

Transition Zero

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Energie Sprong

TRANSITION ZERO

Particip. No	*Partner organization name (acronym)*	*Country*
1 (Coord.)	National Energy Foundation (NEF) *Independent, national charity focused on improving the use of energy in buildings*	UK
2	Energivie (ENV) *Regional innovation centre Alsace/Lorraine with national scope*	FR
3	Cooperation Brede Stroomversnelling (Energiesprong) (ENSP) *Non-for-profit market development team that created deal to refurbish 111,000 houses to Net Zero Energy levels in NL*	NL
4	National Housing Federation (NHF) *(Representing English social housing associations; 2.9 million houses)*	UK
5	Union Social Habitat (USH) *(Representing French social housing associations; 4.5 million houses)*	FR
6	Aedes (AED) *(Representing Dutch social housing associations; 2.3 million houses)*	NL
7	The Housing Financing Corporation (THFC) *Non for profit, financier of choice for UK housing associations (£3.1 billion loans)*	UK
8	Finance Ideas (FID) *Financial consultant developing financing solutions for Dutch housing associations*	NL
9	Centre Scientifique & Technologique du Bâtiment (CSTB) *National Scientific and Technological building centre*	FR
10	Greater London Authority and the RE:NEW program (GLA) *(Covering 3.27 million households)*	UK
11	Housing Europe (HOE) *European Federation of Public, Cooperative and Social Housing, 43 members in 18 EU Members States represent management of 25 million dwellings (12% of total EU housing stock*	BE

Partner organization name (acronym)	*Country*
Partnership agreements with 20 individual social housing organizations collectively managing 141,000 (NL), 250,000 (UK) and 211,000(FR) houses (HA)	FR-UK-NL
Support from three national governments: UK (Department for Energy and Climate Change), NL (Ministry of interior) and France (ministry de l'Egalité des Territoires et du Logement)	FR-UK-NL
Support from construction companies: Willmott Dixon (and Dutch via ENCORD)	UK
Support from ADEME *French Energy Agency*	FR
Support from Plan Bâtiment Durable *National government initiative to improve energy performance buildings in France*	FR
Support from WSW *Exclusive financier of Dutch housing associations*	NL
Support to disseminate from ENCORD *Forum for industry-led research, development and innovation in the construction sector*	EU
Support from Sustainable Housing Action Partnership	UK

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1. EXCELLENCE

Based on the successful Dutch energy transition program Energiesprong in 2014 a consortium has been formed to scale the developed net zero refurbishment technology and accompanying business case for housing associations to France and the UK following the same approach as used in the Netherlands. The effort so far has been funded by Energiesprong, ECF, the UK builders and associations and the in kind efforts of the French partners and supporters in this call. Activities like site visits, knowledge sharing have already been extensively carried out in the last year. The confidence of all partners in and supporters to this bid that it can be made possible has grown over the last year resulting in the establishment of Energiesprong UK by a group of 14 founding members.

Energiesprong brokered a deal to refurbish 111.000 houses to Net Zero Energy levels (annual total household energy consumptions equals annual production of energy on-site) in the Netherlands. These refurbishments are done within one week; they come with a performance guarantee on energy and indoor climate of at least 30 years and are implemented without subsidies. This has resulted in 200 pilot refurbishments in 2014 and a roll out of 2000 more refurbishments in 2015.

The challenge

"If I'd asked my customers what they wanted, they'd have asked for a faster horse." Henry Ford

- Regulators and market players have not managed to introduce energy efficiency building upgrades that are attractive to the public or for investors.
- Buildings are seldom refurbished more often than once every 30 years. Energy efficiency in buildings cannot be optimised through piecemeal insulation measures and gradual improvements (e.g. as legislated for with EPC). These measures thus lead to an opportunity lockout.
- We need integrated, holistic solutions that deliver net zero energy refurbishments as this is the performance level required for the majority of houses if we are to meet the CO_2 targets set out.
- We can only deliver these solutions if they are attractive to the consumer. In order to ensure that the resulting energy costs savings cover the costs for these refurbishments, prices have to go down dramatically. In order to make these refurbishments attractive, delivery times have to go down to days instead of months. In order to turn energy costs into a revenue stream to recover the costs of investment, in many cases we need a financier to put up the necessary upfront capital. To convince the financier that this investment is worthwhile and secure, we need a long-year energy performance warranty on the refurbished house.

The solution

"The difficulty lies, not in the new ideas, but in escaping from the old ones." John Maynard Keynes

- Today, an E=0 refurbishment of a house costs substantially more than the net present value of today's energy bill. Therefore, we need an intensive innovation process in the construction sector focused on cost reduction, intervention time reduction and energy performance guarantees.
- To catalyse that innovation process a large demand volume that collectively asks for a different type of offering from construction companies based on performance requirements instead of technical solutions > outcome-based procurement to incentivise product and process innovation throughout the construction sector and supply chain.
- Only such a large volume of articulated demand will convince construction companies (or refurbishment solution providers, RSPs) to put in the substantial innovation investment needed to develop attractive and affordable E=0 refurbishment packages (industrialisation of solution).
- Once the prospect of substantial demand and fitting supply becomes apparent, financiers will be able to evaluate this new proposition to invest in tailored financial products.

The approach

"Never doubt that a small group of thoughtful, committed citizens can change the world; indeed, it's the only thing that ever has." Margaret Mead

- Change the market conditions through market development that drives innovation by:
- Aggregating demand (initially 5000 committed dwellings per market) through large housing providers to provide industry confidence of sufficiently high volume production rates, while filling that pipeline further to demonstrate the market opportunity for industry to innovate.
- Coordinating the actors to jointly develop and improve the necessary market conditions (including regulation and financing) for net zero energy refurbishments to significantly improve to become commercially viable and feasible to implement in each of the countries regulatory and planning frameworks.
- Mobilizing the collective knowledge of the construction sector through projects and deals to innovate on performance based requirements and therefore not pre-select one or a few construction companies to participate in the program.
- Demonstrate and scale attractive, fast, affordable (and financeable), asset enhancing, net zero energy performance guaranteed refurbishment solutions.

The project builds on the successful Dutch Energiesprong experience, which had piloted and is now scaling up net zero energy (E=0) retrofits with up to 40 year performance guarantees and installation times within one week at scale which are completely paid from the energy cost savings (see pictures here: *https://www.flickr.com/photos/111630915@N04/sets/*). Key to turning the retrofit market in the NL was the establishment of a strong and highly skilled independent market development team that challenged business-as-usual. Rolling out this approach in the UK and France will require careful assessment of the specific market conditions in each of these countries with solutions tailored accordingly. Additional member states will benefit by increasing their understanding of the most significant considerations and barriers and learning from states more advanced in the approach, how these can be addressed most effectively.

1.1 Objectives

- Driving product and process innovation and supply chain collaborations to establish a new construction manufacturing sector for attractive, affordable, financeable net zero energy refurbishments in the UK and France using frontrunner social housing organisations. The result should be:
  - *Quality and assured performance* - by implementing quality standards, manufacturing and delivery methods, inspection and verification that enable a long-term performance warranty to be offered
  - *Affordability* – assured performance, coupled with mass customisation industrialisation and delivery process efficiency to reduce costs and investment refinanced through guaranteed energy cost savings and generation of on-site renewables
  - *Desirability* – low disruption, fast process, improved aesthetics and increased asset value of individual dwellings plus neighbourhood renewal, elimination of fuel poverty and social impact of mass implementation.
- Address financial, planning, regulatory issues in UK and France (learning from earlier experience in Netherlands) to enable the market transformation to mass uptake of net zero energy refurbishment solutions
- To scale the E=0 retrofit market in the NL beyond the current committed volumes and to accelerate the pace of new entrants into the supply side of the market.
- Sharing the lessons and examples with interested leading players in other member states through our pan-European partners.



Roll out of an E=0 refurbishment with 30 year guarantee

1.2 Concept and approach, quality of the coordination and support measures

THE CONCEPT

The current pace and approach to retrofitting across the EU will not achieve the 2020 targets, let alone the ones set for 2050 (e.g. during the remaining period only one or two significant investment on average will occur on each existing building according to asset management cycles). Currently, piecemeal efficiency measures are chosen that create a lockout to achieve the level of efficiency needed and even these measures are not being adopted at the scale set out by the 2020 policy objectives. To solve this, a market transformation approach is being pioneered by Energiesprong, which delivers fully integrated refurbishment packages, supported by long term performance guarantees and thus making the solution commercially financeable and scalable. The Dutch experience clearly demonstrates that it is possible to refurbish to net zero energy very rapidly (i.e. initially 2 weeks and now down to even 1 day refurbishments, (*https://www.youtube.com/watch?v=I3WBT2eAArI*) allowing the occupant to continue living in the house during the works thereby saving on disruption costs that would otherwise be borne by the owner. These packages include a 30 or 40 year net zero energy guarantee from the refurbishment solution provider (RSP) and are attractive for the house occupants in terms of aesthetic conditions and habitat quality (e.g. improved appearance, indoor climate quality).
When Energiesprong (government funded, non-for profit market development program to drive energy efficiency in buildings, operating in the market) started in the Netherlands, very few people considered this ambition level to be feasible. Today, the first 700 E=0 refurbishments have been installed/committed before Q2-2015 without subsidies. The following principles explain in part why E=0 and the approach used works:

Principle 1: guaranteed E=0 refurbishments are more attractive investment than piecemeal measures

Net zero energy implies a house should not consume more energy over a period of a year for thermal space heating, hot water, light and appliances than it produces. This level is chosen for multiple reasons:

1. Energy performance guarantees can be given on

an E=0 refurbishment, because the other external factors (building characteristics) are not important anymore. This is not the case with level B-label refurbishment, which makes a performance guarantee problematic. It is much easier and cheaper to finance a product with a guarantee to generate an extra income stream from the energy savings.

2. A house after an E=0 retrofit can ben seen as a new house. In fact they are better than the new build standard that is common practice. For this reason the payback period can be spread over a longer time, resulting in a far better business case.
3. Most maintenance to the house is included in the retrofit implying that typically budgets for maintenance and refurbishments can be combined.
4. Incremental improvements do not change the status quo in how the market actors operate. When setting the bar high, current market mechanisms cannot sustain, because they are incapable of achieving the new level of ambition. E=0 re-orientates the market, new solutions will emerge quicker and will be a better fit to what is required.
5. E=0 is much more attractive and fun for people than energy savings. This is especially key in the private sector.

Principle 2: Front runners have the potential to make the change

A huge gap exists between front running actors that want to move forward and the mainstream actors that do as they used to do. When looking at statistics the mainstream will always be the overwhelming majority. For that reason ambitious refurbishments seem a hard sell. But as soon as one taps the collective demand of the frontrunners a new market develops. To get the market moving, the program starts working with the frontrunners in the market to proof concepts. The front running associations ask for E=0 refurbishments, financiers will re-evaluate the financial opportunity and RSPs, who surface through the selection process in the competitive dialogue, see the revenue perspective and invest in the innovation process. Once these refurbishments are delivered at scale through the development of packaged solutions, the mainstream associations will see these packages as proven technology they can safely adopt.

Principle 3: Focus on the right housing stock will kick start the market

Instead of trying to refurbish every house, focus on the right housing stock: collect a volume with a homogenous typology, limited issues with planning rules, no high share of under-heating, a lot of maintenance that has to happen anyway and that presents a secure investment for an association. Once a RSP has developed a refurbishment proposition for one of these houses it can be sold to many. Meaning the innovation investment can be spread out over many houses. Once RSPs start developing more concepts for more typologies and have flexible factories to fabricate packages (solutions in the Dutch market so far have been focusing on cladding, solutions focusing on the inside are now also emerging), the ability to apply a greater amount of flexibility will increase, enabling RSPs to fabricate solutions for houses with more diverse characteristics. This is a continuous process where solutions will get smarter and the scope of housing types increases as skills develop.

Principle 4: Start with social housing: private market comes later

To change the dynamics in the market, the initial scale of demand is essential. It is easier to organise sufficient initial demand that can be steered in asking for the same kind of propositions when working together with housing organisations than when you would try this in the private market.

Financing conditions, regulation and marketing of solutions will be different in the private sector, but once the technical concepts have been developed using the housing associations stock, it is much easier to penetrate the private housing market. The financing principle in the private sector can be similar: a financier (typically a mortgage provider) provides the homeowners with an additional mortgage to finance the refurbishment package and instead of paying an energy bill the home owners pays an instalment on that loan. Financiers want to know that the energy bill will be reduced to zero though, that's why a performance guarantee is essential here as well.

Currently, in the Netherlands Energiesprong has brokered a deal with 175 parties to bring the solutions to the private market and the first house from a private homeowner is refurbished in June of this year.

THE APPROACH

TRANSITION ZERO will organize massive demand for a not yet existing E=0 refurbishment proposition from social housing organizations in France and the UK, facilitates financers and governments to tune their financing products and regulations towards this non-existing product and challenges the building sector to start an ambitious innovation process to deliver the proposition. The massive demand, the security that there will be finance available and an enabling regulatory environment will de-risk the innovation investment for the Refurbishment Solution Provider (RSP). By coordinating the actors to jointly develop all parts of the market solution in parallel, TRANSITION ZERO frees the market from the trap of interdependent actors.

The program will organize mass demand for deep refurbishments with the following criteria:



Energy performance guarantee. The E=0 refurbishment package needs to come with a long year (i.e. 30) energy performance warranty on the house. This can only work if an insurer backs it.



One-week delivery. The installation of the package should not require more than one week and allow occupants to continue living in the house for the greater part of the works



Affordability. The ability to finance an investment requires a business case. This implies the investment (largely) needs to be paid for by the resulting energy cost savings. The net present value of the energy cost savings over the lifetime of the package therefore sets the price target.



Attractiveness. The refurbishment packages need to be attractive to occupants. It needs to improve quality of life and the appearance of the house. In order to bring this about, products must be made desirable, given the appearance of being easy and fun, which is not how construction companies currently sell refurbishment products.

Mass demand should ask for no less, but also no more. It is essential that full freedom to innovate should be left to the suppliers in order to come up with the best ideas based on performance indicators only. This is not how refurbishments currently are procured and escaping from existing practices is challenging, also for the demand side.

The problem to solve to get these propositions to the market is not around technical challenges requiring breakthroughs. The problem is a set of market conditions that are not set right for the innovation process in the building sector to take off. The consortium is therefore convinced that the market needs a new and independent actor to drive all relevant stakeholder to ask for, create or enable such E=0 refurbishment packages. This independent actor is the TRANSITION ZERO market development team. Therefore, the consortium seeks funding to deploy a non-for-profit independent market development team that can facilitate and coordinate actors in the market to develop E=0 solutions in order to move a large share of the existing housing stock to E=0 levels.



Row of guaranteed E=0 refurbishments in Melick (NL) with colourful design (April 2014)

The proposal focuses on France, the UK (and the Netherlands) because an initial analysis (Energiesprong visited and analysed 10 countries in the EU) showed that the socio-economic setting, political support, available financing and technical characteristics (limited district heating, sufficient stock volume with some homogeneous characteristics, climatic circumstances) are most likely to make this approach initially successful in those countries. BPIE's[1] report on market barriers confirms that there is commonality amongst market barriers in the EU markets, highlighting many of the same ones as Energiesprong has successfully tackled in the Netherlands. In France, recently there have been published three reports by "The Shift Project", "Plan Batiment Durable" and "La Fabrique Ecologique" that come to similar conclusions on market barriers[2].

This is further validated by the results of lining up the essential stakeholders together who all subscribe to this approach in the past year. In the UK the profit-for-purpose legal entity "Energiesprong UK" has been established. A group of 20 partners have joined the Energiesprong UK partnership. This includes 8 housing associations, 3 construction companies, trade bodies and with support from the Greater London Authority. Work on the business case has commenced and part of the properties for the first 5000 retrofits has been identified. In France the momentum has also increased with 3 more housing associations joining (8 in total) and the establishment of a home for the market development team in France (Energivie). Apart from the convincing results in the Netherlands, the fact that regulators, financiers, demand and supply in the UK and France all sign up to the approach is the best indication of a strong chance of success in those countries as well.

[1] *http://www.europeanclimate.org/documents/LR_%20CbC_study.pdf*

[2] *http://theshiftproject.org/sites/default/files/files/tsp_-_gt_renovation_thermique_du_batiment_v3.4.pdf*
http://www.planbatimentdurable.fr/IMG/pdf/140703_-_Rapport_REFB_Plan_Batiment_Durable_version_definitive-2.pdf
http://media.wix.com/ugd/ba2e19_68dc071767bd4020a54b2bdfd7ba670a.pdf

In the meantime, in the Netherlands, the E=0 refurbishment starts to become more common practice because other social housing organisations than the ones part of the initial 111.000 deal start procuring these refurbishments on the same basis. Furthermore, the European Investment Bank (contact: e.sweeney@eib.org) is currently in the 2nd phase of assessing to finance 50% of the next batch of several thousands E=0 refurbishment part of the Energiesprong deal in the Netherlands. Although European projects often have a large number of countries involved, focus is very important to make this a success. The organizational complexity to start such a movement in the initial phase in more than 2 additional countries would also be too high. Although great interest from various countries (Italy, Spain, Ireland, Belgium, Luxembourg, Germany) has been expressed and exposure given by large media outlets (such as the Guardian[3] and Il Sole 24 Ore[4] (Italian main financial paper), we therefore decided to build a strong case for two markets to expand to first rather then spreading our efforts too thin. Further scaling at a later stage and market diffusion of solutions to other member states is something we expect to happen (section 2).

Kick-start in France and UK, accelerate in the Netherlands

In the Netherlands, *Energiesprong* has brokered a deal for 111.000 E=0 refurbishments. 11.000 of these are based on a hard contract between 6 housing associations and 4 construction companies. Solutions are now being brought to market (TRL 8/9), the efforts will focus on efforts scaling the market (more demand, but also to get more RSPs and suppliers to invest in making such propositions). The role of the TRANSITION ZERO project there will be reinforcement of the existing Dutch Energiesprong market development team focusing on three things:

1. Further scaling of demand by housing associations for E=0 packages including adding contracts for 10.000 E=0 refurbishments.
2. Further support on improvement of the business model and performance parameters
3. Coordination of frontrunner RSPs to ensure a quick innovation process can take place and not all RSPs in this early phase re-invent the wheel. Coordinate which RSP focuses on what part of the improvement (cheaper and faster 3D scanning techniques and building information modelling; integrating monitoring data in optimizing the E=0 package; faster delivery and placement of the E=0 package; dust free stripping of window and doorframes; etc.).
4. Supporting a group of construction companies that are willing to develop the E=0 offering to increase the number of companies entering the market.

In France and the UK, this E=0 refurbishment market still needs to be created. In the *UK*, we experienced that after bringing the stakeholders over to the Netherlands[5] to see the refurbished houses and speak with the social housing associations and construction companies, there was considerable confidence this could be replicated in the UK. And with a strong core of leading housing associations already engaged (220.000 dwellings) partners' proposal is to work through the following staged approach:

1. **Business case validation**
   A high level analyses of this the business case has been completed, a more in-depth validation will compare the Dutch Energiesprong approach to the regulatory and financing conditions in the UK and France and design solutions tailored to the UK context;
2. **Concept deal phase**
   Drafting a "concept deal" in which contractors and housing associations together commit to refurbish 5000 houses conditional to certain criteria being fulfilled. This is about testing regulatory and financing conditions and finding workaround solutions and experiment with these. By creating a concept deal, it brings very clear

[3] *http://www.theguardian.com/environment/2014/oct/10/uk-looks-to-dutch-model-to-make-100000-homes-carbon-neutral-by-2020*

[4] *http://www.rebuilditalia.it/notizie-rebuild/?idNews=109*

[5] *The time and effort thus far has been put in by the partners in-kind and covered from Energiesprong's limited budget to disseminate knowledge in the EU.*

focus on what conditions need to be worked on. This phase should then result in concrete individual deals between housing associations and RSPs for the first refurbishments, but through a collective concept deal the effort for the housing associations is shared and the effort for the construction companies is de-risked. This is how the Dutch 11.000 deal (as first part of the 111.000 wider deal) came about.

3. **Pipeline development phase**
   Experimental solutions will be improved and scaled up to remove market barriers (finance, regulation, planning etc.) and greater demand volume (also beyond the initial 5000 that this project directly aims to achieve) will be lined up in parallel to create scale.

In France, the foreseen development is similar, but the process is a little bit lagging in time (reflected in the work program). First steps have been made to validate the business model. The support from the French government (essential to make this a success in France), Caisse des Dépôts as the exclusive financer in France, CSTB as the building certification party in France and the frontrunners social housing associations including the umbrella organisation USH is very powerful and the collective belief in the potential of TRANSITION ZERO and willingness to work in this program a very. Their collective subscription to this working model indicates the impact that the idea already had in France. As an example: Energiesprong featured in the magazine issued twice per year by the ministry of Economy (Annales des Mines) in April 2015. This feature is comprised of 15 articles written by the CEO's of the largest French energy companies and national politicians. Energiesprong was the only foreign organisation that featured in a joint article with Carole Legall, Directeur General of CSTB.

THE MAIN IDEAS

The transition of the building sector: from project to product

Great improvement potential exists in converting the building sector to start developing and producing integrated solutions that are industrially produced instead of project-based, craftsmanship-oriented piecemeal solutions. In order to decrease costs while achieving constant high standards of quality and a short completion time this is essential.

A transformation in the construction sector towards industrialization, prefabrication, constant and high quality, lower costs and continuous innovation, needs to have a product first. The Energiesprong program has defined the quick to install, E=0 refurbishment with an energy performance guarantee as that product. This concept allows there to be continuous improvement by a refurbishment solution provider (RSP) who needs to give the guarantee and to also ask their suppliers to deliver new and better components. As a consequence, suppliers of RSPs will offer better and more integrated components to fit these complete concepts.



Set of E=0 refurbished row houses, each house is individually measured and it's package cusom made

Houses are all different. Even the ones that look the same (like row houses) are mostly not exactly the same as they differ a centimetre here and there. Therefore, factories making the packages need to be flexible (mass customisation), so they can make wall and roof solutions for different dimensions and different mounting mechanisms. In fact, every house that is converted in the Netherlands is measured separately and custom produced. It is therefore a misconception that this approach only works if there is a large volume of houses that exactly look the same. The flexible factory doesn't find it more complicated to vary 2 centimetres or 50 centimetres when making a new roof.

The basic idea all construction companies will/are using is based on 3-D laser scanning techniques that allows to make a quick (and cheap) scan of all the relevant dimensions of a house with great precision. These dimensions are fed into a building information model generating the technical drawings that then steers a flexible factory producing the packages.



3D scanning, BIM generates technical drawings based on existing concepts, flexible factory makes prefab solutions

Because RSPs are asked to give an energy performance guarantee on the house, they are constantly optimizing between costs for extra insulation, a smarter installation and extra energy production capacity or reduction in electric or hot water demand. This drives optimization and integration of solutions. In the Dutch program, RSPs in some houses f.i. provide a new efficient fridge with the package as that is cheaper than adding generation capacity to supply the existing one.

These types of innovations will only happen if there is scale. This implies that RSPs need to develop packages that can be produced in flexible factories and personalized where desired and ask suppliers for different components that can be fitted in those packages.

In the Dutch market RSPs now already realized price cuts of 55% in comparison to other pilot projects executed 3 years ago, while going from 60% energy improvement refurbishment levels to Net Zero Energy. In the last 16 months alone, prices have dropped 30% and installation times have gone down from 2 weeks to (in some cases) 1 day.

And it works: Technical monitoring results from TNO[6] confirm that realising the energy performance is no problem, in fact E=0 refurbished houses are net suppliers.

[6] *http://energielinq.nl/uploads/attachment/file/6/45/Concepten_DEF-1433237513.pdf*



Three prototype versions from one company (Volker Wessels): Version 1, (Dec 2013, left) took 2 weeks to place and has the energy module sticking out; version 2 (middle) took 1 week and has the energy module more integrated around the front door. Version 3, (February 2015, right) took 1 day and has the module integrated in the façade. Cost reduction between version 1 and version 3 is ±30%. Watch the movie of the 1 day refurbishment here: https://www.youtube.com/watch?v=I3WBT2eAArI

In the Netherlands, the second phase of innovation is starting. RSPs are starting to ask suppliers for new, better fitting components. An example is RSPs asking to have the equipment (heat pump, hot water reservoir, balanced ventilation system, hot water pump, invertors etc.) designed (slim and compact) so it can actually be fitted in the new outer wall or new roof as seen in the picture above. This saves space and increases the level of prefabrication, which reduces costs and installation time onsite. This kick starts a new innovation cycle: R&D departments of mostly large internationally operating supply companies are reinventing and reassembling components and materials to better fit the performance asked by their customers, the RSPs. With this new generation of components the E=0 product of the RSP will improve further (price reduction, delivery time cuts, aesthetics and quality improvement). This second phase of innovation is essential to optimize the E=0 refurbishment and deliver it at prices where the business case can be made for a huge market.

The business case: from an energy bill to an energy plan

The business case for the social housing organizations is based on transforming the energy bills of tenants into an energy plan. This energy plan is a “service fee” (or increase in rent) that costs the tenant the same as the bill that was previously paid to the utility. This fee can be seen as the instalment on the loan taken for the refurbishment. It should be noted that tenants are protected from future energy price rises as the investment is a fixed cost and the energy plan can therefore be too.

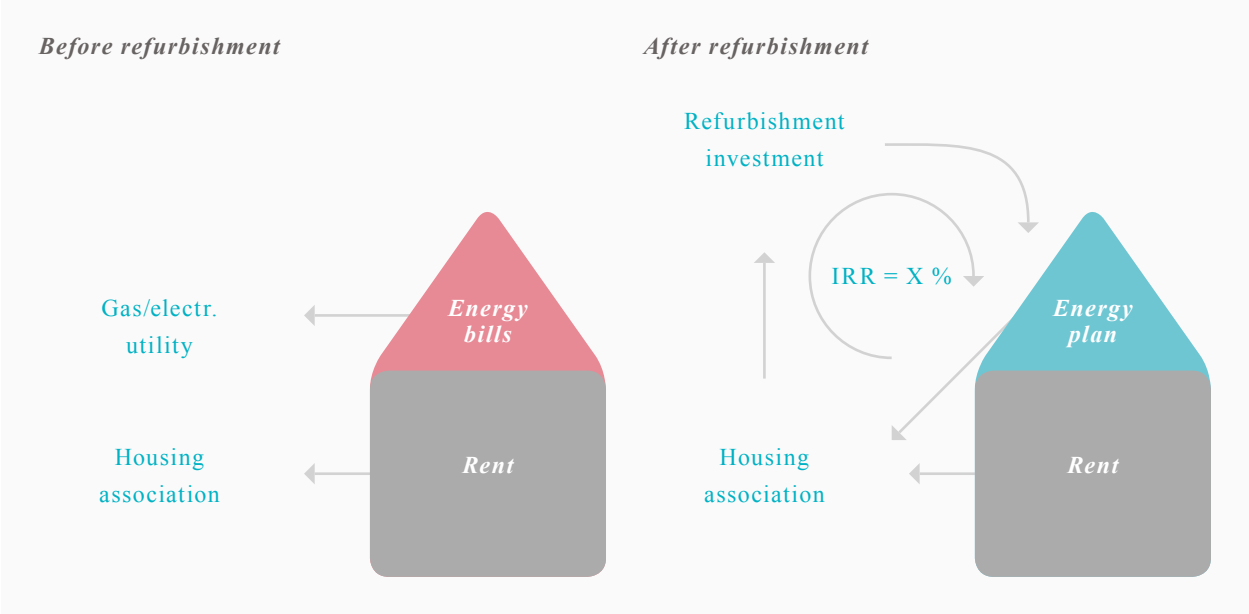
For the social housing organizations, which will (most likely) borrow (part of) the money for the investment from a financier, there needs to be a positive internal rate of return. The level of that return depends on a range of factors.

The approach, based on what is currently successfully being implemented in the Netherlands, is that households will get a warranty on a minimum guaranteed thermal energy supply (room heating and hot water. If they exceed this (room heating of 21 degrees, certain amount of shower time), they consume more energy, which implies they will pay excess electricity consumption to the utility with which they still have a connection and contract (houses are converted to all electric).

For the electricity consumption for lights and appliances, tenants receive a bundle (like a mobile phone plan) based on the typical household’s energy consumption. If the tenant’s consumption does not

exceed the limits set by the bundle, it's covered; if consumption exceeds the limits, there is an excess charge per kWh (to the utility). Years with excessive cold winters might require a bit more energy as well (although the effect is much smaller compared to "normal" houses due to insulation quality). Such years may cause a surcharge to be imposed (as would be the case in the current situation, only now the surcharge will be smaller).

Monitoring equipment is installed to provide real time feedback to tenants (monitor in the house). If consumption of energy for heating and hot water exceeds the projected energy performance of the E=0 home, the RSP and the social housing organizations will investigate what the cause is and find out if the cause is behavioural or technical and address the issue.



Conversion of the energy bill to a monthly energy plan (service fee) to pay for the investment. Total cost of living stays the same.

Regulation plays a role in the feasibility of such a setup. The ability of social housing organizations to receive additional income from the tenant in the form of an energy plan becomes relevant if the cap on the rent would to be otherwise exceeded. For the initial volumes in France and the UK this is not a problem as there is enough stock that has sufficient room to increase charges without hitting that cap, but for scaling further some adjustments could be beneficial. In the Netherlands, the case was similar and sufficient volume was available for which the rent could be increased without legal problems, but a law change enabling housing associations to charge an energy performance remuneration for Guaranteed E=0 house irrespective of rent levels is expected to pass in the next two months, which would enable a larger stock to benefit from these solutions.

Independent market development team: essential to bring it together

The approach to finding solutions to all the challenges needs to be one where efforts are focused across sectors and actors. The proposal is therefore to deploy non-for profit, independent market development teams in France and the UK (and strengthen the effort of the existing team in the Dutch market) that can work to alleviate regulatory barriers, help create financing conditions, organize demand for E=0 refurbishment and steer the construction sector to transform all in parallel to move towards a new system together.

Government in some cases tries to take this role, but the problem is that the government themselves is an actor with vested interests and custom to certain

methods and ideas. To be successful, it is therefore essential that the market development teams are independent. This implies it is required to create a new team instead of bringing together a working group of people from existing parties that are actors in the domain. The interests, attitudes and working methods vested in these parties have led to the status quo, as it exists today. The objective is to change that rapidly and using the same ingredients is not a good basis to expect a different outcome. This setup imposes a challenge to fit the mold of typical EU projects, where funds are typically shared between different partnering beneficiaries. This is addressed in section 3. More details of the actions the teams take to organise the markets can be found in the work packages.

Competitive dialogue: use collective market knowledge and let competitors cooperate

The team works with social housing organizations to design calls for refurbishments with specific functional requirements (along the lines of the four criteria mentioned). These demands need to leave as much freedom to consortia of RSPs to freely create total integrated concepts. In the Netherlands, the construction sector was initially asked to bid with solutions for smaller scale projects: five housing associations collectively put houses of the same type in the market in different calls for refurbishment with a set of criteria (i.e. short intervention time, fixed cost and performance guarantee and minimum 60% energy performance improvement). Up to 40 consortia made offerings in response. The requirement of the call was to share the proposed solutions in a public presentation. The parties that made the best offerings were selected and based on the gathered knowledge in the presentations from all the different parties these top bidders were given a more challenging request incorporating the best ideas delivered by the market. This process was repeated several times, which resulted in greatly and rapidly improved quality of offerings. Hands on knowledge transfer in a regular market process directly to the most relevant stakeholders (those who demand for solutions and those who offer them).

By using a multi-stage selection process, the program can accumulate the knowledge to further raise the bar on the next stage in the bidding scheme. Leveraging all the available knowledge in the market has proven to be effective in the Dutch context to quickly drive the quality of proposals up and to let market knowledge be shared amongst all that are interested.

The key for motivating the construction sector to openly sharing their ideas was to convince them that the competition was not the other construction company. The competition is the utilities and the challenge was to transfer a multi-billion (±€100 billion for the three focal countries combined) annual collective household energy bill into a new market for the construction sector. If that works, the refurbishment market is bigger than any construction company could deal with on its own.

Energiesprong in NL finally worked towards a larger scale deal of 111.000 to get the construction sector motivated to push hard to further improve solutions, government to improve regulation and financiers to re-evaluate financing conditions. This was decisive in motivating the first four construction companies (who lead consortia of suppliers and developers) to do the required investment in further developing concepts and investing in factories required to pre-fabricate these refurbishment solutions with a view to scale. It made the government change regulation (i.e. ability for associations to collect the energy plan money) and it made the financier (WSW) revalue the properties that would be refurbished in order to free extra room to borrow money. The assurance of an early market demand to drive this change is essential. A vague notion that a market exists if construction companies can deliver a certain product is not enough to change the dynamics inside a construction company and to attribute the required innovation budget, with financiers or within the government.

2. IMPACT

The impacts of this proposal are manifold: direct energy savings of 104 GWh/year/M€ subsidy (see 2.1); catalyst for direct investments of €800 million (see 2.1); the program leverages time investment by partners and stakeholders (associations and RSPs mainly) to the amount of 10x the time spent by the subsidized hours of the consortium during the time of the program and creates significantly increased knowledge and skills both in the three markets in focus as well as with a group of relevant stakeholder across the EU. However, the effects we see in the Netherlands much larger than these.

In the Netherlands we see many new associations reconsidering there refurbishment strategy to Net zero energy inspired by the results of the deal partners now the market is created an the examples are visible. More construction companies are developing there own E=0 refurbishment and suppliers are tuning there products towards the more conceptual solutions these RSPs deliver. This proposal is about creating a market and about creating better refurbishment propositions. The program initially uses 2 deals to refurbish 5,000 houses to redirect market mechanisms and drive innovation in two markets (FR and UK) while accelerating this development in a third one (NL). Therefore, the expected long-term impacts are well beyond the actual refurbishments targeted through this program. These are merely a means to start a new market dynamics.

The program creates a context in France and UK to develop and deploy E=0 refurbishment packages. This sets the market conditions for further scaling in these domestic markets (1) and creates examples of how market conditions can be set in order to let the market develop refurbishment solutions in other EU member States (2).

The program also drives the development of significant better offerings of such packages by the construction sector. This will benefit the EU as a whole, because other companies can learn from the approach (all knowledge is publicly shared from the Dutch Energiesprong program as agreed with the National market authority, the same will be true for the two programs in the UK and FR).

1. Scaling of solutions in FR, UK and NL

The market conditions in the focal countries pave the path for mass future uptake of such solutions in those markets. The Netherlands, the building stock contains 2.3 million houses that fit the typology of the houses that are in the current deal to be refurbished. This means solutions are being developed for 20 times the number of houses that are included in the deal in that market alone. Obviously, not all of those houses will be refurbished afterwards, but at least the potential of the application is multiple the size of the current houses in scope of the deal.



The three building typologies that are included in the Dutch 111,000-deal. The prototypes for the first type (terraced houses) and second type (4 story buildings) have been delivered (700 in total by Q2 2015). The multi-story flats will be prototyped later in 2015.

Some indicative numbers on the French and UK market: In the UK, between 1969 and 1984, there were a total of 3.9m housing completions of which 1/3 are social housing[7] [8]. In France 48% of all houses where built between 1948 and 1989. The vast majority of these have an energy consumption of over 150kWh/m^2.[9] This is mostly housing with no or limited restrictions on façade alterations. The consortium appreciates there are cultural differences in markets also relating to the heritage of building stock. The consortium chooses a set of houses to kick-start the innovation process for which this is not a problem: in fact these houses will look better/nicer/more appealing after the refurbishment.

After, the first set of houses, increasing production flexibility is occurring (proof in the Netherlands). Personalized mass-production, will allow the development and production of a greater level of diversity of housing stock, increasing the diversity of building typologies that developed solutions can be applied to. It should be noted that solutions are not restricted to cladding necessarily. The first E=0 retrofit with the same performance/price/quality standards that is partly based on (thin) internal wall insulation to keep the façade characteristics has been contracted in the Netherlands this month (May).

All the above makes clear that wider spread of solutions driven by this program can increase conventional energy savings/€ subsidy impact by an order of magnitude when only focusing on the three markets in focus. The wider spread of solutions through industrialization of the sector and transforming a nationally focused market to a EU market where other companies adopt and sell these concepts will grow that impact significantly further. The devil to get this done is in the many details to be solved. For this reason focus on three countries will probably result in a faster EU wide uptake than spreading the effort over more Member States in this phase.

2. Disseminate replicable market (financing, regulation) conditions to other Member States

The market conditions created in the three markets in focus can provide blueprints for other countries to use. On the regulatory and financing side, Housing Europe is well positioned to disseminate the lessons learned and market conditions realized through their network of members as well as to national and EU policy makers including through the Concerted Action meetings they are frequently invited to. In addition, and because of its appeal and best in class example, Energiesprong has been invited to speak at several national conferences across Europe (UK, France, Italy, Belgium, Ireland and in Brussels) as well as in the US. This has proven an excellent way to touch upon a large group of stakeholders. Furthermore, the Brussels based organisations European Climate foundation (who co-funds preparing this bid), Euroace and the Coalition for Energy Savings) present it as a strong and positive example on how to achieve large energy savings in Europe. It's always better if somebody else is doing your sales. We intend to continue using those networks to disseminate lessons learned. It's efficient and extremely effective.

3. Scaling supply and demand to other Member States

Whereas the previous objective is more top-down focussed, the principle TRANSITION ZERO works on is very much a combination of top down and bottom up. This change will only happen if the group of frontrunners at the demand side and at the supply side come together and want to do this together and believe it is possible. The trick is to find these frontrunners. So far, they have been able to find Energiesprong. From many countries (Ireland, UK, France, Italy, Sweden, Belgium, Luxembourg, Spain) companies and other stakeholders have expressed an interest to come a visit the E=0 houses in the Netherlands (and some have

[7] *of which 770.000 are terrace house*

[8] *http://www.bre.co.uk/filelibrary/accreditation/rdsap9_91/BRE_RdSAP_Manual_5_-_Identifying_basic_constructions_v8_0.pdf*

[9] *http://www.reglesdelart-grenelle-environnement-2012.fr/fileadmin/redacteurs/Regles_de_l_Art/Rapports/rapport-rage-parc-residentiel-existant-2012-09.pdf*

done so), but current capacity is lacking to facilitate all these requests, therefore Energiesprong currently mostly declines. This interest was also spurred as several international news outlets have written about the Energiesprong program (Guardian, Il Sole 24 Ora, EnergyPost, Annales des Mines, and at least half a dozen specialised energy and housing outlets such as the International Energy Agency in their Energy Efficiency Market Report). The English webpage (energiesprong.nl/transitionzero) currently already gets over 500 page visits per month with an average time of 3:34 minutes spent (which is high, but less than the 15.000 visits the Dutch website monthly gets). This spread will grow significantly when TRANSITION ZERO will be executed and a website will be set up with the focus of reaching out to a wider market in the EU. The Dutch Energiesprong communication mainly uses social media (and the tv program "ons huis verdient het") to reach its audience. The TRANSITION ZERO program will set up an English version (and a French one) of Twitter and Facebook to share updates, short videos and pictures of resulted houses and other progress.

2.1 Expected impacts

Program leverages others to work

The reason why this program is able to achieve such impacts per Euro of financial support is because it uses market value (housing stock that can be refurbished) to motivate actors to start working on solutions. RSPs and consortia (supported by the market development team) will do the majority of work when competing over the market opportunity presented. Housing associations that will put up their stock will (supported by the market development team) prepare the call for tender for their stock. Financiers will be asked by the housing associations to finance the projects, so financiers (supported by the market development team) will start working on finding financing solutions.

Regulators (also where needed with support of the market development team) will be asked to improve regulation by stakeholders where barriers exist. Based on the Dutch experience, the leveraging effect for the first phase is about 1:10, but increasing over time, while the effect lasts after the program ends.

Energy savings & renewable generation in direct scope

In the E=0 houses, part of the previous energy demand will be eliminated through energy efficiency measures and the remainder substituted by on-site renewable energy. The conventional final energy consumption reduction for these houses is set at 15,000 kWh[10]/ house per year.

The division between efficiency gains and substitution with locally generated renewables depends on technology decisions in the refurbishment concepts used and will be a result of the optimizations between insulation and installations (including generation). The current first completed E=0 prototypes in NL generate about 1/3 of the original total final energy consumption on-site; the other 2/3 of the original final energy consumption is saved.

[10] Average thermal and electric energy consumption (including appliances) for typical terrace or row houses and multi story (up to 5) housing blocks when considering climate in regions North France, UK, NL). The first 100 houses that are being refurbished as part of the Dutch deal historically had an average electric consumption of 2,854 kWh and 1729m3 gas = 16,860 kWh final. For multi-story buildings the thermal needs will be lower. Therefore, 15.000 kWh is assumed. UK and (northern) French numbers suggest similar values: https://www.gov.uk/government/collections/mlsoa-and-llsoa-electricity-and-gas-estimates

	Before /m2	*After /m2*	*Before House*	*After house*
Space heating [kWh]	162	25	14,723	2,275
Hot water [kWh]	24	19	2,145	1,729
Lighting, pumps and fans [kWh]	7.2	6.0	654	546
Electric (home) appliances [kWh]	24.2	20.0	2,200	1,820
Totaal	**217**	**70**	**19,722**	**6,370**[11]

The savings are split between ±70% reduction of thermal energy demand through insulation and heat recovery and ±15% reduction of electricity in lighting and appliances. The numbers could be different in France and the UK as conditions (including regulation) may skew solutions more towards (thermal) savings or towards extra generation, but for the purpose of the calculation the same numbers are assumed here.

Conversion of those 15,000 kWh/year to primary savings/substitution gives the following results:

- **France** uses ±37% electric heating in houses[12]; applying factor 2.5 following the prescribed methodology[13] implies substitution of (0.37 * 2.5 * 15,000 $kWh_{electric}$) + (0.63 * (12,000$kWh_{gas/oil}$ + 2.5 * 3,000 $kWh_{electric}$) = 26,160 kWh/house per year of primary energy.
- **UK** uses ±15% electric heating in houses[14] applying factor 2.5 following the prescribed methodology implies substitution of (0.15 * 2.5 * 15,000$kWh_{electric}$) + (0.85 * (12,000$kWh_{gas/oil}$ + 2.5 * 3,000 $kW_{helectric}$) = 22,200 kWh/house per year of primary energy.
- **Netherlands**: The consortium seeks funds to further support the uptake as part of a larger effort to contract 30.000 houses in the period 2016-2017 in the Netherlands. This effort is co-funded by the founders and member of the Cooperation "Brede Stroomversnelling" (housing associations and RSPs) and the Dutch national government. The objective is that this together will create a working budget of 1,5 million Euros for 2016 and 2017 to drive the market in order to secure hard contracts for a further 30.000 Net Zero Energy refurbishments in the social housing market. The grant asked for in this H2020 bid would be 1/3 of that budget and therefore only 10.000 houses are counted towards the calculated impact. Numbers are used from the table above for the calculation of the impact.

[11] In all electric configurations a heat pump COP makes electricity demand for such a house significantly lower.

[12] http://multimedia.ademe.fr/catalogues/chiffres-cles-batiment-2013/ (34% electric room heating, 47% electric warm water)

[13] This assumes an average EU mix and does not reflect the French (or UK) electricity generation mix.

[14] Of 22.1m households in the UK, 96% have central heating. Of these, 8% (or 7.6% of the total) have electric heating. Of the houses without central heating, 40% (or 1.6% of the total) have electric heating. https://www.gov.uk/government/publications/mlsoa-electricity-and-gas-2012

Total impact including baseline correction: for the purpose of this calculation it is assumed that 100% of the conventional energy consumption in the house is reduced (saved or substituted). The consortium acknowledges that Net Zero Energy houses in most cases will still have interaction with the electricity grid (although developments of storage systems will increasingly allow autonomous operation). This implies that time of consumption of electricity is not always synchronized with on-site production of electricity. This means that the house will import electricity from the grid at certain moments and export electricity back at others. Since it concerns Net Zero Energy houses, the (primary) energy taken from the distribution network is cancelled out by the on-site generated power that is fed into the grid at other moments. The calculations do therefore not take into account possible variations of the (marginal) primary energy source of the electricity mix on the grid throughout the day/year.

Project Performance Indicator	*Quantification*[15]
Primary energy savings triggered by the project within its duration (without baseline adjustment)	FR: 26.2 mWh *5,000 = 131 GWh/year UK: 19.5 mWh * 5,000 = 97.5 GWh/year NL: 10,000 * 19,8 = 198 GWh/year **Total: 426.5 GWH/year**
Renewable Energy production triggered by the project within its duration	FR: 5,000 kWh * 5.000 = 25 GWh/year UK: 5,000 kWh * 5.000 = 25 GWh/year NL: 5000 * 10.000 = 50 GWh/year **Total: 100 GWh/year**
Savings per M€ subsidy (without baseline adjustment)	**112 GWh/year/ M€ subsidy**
Baseline (assuming 1/2 of houses would have been refurbished with measures to improve energy efficiency on average with 25% (mix of new glazing, new boiler, more efficient appliances, cavity wall and roof insulation).	FR: 2,500 x 0.25 x 26.2 = 16 GWh/year UK: 2,500 x 0.25 x 19.5 = 12 GWh/year **Total: 28 GWh/year**
Savings per M€ subsidy (without baseline adjustment)	(426,5 – 28)/3.8 = **104 GWh/year/ M€ subsidy**

[15] *The pilot project are ignored as the impact of energy savings in 1000 houses is insignificant in comparison.*

The consortium appreciates that attributing the results above savings solely to the proposed program could be seen as overly zealous. Many other actors will have to put great efforts into making the envisaged solutions work. Some of which may be using other government support structures (including EU's) for that. However, in the Dutch context, the realized deal and redirection of the market would not have happened without the intervention of such an independent market development team. This is reaffirmed by taking stock of developments in other EU markets where the consortium is not aware of a movement of the market of this scale or offerings of this quality that are (close to) bankable.

The consortium could further argue the details of the numbers, but since the bid exceed the 25GWh/year/million with such a large margin, the exact level of impact is less relevant than evaluator's confidence that it will work and is a good idea. Furthermore, the objective of TRANSITION ZERO is not the 2 x 5,000 or 10,000 houses; it's to scale the Dutch market transformation to other markets in Europe in which the impact numbers mentioned above become very small in comparison.

Financing triggered in direct scope

For an estimation of the investment that will be triggered the consortium bases itself on Energiesprong's experiences in the Netherlands. The main principle is that the net present value of the energy bills of a household over the lifetime of the installation sets the price target for the energy neutral refurbishment. An analysis of Energy bills for households in the initial target group in France and the UK in this sector carried out by the consortium partners concluded that these comparable to those in the Netherlands. This This implies a price target of in the range of €40,000 for an E=0 refurbishment given low financing interest rates. Most of the Dutch social houses that are being put up for Net Zero Energy refurbishment already have a maintenance budget available for them and are due for a big refurbishment. Typically, currently this implies that a total of about €60,000 is available for which all the works including interior upgrades (new kitchen and bathroom) are fitted.

The Dutch deal between housing associations and RSPs made in June 2013 therefore entailed a total investment of between 5 and 6 billion Euros.

For the purpose of this calculation only the costs of ±€40k per house to convert the house to energy neutral are assumed.

Total foreseen investment: 20,000 * €40,000 = €800 million

It is expected new financing products will be developed to create the financing for this. Caisse des Dépôts and THFC are (associated) partners through which the efforts finding financing solutions in the UK and France mostly will be developed. EIB financing (possibly partly with Jessica funds, which these entities manage in their countries) is explored as part of the solution. Also, both the UK and Dutch government introduced Energiesprong on the Juncker list for the EFSI fund[16] and discussions with the EIB for the Dutch market to use this instrument (mainly to scale the solutions to the private homeowner market) have commenced. There is a distinct work package attributed to solving the financing question.

[16] *http://ec.europa.eu/priorities/jobs-growth-investment/plan/docs/project-list_part-2_en.pdf*

BUILDING CAPACITIES AND SKILLS

1. Regulatory reform to facilitate and steer towards E=0 refurbishment (governments and regulators)

The regulation and construction policies differ from one country to another. Therefore, one of the project work packages will be focusing on improving the regulatory conditions. The first level of analyses has already been carried out by the consortium partners and identifies the Issues:

Possibility for social housing organizations to manage an income stream from tenants in the form of an energy plan;

1. Potential for increasing rent when the energy bill is reduced to zero for all their stock;
2. Ability of social housing organizations and regulated financiers to appropriately re-valuate the refurbish house in order to free up enough room to finance the refurbishments;
3. Rules in relation to exchange of solar PV -electricity with the grid other than through feed-in tariffs (or generation tariff) and in particular local storage solutions or sharing of generation from rooftop installations;
4. Exemptions from or reforms of regulation regarding the share of fixed costs in consumers' energy bills (standing costs; connection fees).
5. So-called redlines and historic façade protection on building permits if houses get new envelopes (again solutions partly based on internal are also developed) and other local planning requirements.

Partners confirmed that none of these are deal breakers for the first 5000 if well picked from the Associations stock in the UK or France, but when scaling further, there is a need for some change in these regulations (no. 2, 5 and 6 in particular for UK; no. 2, 3 and 5 in particular for FR).

The consortium has taken note of the fact that one of the criteria mentioned in the call refers to "number of policy makers influenced". Some regulatory barriers will exist in France and the UK. The consortium and partners need to influence as many policy makers as needed to have that improved. Support from the national French, British and Dutch government as well as from the French energy agency ADEME and the French National Scientific Technological Building Institute CSTB indicate the strong interest from government bodies in working with the consortium. The project will (and already has) by definition influence a large number of policy makers both at the national level (regulation, policy) and the local level (local authorities, planners) and some at EU level. This amount is further increased through dissemination activities, both through Concerted Action meetings (Housing Europe).

2. Transforming demand from construction services (social housing organizations)

One of the key components to the program is to leverage the collective demand social housing organizations can put in the market and organize this to challenge the construction sector. An important element is that housing organizations ask for construction services for their properties in the market in a different way. This means working with the program to create demand in the market for refurbishment of houses based on quality performance outcomes then predefining the details of the design of the outcome, thereby giving the RSPs more freedom to come up with innovative solutions.

It also implies communication with tenants to ensure there is support amongst the occupants for these deep refurbishments, as they can seem to be more of a change to the house from the tenant's point of view than a regular refurbishment would be. In the Netherlands, TNO surveys show that the E=0 houses get high tenant satisfaction: *http://energieling.nl/uploads/attachment/file/6/47/Tevreden_bewoners_DEF-2-1433240342.pdf*; the latest survey done by BAM on a 50 house conversion in Soesterberg even gave 9.1 satisfaction rating for the product (the process still had some thing to be left desired for).

The proposal includes an initial participation of 7 social housing organizations (together owning 220,000 houses) in the UK and 6 housing associations (together representing 211,000 thousand houses) in France that signed a partnership in the context of this proposal. The social housing organizations that have already signed partnership agreements committed to work with other relevant stakeholders to explore if

they can set the ambition level on net zero energy for refurbishments of (part of) their housing stock. This includes:

- Participating in a business model optimisation and identifying bottlenecks/opportunities specific to the market, both in terms of procurement process, supply side expertise, economics, financing and rules & regulations;
- The intention to put up part of their housing stock to use in first round of refurbishment where social housing organizations ask more ambitious offers from the market in a competitive dialogue;
- The intention to put up part of their housing stock to use for refurbishment of houses to Net Zero Energy levels, paid for by energy cost savings as part of the 5000 deal per market.

These initial 12 social housing organizations in France and UK have been identified as frontrunners or owning housing stock that fit the profile for the start of the program (building characteristics, energy performance). They have declared a willingness to cooperate with the program. When the program starts, the consortium works (mainly through USH, NHF, NFA and GLA) to have many others to either join the program of closely follow its developments, which will be required to get realise further pipeline development and cross-pollination of knowledge and ideas. The consortium wants to demonstrate the strong existing interest from a number of organizations to support the feasibility of the approach in these two markets and to give the proposal credibility since organized scale of demand is the cornerstone to this approach.

The Dutch national umbrella association Aedes (members owning 2.3 million houses), the French national umbrella association USH (members owning 4.3 million houses) and the English National Housing Federation (members owning 2.9 million houses) and the RE:NEW program from the Greater London Authority (focusing on 3.7 million houses in total) are all partners in the call. Housing Europe is ideally placed to ensure their member housing associations in other Member States can learn from practices under the program.

3. Transforming development of solutions (construction companies, suppliers, consultants, developers)

The consortium deliberately has not included any parties from the construction sector in the call. The approach the program aims to use is an open competitive dialogue, where no parties in the sector are excluded or given an advantage from the beginning of the program. (Consortia of) RSPs can get business through meritocratic selection in an open competitive process where social housing organizations will put up stock for refurbishment. There were some questions raised about the involvement of the construction sector in this bid. In case there is doubt that the frontrunners in the sector indeed support this approach although not being part of the consortium, the evaluators are suggested to review the content of the support letters from ENCORD (about the Dutch RSPs) as well as some of the UK and FR letters of support from some frontrunners in the construction sector.

The consortium does not dictate technological solutions in these calls and throughout the refurbishments of the large-scale deals that are foreseen. In the Netherlands, RSP's apply different configurations although all choose a full electrification approach. However the consortium is convinced that industrialization and prefabrication is eminent in order to achieve the specifications requested (short intervention times significant drop in cost price; high, constant and predictable performance levels).

2.2 Measures to maximize impact

Program leverages others to work

The program aims at creating a movement and changing the dynamics in the sector. The consortium's view on relevant knowledge dissemination and development to achieve what is needed is that this works best through projects and deals that create urgency. The second dynamics to maximize the impact of the program is inspiration. The E=0 refurbishment package that is available, affordable and attractive can be seen as the holy grail of energy efficiency in buildings. This has been inspiring people to be open and receptive for the results of the program in the

Netherlands and in Member States when making this proposal. In the focal countries UK, France and The Netherlands the urgency factor will be most important. Outside these markets inspiration will be the driver behind the knowledge dissemination.

Knowledge build-up and dissemination will be much higher and faster than in a normal market setting. TRANSITION ZERO creates an urgency for new knowledge, actively brings actors together that typically do not talk to each other, creates an overview of interdependencies that gives everybody an active role to collectively solve the whole problem. The knowledge build-up and dissemination will be done directly by stakeholders that are actively involved in making the market for E=0 refurbishments. The more traditional line via universities and knowledge institutions has proven too slow and too narrow in the Netherlands. Most of these institutions, being strong in one pillar of knowledge, have difficulties in finding solutions in the multi-disciplinary context of the market and have shown limited effectiveness in reaching the sector. The distance between market players (and even regulators) and academic researchers is typically wide; the research cycle of ideas, to prototype, to data analyses, to submitting papers, to review, publication and dissemination is also often too long or not aligned with the window of opportunity to use such knowledge in the market.

Since this is not a scientific project but a program to drive innovation in the construction sector, it does not focus on theoretical knowledge. The relevant outputs for dissemination are finished products like building propositions, performance contracts, business cases, regulation and financing solutions that have been proven in the market. This is how innovation in products typically works in sectors that develop products. All the knowledge is in the end of the day distilled in the product not in the people. That is why for example a car is so good and relatively cheap these days (The T-ford cost $22,000 in today's terms).

Dissemination and exploitation of results

The program has a separate work package called "dissemination" (WP8), which contains tasks to disseminate knowledge outside the focal countries and a communication program. However, dissemination and exploitation is strongly woven in to other work packages as well as explained above and further in work packages.

The program initially focuses on the UK, NL and France, but it will introduce some of the principles in other Member States[17] through targeted messaging (via our pan European partners) as well as through conferences where we ensure invitation for and wide spread media coverage that so far has been finding Energiesprong to spread the information.

The TRANSITION ZERO project will bring relevant information for the implementation and review of the Energy Efficiency Directive (EED) and of the Energy Performance of Buildings Directive (EPBD). The project is about scaling up an innovative approach to increase the number of deeply renovated homes to reach net zero energy consumption. This approach can play a relevant part in the renovation roadmaps that Member States have to implement according to the article 4 of the EED.

The project will offer information on how to create market conditions that enable the development and deployment of energy efficiency solutions for houses. This information will be shared towards the EU wide community of energy efficiency stakeholders. This will be done to the social housing sector (Housing Europe), the construction sector (ENCORD and E2Ba) and government and regulators (Concerted Actions EPBD and EED where Housing Europe has been regularly invited to their meetings and we foresee to present key findings of the program at their future workshops).

[17] Today, Energiesprong is invited to several international seminars to speak on the approach and results. When results will be achieved in new markets, it is likely that people come to seek for knowledge rather than the Consortium needing to bring it. That is also a much more powerful way of getting knowledge spread: tangible results always draws much more attention than (theoretical) reports. In particular with the stakeholders that are in a position to drive the transformation aimed for.

Communication activities

Communication under this program is not merely a tool to spread information about the project's results, but an essential element to make the overall program successful. The objective is to create a movement in the market. Building a receptive audience base and influencing them is essential for the program to succeed. Enabling a transformation requires a fresh perspective and therefore communication focuses on both sharing state of the art knowledge and inspiring stakeholders.

The approach used to do this is:

- Setting the public agenda for issues related to energy performance of housing and the inspiring idea of e=0 refurbishment as well as the how-to achieve this, by constantly launching a well composed set of messages in speeches, media coverage and through social media. This is "content worth talking about". In a world where information overload exists, professionals like to get an interpretation about what is relevant and valuable information. To this end, a coordinated set of blogs and articles, movies and photos and social media activities are deployed. This can be setting the agenda for a theme, or responding to other news. A link between the program, the news that arises and the companies and organizations that participate is hereby established. Crucial in compiling the content is that the spokesperson in most cases, comes professionals in the field. These professionals are given the stage of the program.
- Managing moments and creating a stage 'to shine'. Following inspiring ideas an audience needs proof. This will mostly not be shared by the program itself, but by established parties in the market working on program related activities. Program management and communications management together define moments with communication value and steer established parties towards those and have them present their results from one milestone to the next, hereby also enlarging the audience.

3. IMPLEMENTATION

3.1 Work plan – overall structure

Since this a re-entry of last years bid it might be useful to highlight some of the changes made which are a consequence of last years experience. With the large amount of Dutch pilot houses in place it has proven to be a lot easier to convince construction companies how to reach net zero in refurbishment. Because the concepts are known and function to the specifications, starting by copy pasting most of the technology has been assessed possible by the UK companies who have visited these houses. This has eliminated a pilot phase in the process to convince the building sector to start innovating. The high-level market assessments have been carried out in the last year so this phase costs less. It is also important to note that in the UK a working structure (Energiesprong UK) has been established with some small seed funding (order 100k) from partners and supporters in order to do preparatory work; in France partners are working towards a similar setup. This, in combination with the confidence built based on the Dutch case, the project will hit the ground running, rather than requiring a long start-up. Therefore the timeline set to meet the project objectives is 32 months.

The program has eight work packages to meet its objectives. The program uses concept deals and prototyping to broker the final deals in the UK and France for 5,000 houses and to make all stakeholders realize conditions conducive for uptake of E=0 refurbishment packages. This includes getting an innovation movement going in the construction industry in France and the UK in addition to continuously driving the current development in the Netherlands (adding 10,000 E=0 contracts and three new integrated solution suppliers).

Three work packages (WP2, WP6, WP7) focus on the three-step approach (business model tuning, concept deal phase, pipeline development phase) used to drive the French and UK market. There are three more horizontal work packages that continuously focus on improving the regulatory environment (WP3), suitable financing solutions (WP4) and ensure the technical agreements around these houses are developed and implemented (WP5). These include the performance guarantees and the insurance for the RSP that gives the insurance, delivery protocols for the refurbishment packages and monitoring systems that are linked to the performance guarantees.

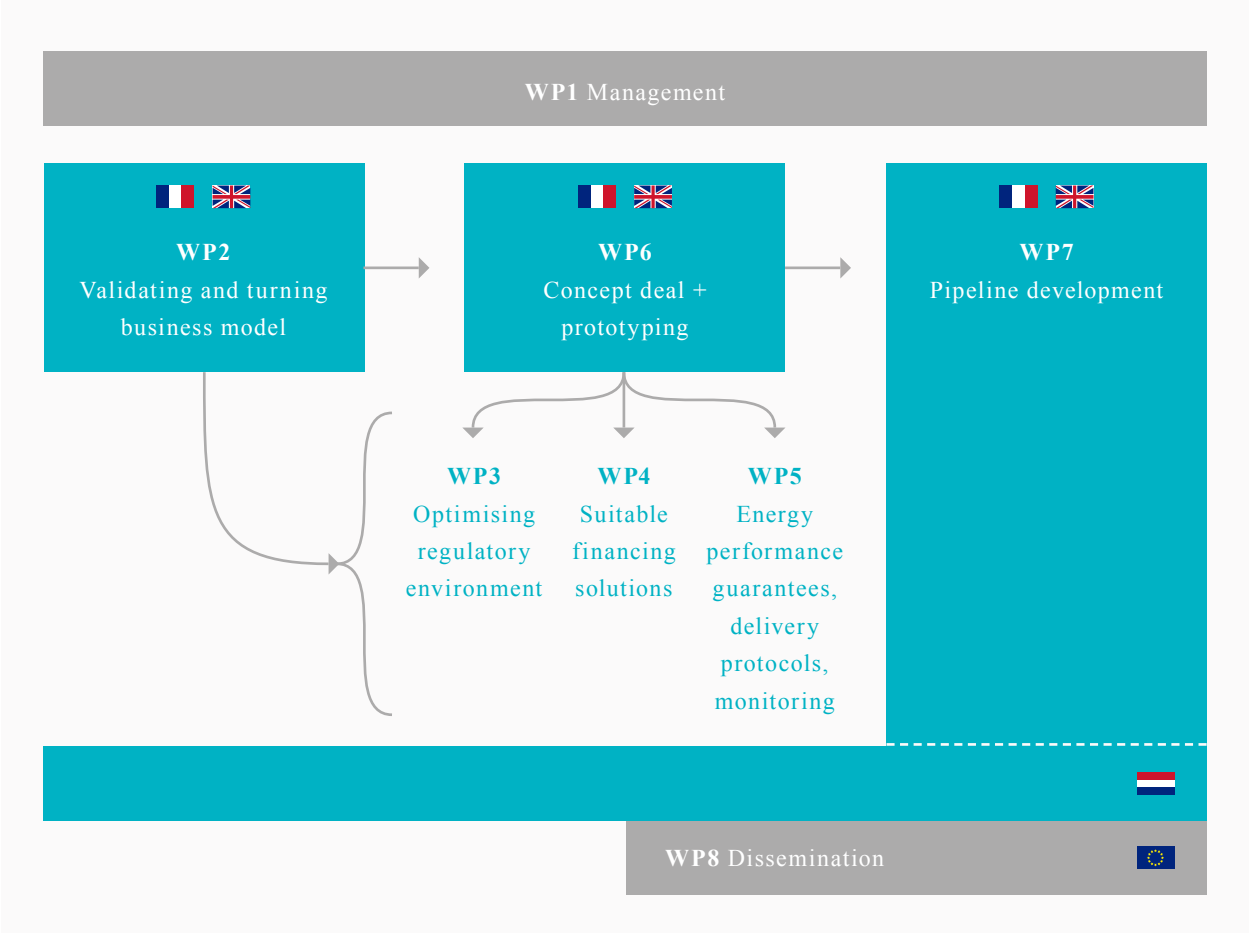
In addition, WP8 focuses on influencing and leveraging other efforts and initiatives in the market and spreading knowledge of this approach to accelerate the movement.

See the model on the next page

Set up market development teams

This proposal is unique in a way that funds will mostly go to two newly established market development teams (and a smaller part to the reinforcement of the existing Dutch market development team), instead of funds being (equally) shared between existing organisations partnering in a typical proposal. Participating partners subscribe to the value of such a team being independent rather than a project setup where existing partners come together. These funds therefore leverage enormous amounts of work from mainly the suppliers of solutions in the market and (to a lesser extent) from housing associations. The work carried out on this program will therefore be a multiple of the hours accounted for by the partners in this bid.

Another difference is that the largest part of the market development teams that will execute the program will be hired after the funds are secured. The roles of the different team members are elaborated on in section 3.2. The market development teams in France and the UK will be built with in-house consultants with specific expertise fitting to the national market situation. The CV's of the first people on the team UK and FR team are included in the annex. The French team, British team and existing reinforced Dutch Energiesprong team will be working together where beneficial, but focusing on developing the domestic market most of the time.



- **WP1**: Programme management, coordination and creation of market development teams
- **WP2**: Validating and tuning the business and delivery model for UK and FR markets.
- **WP3**: Enabling regulation – possibilities within the existing regulatory framework in each country and improvements to accelerate market uptake of E=0 solutions.
- **WP4**: Structured finance – designing business models and financing products that drive delivery of E=0 solutions in each country, including property valuation.
- **WP5**: Energy performance guarantees, delivery protocols and monitoring – cross-country data collection and evaluation; insurance solutions for energy performance.
- **WP6**: Concept deal - commitment to refurbish 5000 houses in UK and FR conditional to certain criteria and first prototyping.
- **WP7**: Pipeline development
  - 5,000 committed contracts per market during project lifetime in UK and FR
  - Doubling of current group of social housing associations (measured by collective stock) that participate in the process of procurement according to these principles in the UK and FR
  - Additional 10.000 refurbished houses as well as three extra E=0 solution suppliers in NL[18]

[18] This bid asks for funding an existing initiative for which other funds are being made/have been made available. The impact numbers for this bid are calculated based on the proportion of funding this bid asks for in relation tot his task.

3.2 Management structure and procedures

The TRANSITION ZERO program is focused on direct market result oriented interventions. It needs a flexible non-hierarchical organization that mostly facilitates, coordinates and inspires other stakeholders to innovate, all focusing on one objective: make E=0 refurbishments a market reality. This reflects in the organizational structure. There will be three teams that operate in the Dutch, UK and French market to do what is needed to drive actors to innovate, coordinated by an TRANSITION ZERO management team that is put together by the country innovation managers and a program director.

In each country a board will be set up to have quarterly discussions about the execution of the program with the MDT. In this board representatives from the sector will have a seat (social housing, financing, RSPs, Energiesprong). Since most of the partners make smaller in kind contributions the coordination between different partners will not be problematic. The market development teams (MDT) are doing most of the work. Since the partners in this program have a clear role in their market, representing demand, finance or regulation they have to be seen as partners program. Making the MDT more effective, giving them a legitimation to act in the market and to help them with specific knowledge and networks. The interactions between the MDT and the professionals of the partners will be continuous and on an operational basis.

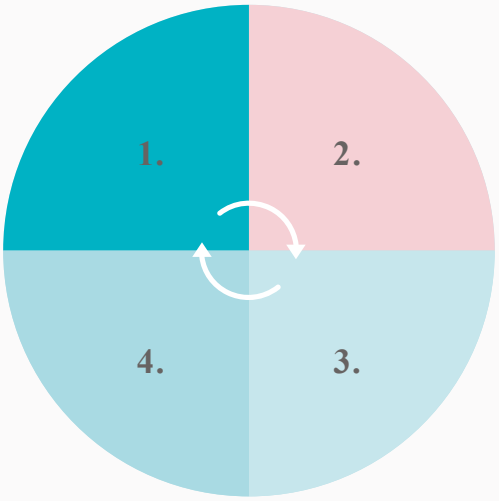
The teams will be filled with senior professionals with a track record of convincing others to join their effort and with a relevant network in their markets. In the beginning they will be coached by experienced professionals from the Energiesprong program to transfer the Dutch knowledge while starting up in their own country. One of the biggest challenges learned from the Dutch program is keeping the overview on all different aspects of the innovation program that will be running. Not only understanding the different fields of innovation (demand, refurbishment package, finance, regulation) but also understanding the dynamics of the different companies and organizations that work with the MDT to come to better fitting regulation, new financial products, better E=0 propositions, good pilot projects and finally the deal. This will be the core task of the innovation manager. He or she is managing the specialists, getting feedback and knowledge from the process coaches and being in contact with the partners and stakeholders in the market. He or she will oversee the most urgent barriers and will be able to focus the team and the stakeholders towards these. The knowledge is all stored with the stakeholders in the market. Not in books or papers but in financial products, performance warranties, and e=0 refurbishment packages.

The TRANSITION ZERO program director will be the director of the Energiesprong program. He will steer the MDTs and ensure knowledge transfer between the different markets.

3.3 Consortium as a whole

Building the consortium for this proposal was based on the philosophy “create what is needed”. Energiesprong made an assessment of ten countries in the EU by speaking with government, demand side and experts in those countries. After that, it was concluded that the UK and France had the best conditions to scale the results of Energiesprong. Subsequently, the necessary partners were selected and included in government, financing and at the demand side.

The consortium uses the social housing sector to organize and articulate new demand at scale through aggregation and joint procurement. Alongside, the consortium works with financiers and regulators to make sure refurbishment solutions that housing associations ask for can be financed and have no regulatory obstacles. The construction sector plays an essential role and will be brought in the program through the pilot projects and deals (for references see the support letter of f.i. Willmott Dixon).



1. Fitting regulation

- French Ministry Housing, ADEME, CSTB, Plan Batiment Durable
- Department of Energy and Climate change (UK)
- Greater London Authority
- Ministry of interior (NL)

2. Better offers

- ENCORD

3. Articulated demand

- 19 individual social housing organisations in UK, FR and NL
- Aedes
- USH
- NHF
- Housing Europe
- Greater London Authority

4. Available financing and appropriate valuation

- Caisse des Depots (USH)
- THFC
- WSW
- Finance Ideas

The blue quadrants are represented as partners/supporters in the proposal. They collectively need to align, create conducive market conditions and then challenge the construction sector to develop new solutions.

Government: The essential ministries in all three countries have declared their support. In France, a wider range of public stakeholders has been included in the bid. This relates to the somewhat more dominant as well as EIB loans for the sector), it is the obvious partner for this program. However, it is not excluded other financiers may get directly involved at a later stage in the UK.

Demand side: All umbrella organizations of social housing in UK, FR and NL are partners (NHF, NFA, USH, Aedes). In addition, the Greater London Authority has an ambitious energy efficiency program and given the scale of the area (3.7 million houses, including large amounts of social housing) it focuses on, the consortium is reinforced with the partnership of the GLA. Umbrella organizations don't manage houses themselves, but their individual members do. The umbrella organizations have initially recruited 17 front running members who signed partnership letters to participate in this program with a view to put up houses under their ownership or management for refurbishment under this program. This number will continuously be increased under the program. The consortium has worked through partnership agreements rather than through full consortium partners, as with such high number of participants this would become difficult to manage for the submission of the call.

Uitgave in opdracht van Energiesprong | Platform31 in samenwerking met TNO, RIGO en Van Beek

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