

A house makeover paid for by your energy bill

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In the Netherlands, 27 social housing associations (HLM's) and a group of builders are refurbishing 111,000 houses to Net Zero Energy levels. Net Zero Energy means that the house annually produces the same amount of energy that is used for heating, hot water, lights and electric appliances. Remarkably, the refurbishments take only one week; the builder provides a 40-year guarantee on the energy performance and the refurbishments are done without government subsidies. The best part is: the people living in these houses are very happy with their refurbished new homes. In 2015, these solutions are also brought to the private market. The deal is the same: A Net Zero Energy makeover, with no additional cost for the homeowner. It sounds too good to be true. How was this achieved and could this be done in France?

Increasing numbers of people want to feel that they can play a role towards ensuring healthier, more sustainable communities and these concerns more often also include ensuring cleaner air and environment. Unfortunately growing environmental concerns have been matched by growing energy bills and fuel poverty is on the rise across France and the rest of Europe. What if we could offer people a solution to all these problems in one go? Is it possible to rapidly modernize and improve the way our homes look, at no extra cost to householders while greening our communities, lowering their energy bills and developing a competitive industry for energy efficiency solutions in buildings?

This may sound like a utopian vision of the future but it is already starting to happen in the Netherlands, and France could soon be taking a similar lead.

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Let us look at the problem first. Governments want to drastically improve the energy efficiency of the building stock but cannot seem to make this happen at sufficient scale and pace. There are two main reasons why reducing energy consumption of the building stock is one of the biggest challenges when moving towards a sustainable energy system. First, the pace of replacing buildings is slow. Solutions must fix existing buildings, which is harder than designing a new product (or building) from scratch. Second, the possible reasons why people may choose to invest to refurbish their real estate are diverse and surely cannot be triggered in masses solely based on an economic (or environmental) rationale.

This challenge is therefore much harder than for instance transforming cars that have a lifetime of 15 years to drive on electricity (France is actually leading that transformation in the EU, with over 15.000 new electric vehicle registrations in 2014) or transforming the electricity generation mix.

How are we going to transform 30 million houses in France (or 150 million in Europe) to a high-energy efficiency standard

when building owners cannot be persuaded by economics alone?

Make something people want to buy

Let us start with how people today like to buy things. For instance, when buying a car or a new kitchen, we tend to go to shops where helpful sales people offer advice on a range of products in a cosy shop environment. We can even do Internet research to compare or buy online. We have a sense of what a brand stands for and whether we like that brand. Products normally come with a performance warranty. There may be a credit facility accompanying the product for those who cannot afford to pay the full amount at once. The product can be delivered to our home if we want and we have a sense that the price we pay is reasonable for the product because the brand reputation is at stake and the product competes with other brands.

Now let us look at somebody who wants to give his or her house an energy refurbishment. Typically, we end up with the construction company recommended by our neighbour because he used them last year and he said they were ok. We have no idea what a reasonable price is or whether the company is aware of the latest (or cheapest) components for the solution they propose. If we were to ask for a Net Zero Energy performance upgrade to eradicate our future energy bills, we would most likely be told it is not possible. If we were to insist, we would discover that the builder's quotation costs much more than the energy cost savings would ever return. A generic warranty would typically not be provided and a warranty on the energy performance would certainly be out of the question. Next stop: the bank. financing a retrofit is not something banks will automatically approve. A detailed as-

essment is made of your income and the added value to the house, crosschecked with rules and regulation of mortgage caps. If any of us were persistent enough to overcome these hurdles, we would be faced with weeks or rather months of rubble and disturbance in our house and quite some uncertainty of what the end result would look like. This is not an attractive proposition. This needs to change.

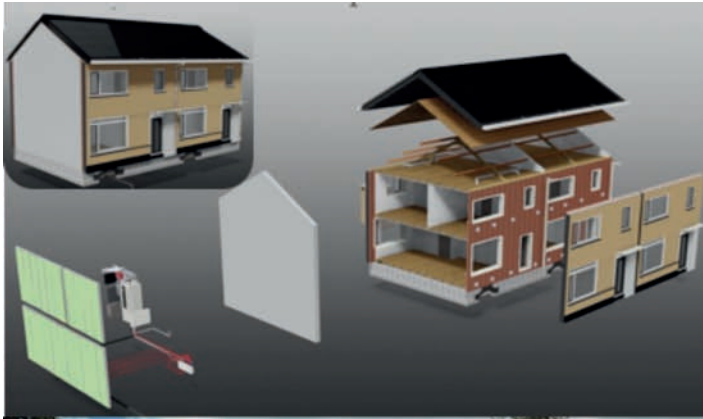
Let us start with the costs. To ensure that the (majority of the) refurbishment costs are met by the resulting energy cost savings, prices must go down dramatically. In order to make these refurbishments attractive, delivery times must reduce to days instead of months. In order to turn energy costs into a revenue stream to recover the costs of investment, in many cases a financier is needed to provide the necessary, upfront capital. To convince the financier that this investment is secure and worthwhile, a long-year energy performance warranty must be guaranteed on the refurbished house.

Today, a Net Zero Energy 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. This will require moving from doing one-off projects towards developing mass-produced refurbishment packages with a performance standard. And then these packages will be sold in shops, which are cosy and have helpful staff. To catalyze that innovation process, first a large demand volume that asks for this new product is needed.

This means house owners need to collectively ask for a different type of offering from builders. Only a large volume of articulated demand will convince builders to put in the substantial innovation investment needed to develop attractive and affordable Net Zero Energy refurbishment packages. Once



An example of a (colorful) Net Zero Energy makeover. About 200 of these prototypes and first phase test makeovers have now been completed.



The building blocks of the technical solution for row houses as used in one of the early models. The Energiesprong philosophy does not only apply to external wall insulation. It is about developing industrialized solutions with an energy performance guarantee that are quick to install. This could also include (partial) internal insulation solutions.

D.R.

the prospect of substantial demand and suitable supply becomes apparent, a wider range of finance providers will be able to evaluate this new proposition to offer tailored financial products and governments will be able to create the an enabling regulatory environment.

These days, the construction sector is not typically regarded as being among the most inventive. Its corporate brands do not carry anything like the same innovation capital as the likes of Apple, Google and Intel. However, it does not lack talent and capacity for innovation. Rather, it is the market that will either continue to constrain or drive innovation within the construction sector. If market conditions can be changed and large-scale demand can be organized, the construction sector will innovate to offer better products faster than ever before. We know this because it is happening in the Netherlands.

The Dutch have organised such large-scale demand to secure a contract to refurbish 111,000 houses to Net Zero Energy levels guaranteed for 40 years and installed within one week. While this proposition may sound impressive enough, these rational value drivers are not the reasons why people decide to buy at scale. The other requirement the retrofits need to fulfill is that people need to like it. It needs to improve the look and feel of their house. People will not invest if it is poor quality, too expensive or when it is too much hassle to buy or have it installed. However, the most positive motivation comes from how people will feel about the result on their house and in the Netherlands, the feedback from residents has been overwhelmingly happy.

The independent market development team

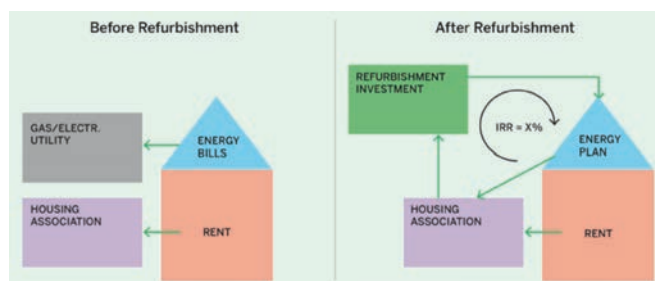
How did this come about in the Netherlands? The Dutch government realized something very important five years ago. They realized that their efforts to stimulate the market did not grow in a systemic way. There was nobody directing these efforts, also because nobody really knew where to go. Therefore, they stopped using typical prescribed subsidy programmes for so-called “innovation” projects in the buildings sector. Instead, they decided to give €50 million to a market development team. To be successful, it was essential that the market development team would be independent. This implied it was 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 (including the government) had led to the status quo, as it existed. The objective was to change that rapidly and using the same ingredients is not a good basis to expect a different outcome. The independent non-for-profit team was called “Energiesprong” meaning “saut d’énergie” and their assignment was: make the mass market for energy efficiency solutions in buildings a reality in five years. They hired three bright, unconventional minds, who started doing different experiments, learning quickly that when you set the bar high (Net Zero Energy) you not only directly get the end result you aim for, but also current market conditions must change. This gives innovation the quickest boost.

When that approach was understood, the team started to condition the market by putting social housing stock up for refurbishment, asking only for a set of specific functional requirements (costs, performance, warranty, intervention time). These demands need to leave as much freedom to consortia of builders to freely create total, integrated concepts.

The builders bidding on the refurbishment tenders were required to share the proposed solutions in a public presentation. The parties who 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.

The key for motivating the construction sector to openly sharing their ideas was to convince them to unleash their abilities to deliver rapid innovation in order to drive towards a more prosperous sector overall. They were convinced to respond to the challenge of transferring a multi-billion annual collective household energy bill into a new market for the construction sector. If that works, the refurbishment market would be much bigger than any construction company could deal with on its own.

Energiesprong subsequently worked towards the 111 000 deal to motivate the construction sector to deliver improved solutions, to encourage government to lift regulatory barriers and drive financiers to re-evaluate financing conditions. This was decisive in motivating the first construction companies (which formed consortia of suppliers and developers) to do the required investment in further developing concepts and



Graphique 1: The financing of the refurbishment is done by giving the tenants an “energy plan” including a guarantee for a hot house (22 degr.), warm water (certain amount of shower time per day) and an electricity bundle for electric appliances for which they together pay a fixed monthly fee. If they exceed that agreed amount of energy performance, they pay the additional electricity consumption to the utility. The bundle fee is paid to the housing association (HLM). This pays of the investment. In the private sector it works similarly, with an increase in mortgage installments to finance the investment covered by the reduction in energy costs. In the Dutch case, the cost of living stays therefore the same for tenants or private homeowners.

investing in factories required to pre-fabricate these refurbishment solutions with a view to scale. It helped the government to change regulation (i.e. ability for associations to collect the energy plan money) and it made the financier revalue the properties that would be refurbished in order to free extra room to borrow money. The first 200 prototypes and test houses have been built. By the end of next year, there should be 10 000 Net Zero Energy refurbishments completed.

Following that deal, Energiesprong is now working to bring these refurbishment packages to the private homeowner sector. Although the affordable, quick to install product with a warranty is now emerging, that individual homeowner still cannot go to a cosy shop where he or she is tended to by a helpful sales person. Our next challenge: how do we get these solutions sold in a shop, in the same way IKEA sells its kitchens? This challenge is not yet solved, but the potential solutions are a whole lot easier to imagine now the product exists.

The enormous scalability

A common question is whether this only works for certain houses that all look the same. In fact, it is mass customization. Houses are all 3D scanned and refurbishment packages are individually produced because even a set of row houses are not all exactly the same, even if it looks like they are. The focus until now has been on the most prevalent typologies of houses in the Dutch market of which 2.3 million houses in the Netherlands exist, but flexibility will increase over time with the number of possible solutions. The first designs will establish whole new supply chains based on prefabricated industrially production methods providing new platforms for further, interactive innovation process (very much like the car industry).

A final benefit is the additional economic stimulus to the buildings and construction sector. The Dutch economic institute for the building sector has published a study claiming that the 111 000 deal alone creates 9000 extra jobs between 2015 and 2020. The reason is simple: the employment per euro spent on energy bills is much lower than the employment per euro spent on a refurbishment solution. Also in a construction sector where solutions are less labor intensive and industrially produced. Moreover, we invest now to reduce an energy expense over 40 years. The benefits are current, something at least most Dutch politicians seem to appreciate.

Though the stock of buildings and the starting conditions are certainly not the same between the Netherlands and France, a similar success story is possible in France, if policy makers give the necessary support, both in terms of public support and seed funding.