

Energiesprong, The Netherlands

Energiesprong completes 'whole house' deep retrofits for social housing tenants at speed with minimal disruption by using prefabricated façades and off-site manufacture. The organisation also works to develop the market conditions to unlock retrofit at scale and push regulatory changes.



Submitting organisation: Global Energiesprong Alliance

Type of organisation: non-profit

Key elements of the project:

- **Scale and Impact**
10,000+ homes retrofitted across Europe and North America, delivering 70-80% reduction in energy consumption.
- **An Enabling Approach**
Energiesprong works with all stakeholders (Government, private sector, tenants, housing associations) simultaneously to tackle potential obstacles.
- **Market Development**
By signing large volume deals, costs are lowered and the market is developed, with significant reductions after a few years of operation (from €130k to €57k in The Netherlands).

What inspires us ...

This project shows a clear and efficient response to the energy crisis in Europe, and the challenges with existing housing stock. A best practice for retrofit, which reaps the benefits of standardisation but is also flexible in product delivery. Costings have come down significantly in The Netherlands as the market has grown, and there are echoes of replication in the UK, Germany, France, Canada and the USA.





Introduction

Energiesprong delivers deep, net zero housing retrofits, creating scalable market solutions. The programme works mainly with social housing providers, tackling hundreds of homes at a time and thus reducing costs. The work combines off-site manufacturing of insulated external wall panels which are then attached to the existing wall on-site, meaning renovations are usually completed in seven to 10 days with minimum disruption for tenants. Energiesprong was launched to address the urgent need to reduce carbon emissions from buildings, fuel poverty and improve energy efficiency, particularly in the context of existing buildings. It provides a scalable, cost-effective solution for retrofitting buildings with energy-efficient technologies. The programme aims to undertake more affordable large-scale, systematic retrofits that deliver significant energy savings and carbon reductions, while improving comfort and reducing energy bills for residents. The renovations achieve an average of 70-80% reduction in energy use. The programme started in The Netherlands and is now active in seven countries and has delivered more than 10,000 net zero retrofit projects.

Organisation Implementing the Project

The initiative started in The Netherlands, where housing associations that were previously carrying out incremental retrofits to their housing stock decided to collaborate to find a more efficient approach. They challenged the supply chain to come up with a better methodology in exchange for a commitment to purchase solutions. Energiesprong was one of the solutions put forward.

The Energiesprong approach is part of the Global Energiesprong Alliance (GEA). GEA is a non-profit organisation based in The Netherlands and the umbrella body for Energiesprong teams across the different countries in which the programme operates. It coordinates knowledge exchange to expand the movement.

Through years of experience gained with the Energiesprong business model GEA have grown and evolved. They now want to provide answers to questions that go beyond energy transition (the shift from fossil-based systems of energy production and consumption to renewable energy sources), while still being active in, and supportive of, the Energiesprong approach.

GEA is composed of three founders, four board members (three of which are the founders) and two national representatives from each member country. GEA works with self-employed consultants.

The GEA team takes care of surveying and improving the core elements of the approach and coordinates between countries. They are also the first point of contact for the dissemination and acquisition of new countries and help governments and/or public-related organisations to implement the



Energiesprong programme. They also ensure the international open-source exchange of expertise, share lessons learned and monitor methods that have been particularly successful in market development, so other countries can benefit from them. They see themselves as enablers, which is key for successful international market development of affordable deep energy retrofit¹.

Independent Energiesprong Market Development teams in each country work with an ever-growing group of front runners in the supply chain, ambitious housing organisations and public authorities, to grow an international movement for affordable, future-ready living.

Context

The programme is particularly focused on social housing, which in many countries makes up a considerable proportion of the building stock and is often old and in need of renovation. Large housing providers face the challenge of decarbonising their housing stock in accordance with national regulations or their own targets. This has been exacerbated by the energy crisis in Europe, which has driven a large part of the population into fuel poverty.

The approach was initially developed in the Netherlands, where there is a large stock of post-World War II social housing. It has been adapted and implemented in other countries, such as the UK, France, Germany, Italy and the USA, where there is also a need for large-scale building retrofits and continues to attract interest from other countries.

Project Description

The programme is ongoing, having started in 2011 in the Netherlands, 2015 in the UK and France, 2017 in Germany, 2018 in the USA, 2021 in Italy and probably 2023 in Canada. To date, the Energiesprong programme has retrofitted more than 10,000 buildings across Europe, the USA and Canada.

- Large-scale prefabricated retrofits are carried out in a cost-effective and replicable way, which has the potential to make a significant contribution to global emissions reductions.
- Core to the approach is driving a market for off-site manufacturing and full integration of components to improve attractiveness and scalability of retrofit packages. This improves quality and reduces costs and delivery time.
- The approach includes a range of energy-efficient technologies and strategies, such as prefabricated façade modules with insulation and high-performance windows. Plug-in technical supply, with energy-efficient heating and cooling systems, and renewable energy sources,



such as solar panels, are also part of the approach. These technologies are used in a systematic and standardised way, which helps to lower costs and reduce the time needed for building renovations.

- Energiesprong introduces a business model where long-term guaranteed energy and maintenance savings pay for the retrofit, combining financial, technical, contractual and social innovation. As well as being a high-quality and scalable retrofit solution, Energiesprong supplies a financial business model for housing associations.

Aims and Objectives

To future proof our lives, we must change how we live, what we eat, what we buy, how we move around and how we develop ourselves. GEA focuses on some of these challenges and translates them into the following programme streams:

1. Boost the energy transition market for our homes and communities so we no longer use fossil fuels.
2. Push forward the development of energy-positive materials when we build or renovate buildings.
3. Inspire and facilitate personal and business developments that make change possible.
4. Push forward and map the right regulations and financing schemes needed to bring about change.

The Energiesprong movement envisages a world in which fossil fuels are no longer used to power buildings. The movement believes that everyone deserves access to affordable net zero renovated homes, and that achieving this should be a societal and industrial priority in every region.

Energiesprong was launched to address the urgent need to improve energy efficiency and reduce carbon emissions from existing buildings, and tackle rising fuel poverty. Buildings are a major source of carbon emissions and energy consumption, and retrofitting existing buildings with energy-efficient technologies is critical to achieving the emissions reductions needed to mitigate climate change.

The approach was developed to address this challenge by providing a scalable, cost-effective solution for retrofitting existing buildings with energy-efficient technologies. The programme implements affordable large-scale retrofits that deliver significant energy savings and carbon emission reductions, while improving comfort and reducing energy bills for residents.

Energiesprong aims to expand from 10,000-plus retrofits to millions to tackle the climate challenge. They believe they could achieve greater impact through more global awareness and collaboration, for instance in Eastern Europe or in Asia.

Key Features

- Buildings are measured to a very precise degree, after which insulated panels are prefabricated off-site. These panels are then attached directly to the external walls of the building, causing minimal disruption to residents. Work is also carried out inside the property – replacing heating systems, appliances, etc – with the aim of completing the project in seven to 10 days (in some cases it has taken longer).
- Energiesprong operates an open-source model, which involves working with a range of partners, beneficiaries and stakeholders to achieve its goals. This includes building owners, contractors, architects, manufacturers, government agencies and financial institutions.
- Independent Market Development Teams work with key stakeholders, such as housing organisations, construction companies and technical suppliers, as well as with public authorities, to improve policy and regulation. They also work with banks to create financial arrangements that support Energiesprong projects and with tenant organisations to improve the retrofit product itself. Establishing these market contexts – while simultaneously brokering initial pilot projects and, later, large volume retrofit deals (thousands of homes) – creates the momentum needed for stakeholders to act simultaneously. This entices suppliers to invest in off-site manufacturing of the components needed for such retrofits. Mass customisation and industrialisation are key in achieving a better quality and cost standard for retrofitting energy-inefficient buildings.
- Energiesprong collaborates with contractors and manufacturers to ensure the retrofit components are high-quality, cost-effective and easy to install. They also monitor the price of prefab components to support more affordable solutions for different urban contexts and housing typologies.
- Collaboration with local authorities and community groups helps identify buildings that would benefit from retrofits.
- Energiesprong works closely with government agencies and financial institutions to create favourable policy and financing frameworks to support energy-efficient building retrofits. This includes advocating for policies that encourage energy-efficient building retrofits and working with financial institutions to develop innovative financing models, such as pay-for-performance contracts and long-term warranty mechanisms.



- Social landlords are shown flagship projects and guided through the whole process, so they can build confidence in the model. GEA is always there for them if something goes wrong and acts as the link with the developer.
- Landlords, tenants and the supply side benefits from the Energiesprong Approach: By using prefabricated components for façades, roofs and technology, a high and measurable industrial standard can be guaranteed. This makes long-term performance warranties possible, as well as the consideration of costs over the life cycle of +30 years. The landlord thus has a business model in which the refurbishment costs are refinanced without increasing the rent. This warm rent neutrality is a declared goal, but not yet possible at current costs and volume, but a set goal for the whole approach. Due to the depth of the refurbishment, the construction companies have a larger order volume, remain tied to the property and thus to the customer for longer over the long term, and can turn over more, i.e., "grow" and secure their own future, with the same personnel requirements due to the relocation of production to industry. The tenant lives in a comfortable building, without mould, drafts and at best without additional costs. And nevertheless, the approach is also partly solving a major problem of society – the carbon emission of the whole building stock.

Residents' involvement

Tenants remain the focus throughout the entire journey and are involved in every phase of the project. Tenant engagement differs by country and project, but usually includes neighbourhood gatherings, inquiries, door-to-door campaigns, evaluations and workshops to showcase the benefits of energy-efficient building retrofits to local communities.

GEA teaches stakeholders involved in the process how to involve residents in the decision-making process and how to take their feedback into account. Engaging with building owners and occupants to understand their needs and priorities is a key aspect of the approach. This helps to ensure that retrofits are designed to meet their specific needs and are comfortable and convenient to live in. Residents receive personalised training to manage the new appliances where needed.

Obtaining feedback after the completion of the project is key to the approach. Surveys and interviews are conducted with tenants to determine their satisfaction with the retrofit, the way it was built and to obtain feedback on indoor comfort and the energy efficiency of the building. This information is used to further refine and improve the approach.

Innovation

- A key innovation of Energiesprong is the use of prefabrication techniques. This involves prefabricating building elements such as façades, roofs and balconies outside the building and then assembling them on-site. This helps to reduce assembly time and costs while ensuring high-quality and uniform assembly.
- Energiesprong has boosted technical innovation. The first factories to produce façade panels have been established and there are factories developing smart energy modules that can be used in several ways. Over the past few years, many new companies with ‘one-stop-shop-solutions’ have been established to tackle the challenge and are rethinking the whole retrofit process.
- Another important innovation is the use of performance-based contracts. These contracts aim to ensure that the energy savings and other benefits of the retrofit are achieved and maintained over time. This provides an incentive for contractors to carry out high-quality retrofits that deliver the promised energy savings with a relevant business model for housing organisations. Monitoring systems display consumption and help create good energy behaviour.
- Energiesprong facilitates the development of an innovation-friendly environment, while involving all key stakeholders in the retrofit sector. The current culture in the construction industry poses significant challenges because it tends to be inward-looking, fearful, not diverse, often hierarchical and focused on short-term profit, making innovation difficult. Energiesprong is increasingly focusing on the major social transition that is needed within the construction industry to promote experimenting (and making mistakes) in companies that are diverse, non-hierarchical and driven by long-term values.
- The approach also represents innovation in public policy through the public funding of a Market Development Team. This team works to connect demand with supply to create a self-sustaining, functioning and growing deep energy retrofit market. It is an example of how to implement innovation in a conservative environment by enabling key stakeholders to take over the approach and solve the building issue.
- To help kick-start markets, Energiesprong has always worked open source. Everything it does, creates, innovates and executes is available to the public, enabling anyone to use it without paying or needing to apply for usage rights. Knowledge, lessons learned and other tools, such as white papers, or standardised contracts are available to download on the national and international websites and are free of charge.



Funding

GEA has an annual turnover of about €200,000 (\$217,500 USD). This is allocated to international collaboration and support of new markets (40%), knowledge exchange (20%), marketing, tools and social media (25%) and administration, back office and software (15%).

The national Market Development Teams are funded by public authorities in each country of operation, with a range between €500,000 and €2,500,000 (\$544,000 to \$2,700,000 USD).

The main funding comes from collaborative EU projects that the GEA is part of as a partner or a lead partner. International funding has been received from the EU via the Horizon 2020 programme, the Interreg NWE programme and the LIFE programme. These three projects are just starting and have secured funding for at least the next three years.

A small part comes from an annual contribution from the national Energiesprong teams in Europe – a kind of licence model to base fund the GEA. This contribution from the national Energiesprong teams is secured, so the structure of the umbrella is a standalone one.

The team has a great track record of managing and implementing European projects over the past decade and none of the funds were at risk. Getting funding is an ongoing effort, and during the next three years, the team will dedicate resources to secure more funding streams in line with their mission to secure a continuous funding stream beyond that period.

One of the goals of the GEA is to reduce the cost of retrofit. Although the price of materials and labour have been going up, the total cost of retrofit projects will actually go down in the near future. This is due to the market transition that Energiesprong is spearheading.

The current costs of retrofit per unit depend a lot on the country, the building type and previous works, however, the average range is between €60,000 (\$65,000 USD) and €100,000 (\$108,300 USD) per home.

Housing providers that opt to retrofit their stock sometimes get funding or subsidies from national decarbonisation schemes (such as in the UK) or international (EU) funding and cover the costs using their own capital. In some of the pilot projects, housing providers requested a contribution from residents to cover the costs. This contribution was calculated in a way that still resulted in significantly lower monthly costs for residents (considering the 70-80% reduction on service bills).

Impact

By retrofitting existing social housing with energy-efficient technologies, the programme aims to improve residents' living conditions, lower energy bills and reduce carbon emissions – thus achieving a social, financial and environmental impact.

Financial

To date, the Energiesprong programme has retrofitted more than 10,000 buildings across Europe and North America. These retrofits have resulted in a 70% to 80% reduction in energy consumption and carbon emissions, with many buildings achieving 'net –zero' energy performance. This means they produce enough renewable energy to meet their own annual energy consumption requirements. Reduced energy consumption translates into lower energy bills for residents, improving their economic circumstances and helping to tackle fuel poverty.

The Energiesprong approach has created a market for prefabricated retrofit components and has led to the establishment of several companies (such as pre.formance, Ecoworks, Renowate, Factory Zero, Synerpod).

Social

Energiesprong has helped shape and strengthen policy support for building retrofits at national and international levels. Canada recently announced a \$200 million CAD (\$147 million USD) funding scheme for market development teams emulating the Energiesprong approach. In 2021, Germany announced a €300 million (\$320 million USD) funding scheme for the development of prefabricated pilots, modules and industries.

In the Netherlands, six housing organisation and four construction companies established a green deal to retrofit 111,000 homes to net zero energy performance. This target has been supported by a range of policy measures, including subsidies and tax incentives for building retrofits and the establishment of a national energy-efficient building programme.

In the UK, the Energiesprong approach to large-scale retrofit inspired the government to establish its Whole House Retrofit competition. This programme aims to accelerate a reduction in domestic retrofit costs and retrofit as many homes as possible to net zero standard by 2035. In Germany, the Federal Office for Economic Affairs and Export Control (BAFA) announced a 15% additional subsidy for retrofits done through prefabricated modules and technical supply. At EU level it has influenced the development of the EU's Renovation Wave.

Tenant satisfaction is a main goal of the approach and feedback is gathered after a project is completed. Some tenant's testimonies, where they discuss the benefits of living in a warmer, dryer and draught-free house, can be found here: <https://vimeo.com/energiesprong>.

Environmental



The programme aims to reduce carbon emissions by retrofitting existing buildings to net zero energy performance. By improving the energy efficiency of buildings, it helps to reduce the amount of energy needed to heat and cool buildings, which in turn reduces the amount of carbon emissions produced by energy generation. Since Energiesprong is a refurbishment programme, the embodied carbon of the existing building remains bound.

The environmental impact of the programme includes:

- **Encouraging Renewable Energy:** such as solar panels, to power buildings. By generating energy from renewable sources, the programme helps to reduce reliance on fossil fuels and further reduce carbon emissions.
- **Reducing Waste:** The programme encourages the use of prefabricated building components, which are manufactured off-site and assembled on-site, reducing waste and minimising the environmental impact of the retrofit process.
- **Encouraging a circular economy:** The programme promotes a circular economy approach to building retrofits, where materials and components are reused or repurposed rather than discarded.
- **Use of bio-based materials, circular procurement and building of a value chain “from farmers to builders”:** starting a three-year project in collaboration with key stakeholders in five countries, working on bio-based materials. The aim is to facilitate public authorities to improve market conditions and develop four scalable bio-based deep energy retrofit packages of a façade and roof system for collective and individual housing, using bio-based materials: straw, wood, bio polymer, miscanthus. The packages will be used on four sites to retrofit 88 social housing units. To supply the materials for these retrofit components the project will set up six place-based cost-effective value chains involving farmers, manufacturers of prefabricated construction components, builders, social housing organisations and public authorities in The Netherlands, Ireland, France and Germany. Circular procurement will be explored in this project to encourage the use of bio-based and circular materials by specifying them in procurement contracts with a specific minimum percentage.
- **Use of digital tools, design for disassembly and deconstruction instead of demolition:** the French team is part of an innovative four-year ‘Digital Deconstruction’ project. The project aims to develop an innovative digital decision support system, integrating various digital tools (3D scanning, building information modelling, a digital materials and buildings database, blockchain technology) that help to define the most sustainable and economical deconstruction and reuse strategy for building. By linking the digital system to innovative building information modelling techniques, a cycle is created between design, construction and demolition. Scarce resources are reused in this way and will drastically reduce the huge CO2 emissions of the construction industry. Researchers within the project are working on this open-source software system so engineers can reuse materials from renovation and demolition projects and create a more sustainable future. The



project focuses on regions having set sustainable materials management, ecotechnologies, ICT and digitisation in industry as one of their priorities in The Netherlands, Belgium, Luxembourg and France, paving the way for roll-out to the UK and Denmark.

- A water-saving component is not currently part of the approach, but there are plans for this to be incorporated in the future. This is also country-dependant. For example, if GEA starts a team in Spain (first steps will be made soon) it would be crucial to include water usage reductions to the performance specification, while in the Netherlands this would add costs to the project without a benefit in terms of affordability.

Learning, evaluation, and recognition

Learning

The Energiesprong approach is based on four principles:

- 1) attractiveness of the product
- 2) affordability
- 3) quick to install
- 4) quality

Over the years, these principles have remained the same, but their interpretation has changed. For example, they have learned what residents find attractive and adapted the product accordingly. Residents are offered the choice to include other elements in the renovation, such as a garden, or to renovate parks and instal benches to benefit the entire district. Other topics, such as the use of materials, have become more important.

Energiesprong is in continuous contact with manufacturers and housing organisations in the different countries in which it operates. Countries share learning with each other, and market players are expanding their activities over their own borders. It is hoped this cooperation will create the snowball effect needed for a big scale-up of net zero retrofits.

One major challenge is the initial high cost of the retrofit solution compared to traditional retrofit methods, as well as overcoming regulatory hurdles and ensuring alignment with building codes and standards. To overcome these challenges, GEA is working closely with all stakeholders, helping them to implement the new approach in their companies and aggregating an initial volume of demand to attract the supply side. GEA has also aggregated gap funding through European funding schemes to help first movers carry out their pilots and to create an incentive for frontrunner housing organisations.



In some cases (such as in the UK), mixed-tenure schemes have posed a challenge for the project (i.e., social housing where a small part of the stock has been sold). This proved to be a barrier for opting into the scheme, as the financial possibilities and motivation of private owners are different to housing associations.

Evaluation

If the pilots or projects rely on Energiesprong-related funding, a monitoring and evaluation process is mandatory. The provider must show that the proposed performance specifications are reached. Therefore, the construction company follows a national evaluation process.

An integrated monitoring system allows Energiesprong to compare the energy performance of retrofitted buildings with that of similar, non-retrofitted buildings. It also displays the total energy consumption and photovoltaic energy production to tenants and helps them balance the two. Impact is also measured by assessing the energy performance and carbon emissions of buildings before and after retrofit. This involves monitoring energy consumption, indoor comfort, and carbon emissions. Results show an average reduction in energy consumption of 70-80%.

Recognition

Many site visits have been organised over the years with thousands of people seeing first-hand the rapid process. Visitors come from many different European countries and also from the USA and Canada. The factories are also popular to visit.

The approach has won the following recognition.

- World Green Building Council Award (2018)
- European Commission's award for most innovative project (2019)
- Ashden Award (2019)
- At EU level, Energiesprong has been recognised as a best practice example of energy-efficient building retrofit and has influenced the development of the EU's Renovation Wave.
- At international level, it has been described as promising good-practice by climate scientists of IPCC in their 2022 report-III on solutions to mitigate climate-change (page 1565).

Transfer and future plans

Originally created in The Netherlands, the Energiesprong approach has been adapted and implemented in six other countries where there is also a need for large-scale building retrofits. The way it is implemented – its theory of change – is applicable to a wide range of countries and also to companies. Adapting Energiesprong's approach to new countries, starting with Eastern Europe and the rebuilding of Ukraine is a priority for the GEA.



The scale of Energiesprong projects is increasing: *GeWobau Erlangen* in Germany has committed to retrofit 6,000 homes with this approach by 2025. About 25,000 homes are planned (EU and USA) and over 30,000 in the EU are bundled for the approach through several volume deals. The organisation aims to jump from the current scale of 10,000s to millions of retrofitted homes to meet the climate challenge and believes a World Habitat Award would be instrumental in achieving this goal, as it would increase impact through more global awareness and collaboration, for instance in Eastern Europe or Asia.

A main barrier for replication in other countries is the initial cost of a prefabricated, deep level retrofit solution. If energy prices are low, as in Eastern Europe, but the cost of materials is high, the refinance mechanism is tight. Another challenge is that the construction sector needs to understand that it is necessary to develop a product to help achieve scale and innovation rather than developing new projects.

Regardless of the market, Energiesprong seeks a cost-neutral retrofit solution, but with a business case for the owner of the building. Social housing organisations do not need to make large profits unlike stock-market-driven companies do with their building stock, but social housing tenants should also be able to live in comfortable and carbon neutral homes. This is usually the point from which the movement has started in the different countries.

In a context with little or no social housing, there will be other housing categories which need special attention. In these cases, the business case might be more dependent on issues other than the energy costs, for example, energy usage from solar. It might also be that the retrofit solution differs from projects in central Europe, however the core elements to implement the project remain the same: involve all stakeholders; take into account the needs of people who live in or use the building; and develop something which is scalable, with high-quality and a high likeability. The success of Energiesprong lies in the replicability of this approach: core principles that are relevant everywhere and coherent local adaptation taking into account architecture, organisation of value chain, existing regulation, and climate characteristics.

World Habitat Reflections

Energiesprong is a comprehensive and systematic approach to retrofit that aims to achieve significant energy savings, carbon reductions (both in energy usage and embodied carbon), social benefits, and improvements in building performance. This project shows a clear and efficient response to the energy crisis in Europe, and the challenges of existing housing stock, giving existing buildings a longer life. This best practice reaps the benefits of standardisation but is also flexible in product delivery. Costs have come down significantly in The Netherlands as the market has grown, and there are echoes of replication in the UK, Germany, France, Canada and the USA.