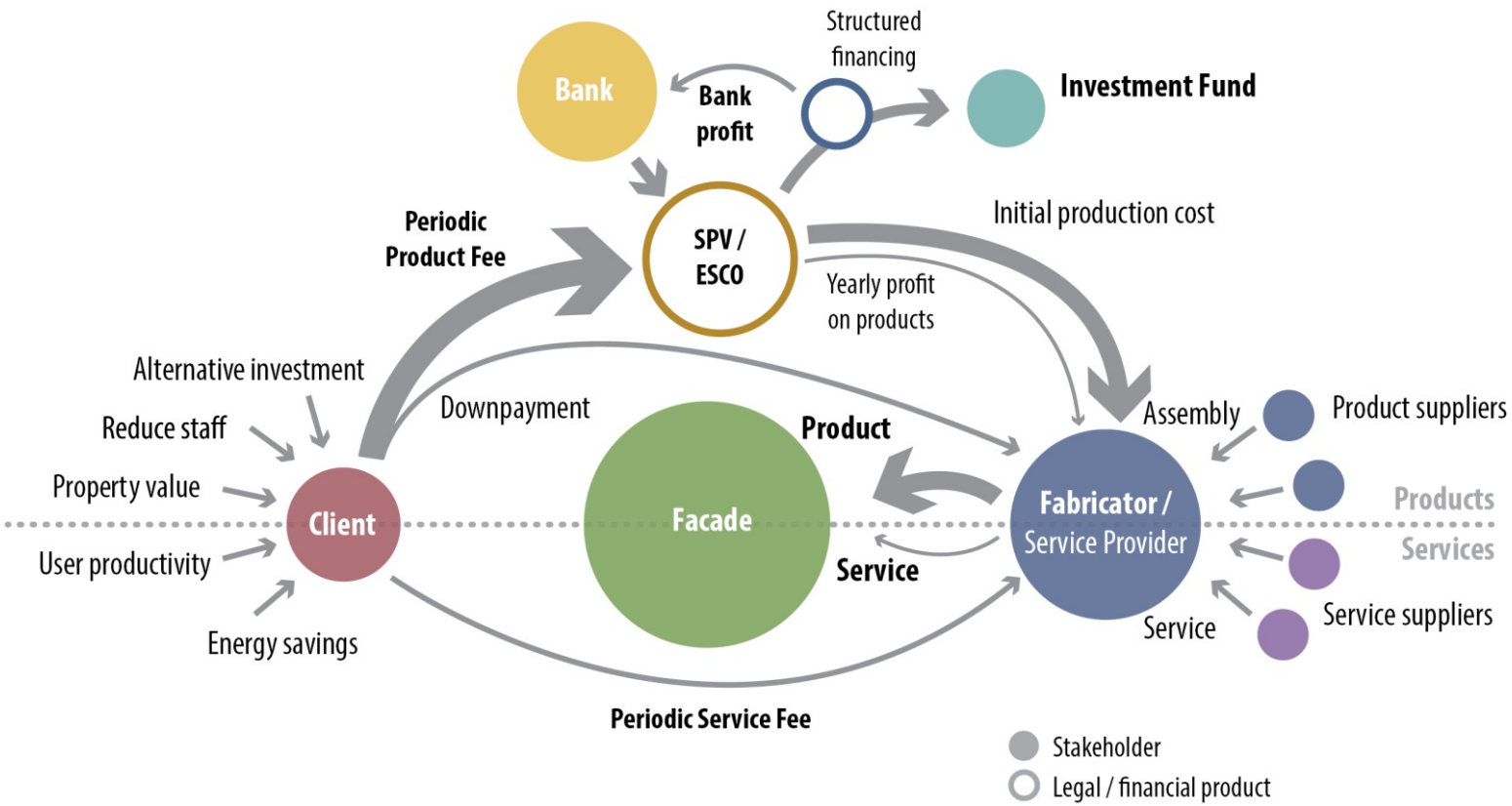
For clients the new model presents them with a new opportunity to improve the quality of their building, in terms of energetic and technical performance leading to real estate value and rentability, without the need for a large initial investment. Monthly or yearly service fees can more easily be balanced by profit from energy savings, rental increase, tenant retention, or occupancy stability. Institutional building owners and operators, such as universities, corporations, or government agencies, rarely use real estate as a core business activity, but rather as an asset to fulfill their core activities of education, business, and administration. This means investment in building systems such as facade come at the cost of sacrificing investment in other, more strategically relevant actions. The large expense needed to renovate a facade and building systems is often difficult to justify in traditional terms such as return on investment; on one side energy prices are still too low for energy alone to constitute a justifiable business case, while on the other hand less tangible values such as the building's book value or staff productivity are difficult to accurately quantify from a long-term perspective.

By spreading the cost of the facade renovation into a series of yearly payments, the cash-flow analysis of costs and benefits can more easily be evaluated and many of the aforementioned challenges overcome. By removing the need for an initial investment the traditional RoI mentality can be left aside and priority can be given to alternative values beyond direct financial savings.

Lastly, financial institutions such as banks and investment funds can benefit from an entirely new market which also satisfies the strict requirements of ethical banking practices, promoting the energy and circular economy transitions. Facade fabricators are generally

The Facade Leasing value distribution model, presented in the journal paper "Façade Leasing: Drivers and barriers to the delivery of integrated Facades-as-a-Service." (Azcarate-Aguerre et al., 2018), annexed to this report and further described in the dissemination activities report 4.2.6.FLD.D4.

Azcarate-Aguerre, J. F., et al. (2018). "Façade Leasing: Drivers and barriers to the delivery of integrated Facades-as-a-Service." Real Estate Research Quarterly 17(3).



ALKONDOR HENGELO

Building Owner / User

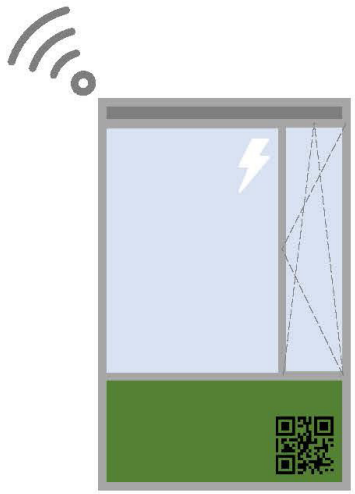
- Buying / renting / using a façade with service on the basis of an agreed performance.
- Long-term relation (15+ years) with the circular facade provider (Alkondor).
- Can easily make changes (to the façade and tintegrated systems).

Receives indoor comfort and energy performance.

- *Clean air.*
- *Temperature control.*
- *Lighting control.*
- *Automated energy settings.*

Is essentially relieved from managing the façade.

The Circular Facade-as-a-Service



Selected facade performance indicators

- *Sunlight-regulating and heat.*
- *Humidity control.*
- *Overheating prevention.*
- *Wind- and water-proof.*
- *Reliable operation of systems.*
- *Facade kept in optimal aesthetic condition.*
- *The facade is changeable (removable, reusable, and 100% recyclable).*

Facade-as-a-Service provider

- Provides an energy- and comfort-based performance.
- Provides a circular facader with a service for 15+ years
- Delivers functionalities defined by Key Performance Indicators (KPI's), and gets paid accordingly.
- Provides for saving energy

- *Assistance in design and engineering.*
- *Construction.*
- *Facade performance monitoring.*
- *Conduct technical maintenance.*
- *Performs aesthetic maintenance and cleaning.*
- *Performs updates, take responsibility for recycling.*

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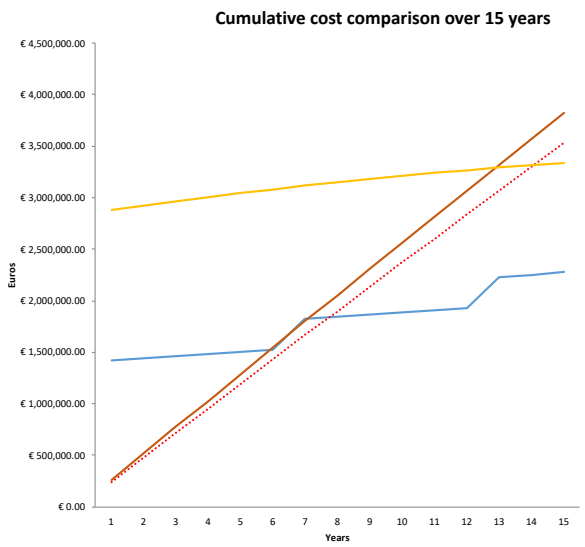
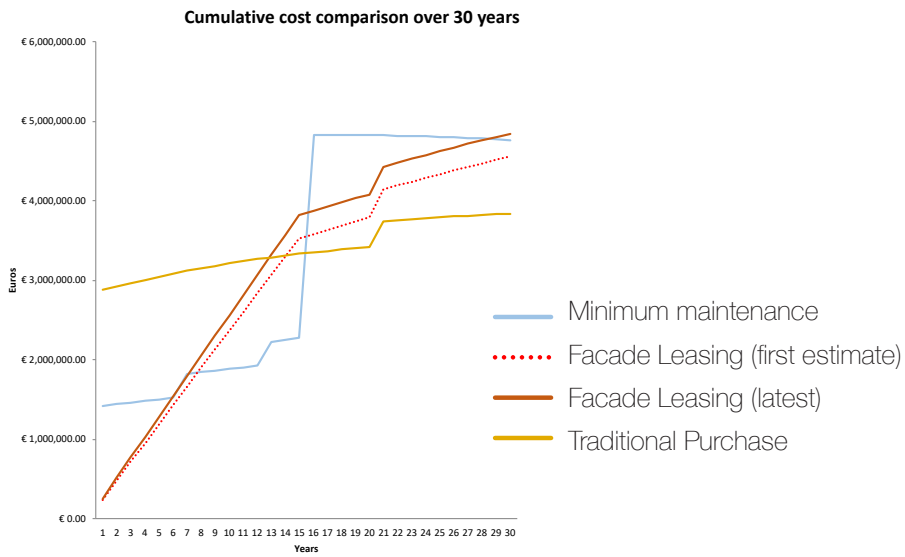
medium enterprises (SME's) with between 100 and 200 employees and integrating administrative, engineering, and construction staff. This business structure does not allow them to make the upfront investment necessary to pre-finance a facade which they can then lease out to a client as a means to deliver performance requirements. Analysis of the supplier's cash-flow, done by the consortium during the project, show the balance sheet of the facade fabricator collapsing after a few projects and its credit-worthiness severely reduced. A financial institution must therefore remove this load from the facade fabricator, by pre-financing the facade system in exchange for a periodic financing fee. A number of alternative models to achieve this have been developed, discussed, and analysed by the consortium, and are summarised in page 14 of this report.

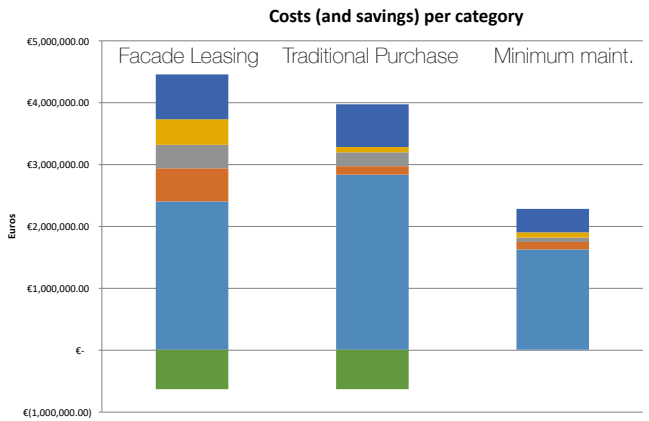
A series of open questions regarding financing are still in the process of being answered: The facade's residual value has been estimate to provide a salvage price and reduce financial risk. This residual value also takes into account upcoming legislation demanding a higher content of reused, remanufactured, or at least recycled components in future building projects, a welcomed governance approach to force the real estate to engage in circular innovation and assign a higher residual value to legacy components. Another open question is credit-worthiness of the facade fabricator, as previously stated, which is being overcome by focusing on the credit rating of the client organisation on whom periodic service fees rely. Such a construct seems promising as it reduces financial costs to a more competitive margin, but open issues of risk distribution as the client bears a larger portion of the risk than the other parties.

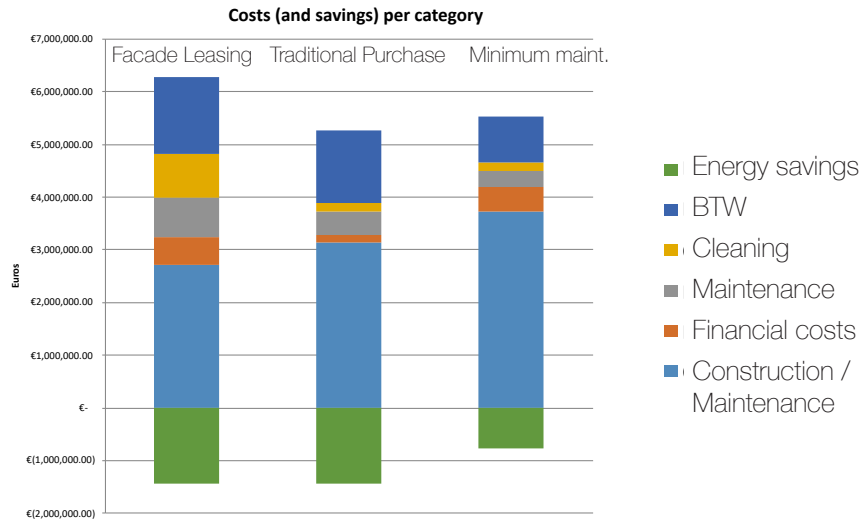
When these are other barriers are overcome the model will present opportunities for low-risk investors such as pension funds, or for funds with specific ethical requirements such as green funds or social development funds. By focusing on certain client segments with high credit ratings and non-commercial interests, the safety of the new financial product can be guaranteed. The targeting of deep energy renovations, leading to decarbonisation and circular use of components and materials, justifies an ethical banking perspective.

Alkondor's value proposition to "essentially relieve the client from the management of the facade". By assuming responsibility over all activities needed to guarantee performance of the facade systems Alkondor can exploit their core business and technical competences, delivering an integrated product-service offering to the client based on pre-determined technical metrics (4.2.6.FLD.D2)









Financial comparison, over 15 and 30 years, of a "Façade Leasing" strategy against a "Minimum maintenance" scenario and a "Traditional purchase" scenario. Factors included in this analysis are:

- Financial costs
- Maintenance
- Management
- Cleaning
+ Energy savings

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The Facade Leasing model relies on the value engineering of technical alternatives in accordance with the strategic priorities of the client. Rather than simply delivering a facade in accordance with specifications, the facade service provider becomes responsible for meeting the long-term demands of the building owner/operator and its end-users, as well as for managing expenses and meeting long-term Total Cost of Ownership projections. Value engineering can be based on a number of different objectives, such as lowering Total Cost of Ownership, maximizing energy and indoor comfort performance, increasing branding recognition of the organisation, allowing for flexibility of systems to future building typology changes, et. Many of these strategies can be desired in combination, in which case it is the task of the service provider to find the best balance to meet the client's strategic goals.

The graph on the left shows the expected financial performance for the CiTG case-study over a period of 15 years of full lease followed by 15 years of service contract. It compares an entirely new facade, contracted under a "Facade Leasing" model, against the traditional alternative of minimum renovation with major maintenance deferred (i.e. delayed) until no longer technically possible in 2033.

As evidenced by the strategy followed by TU Delft Campus Real Estate on the West facade of the building, real estate operators frequently decide to defer major renovation decisions due to lack of long-term clarity on the broader portfolio strategy. Having come to the executive decision to continue operation of the building for another 10 years, the maintenance team at TU Delft CRE is left with a time-scope too short to justify a major renovation, but too long to avoid some kind of action. Works on the west facade of the building therefore represented only the minimum possible technical maintenance needed to secure physical integrity of the facade components: The frames have been repainted and sealed, glazing has been cleaned and where necessary repaired, but overall performance of the facade is still as originally built in the late 1960's, with single glazing and an uninsulated steel frame with very low energy and indoor comfort performance. Such maintenance works are calculated to be necessary at a maximum of 6-year intervals, and the facade is deemed to be technical obsolete within 15 years. This means in 15 years a decision will have to be made whether to replace the facade or discontinue use of the building.

Cleaning, maintenance, energy, and administration costs related to the facade lead to a steady cash-flow on a yearly basis, accounting for a slight discount rate applied to these costs to reflect future inflation.

In contrast, the "Facade Leasing" major renovation alternative does not require the initial investment of almost 1.5 million euros of the "minimum maintenance" scenario, nor the roughly 2.5 to 3 million euros investment required by a traditionally purchased new facade. The outsourcing of cleaning, maintenance, and management costs, and the addition of a new financing cost, leads to a steeper

increase in accumulated yearly costs, dampened by the future value of energy savings. After year 15 the principal has been fully repaid and only operational costs must continue to be paid, under a service contract, as long as the facade remains in place. On year 25 there is a slight increase in this service fee to reflect the need for replacing certain facade systems such as solar shading and digital monitoring and control systems. This replacement investment, however, could again be financed through a "Facade Leasing" model, spreading the costs over the next 25 years of operation of the systems and accounting for their future residual value.

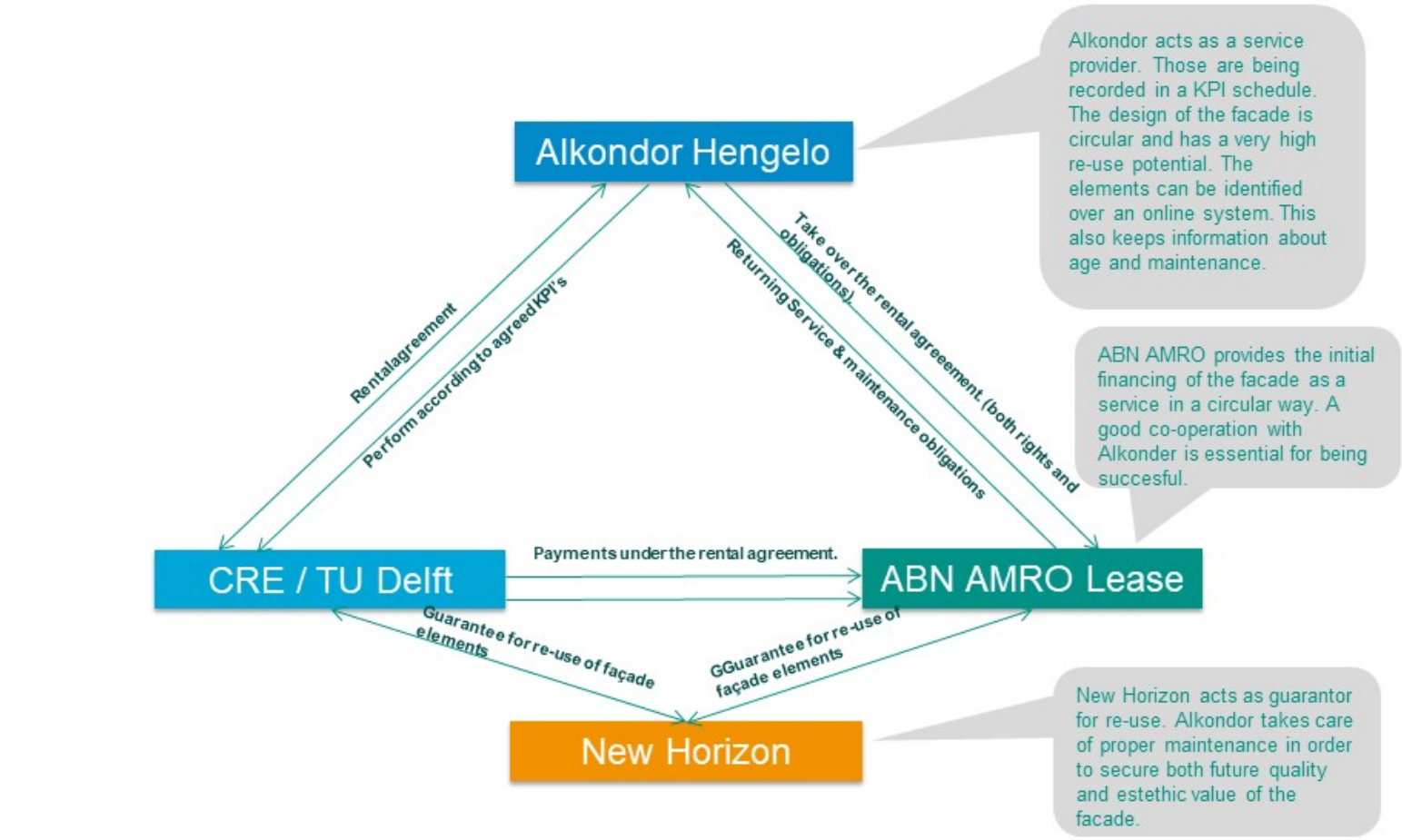
The comparison shows how a "Facade Leasing" contracting model can ease the decision to perform a deep energy renovation, by removing the high initial costs needed by a traditional purchase. While Total Cost of Ownership is slightly higher for the lease facade, the outsourcing of management and maintenance activities and their related risks, and the spreading of costs over time can be worth the extra cost from the client's perspective.

4. Alternative contracting models

Financial and legal aspects of the business model are deeply intertwined, and are the core topic of ongoing discussions and negotiations between the parties. As previously mentioned, the outsourcing of risks and responsibilities constitutes one of the key value propositions of the service contract, and must be reflected in the correct contracting model and legal agreement. The diagram on the right, elaborated by ABN AMRO Lease (subsidiary of ABN AMRO Bank, a large Dutch financial institution), shows the original model in which the three core parties are mutually tied by contractual agreements and financial obligations. New Horizon, a young investment company, could co-finance the transaction by investing in the future value of the facade's reclaimed materials at the end of its service-life.

Open questions have lead to the creation and ongoing evaluation of alternative organisation models, with TU Delft having a direct relation to either the leasing company or the facade fabricator, who in turn is supported by the other partner for financing or service delivery respectively. Such models facilitate a "one stop shop" solution for TU Delft as building operator, as they would have a single point of contact with a single contractual partner, rather than split responsibilities for different aspects of the contract as is the case in the diagram on the right.

These questions, together with the definition of service performance KPI's, like those showed in 4.2.6.FLD.D2 Technical Delivery Report are, at the moment of writing, in the process of being clarified with the support of a large number of internal and external experts.



Initial proposal for a three-party contractual agreement for the financing and delivery of facades-as-a-service. This model and others are being evaluated to find the best solution with the lowest risk and highest value, taking maximum advantage of each partner's core business skills.

5. Upscaling potential

The illustration on the rights provides a rough impression of the nearest potential upscaling markets. Publicly owned Dutch non-residential buildings are considered the most likely early adopters. Corporate real estate, particularly office buildings, is considered the next tier.

Corporate real estate is defined as property which is owned by corporations as operating assets. Commercial real estate, on the other hand, is the ownership and/or operation of real estate as a core business and direct source of revenue. An example of corporate real estate would be the headquarter offices of a large company, as long as the building is owned by the company itself and not rented. Corporate real estate also includes production facilities, warehouses, housing, among many other building typologies, but offices are considered the most promising market due to the high performance required from their facades, and the high investment and maintenance costs associated to this performance.

The five largest European countries are estimated to have over half a billion square meters of facades for office buildings alone, many of which follow the aforementioned trend of having been built in the post-war period and therefore approaching the end of their building envelope's service life. Meanwhile, growing competition for high-quality office-space, tightening indoor comfort, energy-performance, and safety regulations, and the increased risk of extreme weather and climate events place ever more pressure on office-building owners to renovate their building envelopes.

Work related to the upscalability of the model and its adaptability to other markets is ongoing, and will be further described in the 2019 reporting period, at the end of this project stage.

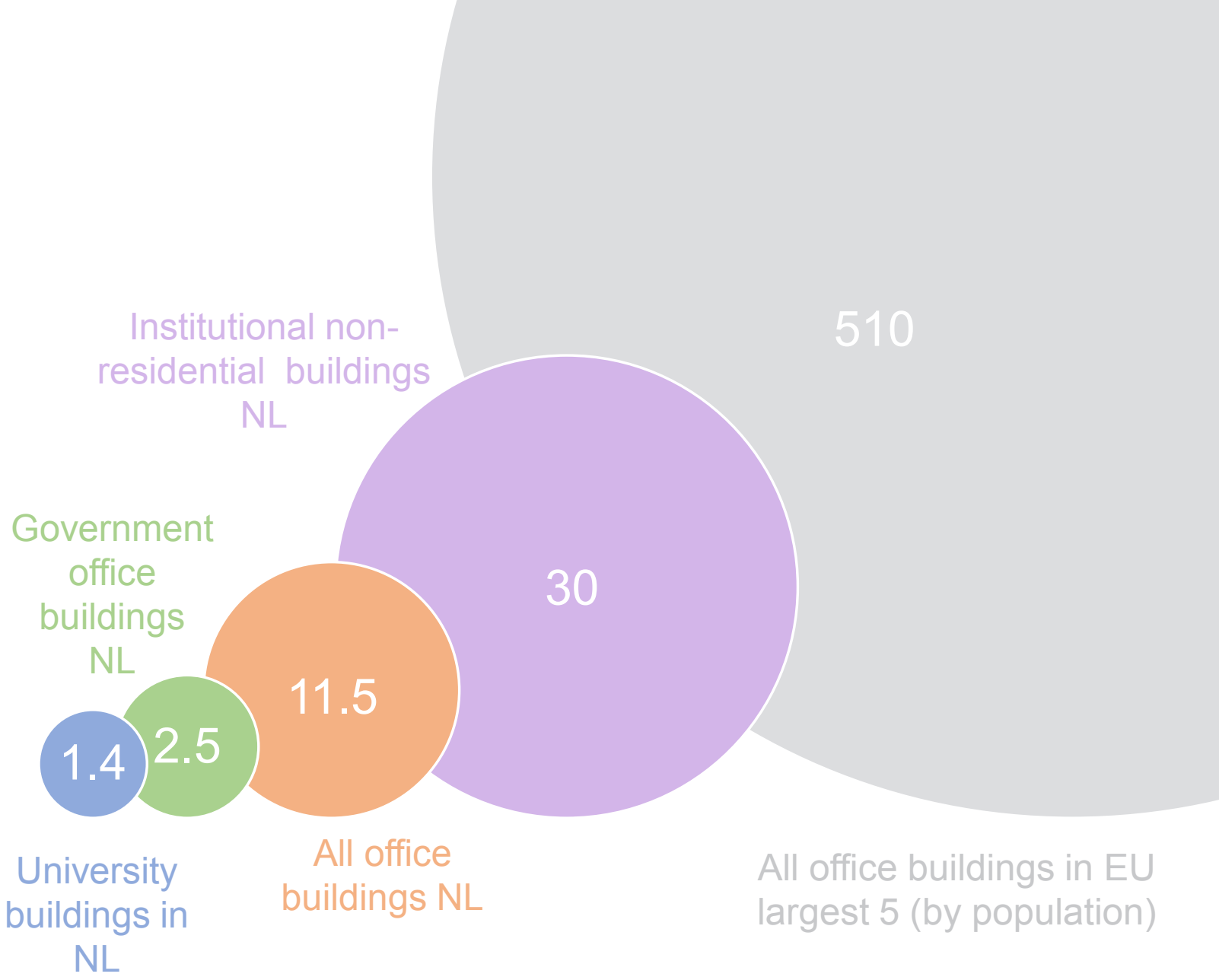


Diagram illustrating upscaling potential for a number of sectors and markets. Values are given in estimated million square meters of facade surface (Ebbert, 2008). The five largest countries in the EU by population are Germany, the UK, France, Italy, and Spain.

8. Contributors

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Jeroen van den Bos	Houthoff
Dolf de Jong	Houthoff

Meeting related to legal and financial models for the CiTG building facade leasing case-study. Participants include experts from TU Delft's academic research team, and TU Delft's Campus Real Estate and Board of Directors.


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