



## ENERGY EFFICIENCY IN BUILDINGS INNOVATION LAB

ENERGY TRANSITION PLATFORM POLICY BRIEFING | NOVEMBER 2017

Innovation Labs are the second phase of The Climate Group's **Energy Transition Platform**, a project which connects 11 highly industrialized, carbon-intensive states and regions seeking to transition to a clean energy future. The Energy Transition Platform enables these governments to share experiences and successful initiatives, and helps them overcome barriers and adopt innovative clean energy policies.

Innovation Labs accelerate this work by facilitating workshops, group calls and best practice case studies. The Grantham Institute – Climate Change and the Environment is the knowledge partner for the Innovation Labs, providing research tailored to each government. This policy briefing outlines some of the key learnings from the Energy Efficiency Innovation Lab, as well as recommendations for state and regional governments seeking to enhance energy efficiency in the built environment as part of their clean energy transitions.

Government partners of the Energy Efficiency Innovation Lab are **Alberta** (Canada), the **Basque Country** (Spain), **California** (US), **Lombardy** (Italy), **North Rhine-Westphalia** (Germany), **Silesia** (Poland) and **Wales** (UK).

### EXECUTIVE SUMMARY

Residential, commercial and industrial buildings account for 30-40% of global energy consumption and 25-35% of total CO<sub>2</sub> emissions<sup>1</sup>. Despite evidence that saving a unit of energy is on average five times cheaper than buying it, investment in energy efficiency improvements in buildings remains low<sup>2</sup>. Building stock remains largely inefficient, while 75-85% of existing buildings are expected to be still in use in 2050<sup>3</sup>. In order to achieve the targets of the Paris

1 United Nations Development Programme. Promoting Energy Efficiency in buildings: Lessons Learned from International experience. 2010 [https://www.thegef.org/sites/default/files/publications/EEBuilding\\_WEB\\_2.pdf](https://www.thegef.org/sites/default/files/publications/EEBuilding_WEB_2.pdf)

2 Rosenow, J. and Cowart, R. Benefits to Consumers and Climate of Article 7 of the Energy Efficiency Directive. 2017 <http://www.raponline.org/wp-content/uploads/2017/03/rap-rosenow-cowart-article7-benefits-2017-march.pdf>

3 Buildings Performance Institute Europe. Attracting Investment In Building Renovation. 2017 <http://bpie.eu/publication/attracting-investment-in-building-renovation/>

Agreement, effective policy interventions will need to ensure not only that all new buildings are energy efficient, but also that the rate of renovations increases considerably.

Most governments in the ETP Innovation Lab on Energy Efficiency in Buildings face similar challenges relating to the slow uptake of existing policies, limited financial resources and the restricted capabilities within municipalities. Despite offering the highest energy-saving potential, retrofitting the existing building stock remains a challenging and costly task. Successful policy interventions tend to combine high-level mandates with targeted financial incentives and wide educational and training initiatives. Other crucial measures include the development of standardized benchmarking and assessment methods, the use of subsidized low-interest loans to leverage private capital and the elimination of bureaucratic processes in order to reduce the cost of participation in the initiatives.

The overall aims and key questions of the Innovation Lab are summarized in Figure 1.

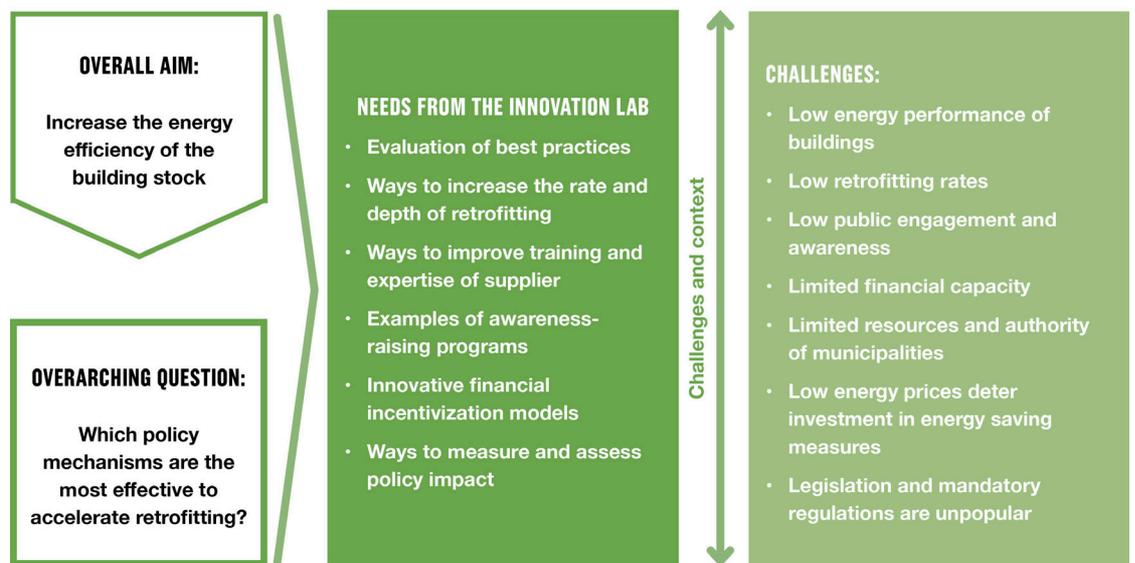


Figure 1 - Overall aim and research questions arising from the Energy Efficiency Innovation Lab

## EVIDENCE FROM THE LITERATURE

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We consulted existing literature to explore the main types of policies that aim to stimulate energy efficiency initiatives in buildings, evaluate methods to assess their effectiveness and identify region-specific policy interventions, respective priorities and barriers to their adoption.

The United Nations Development Programme analyzed evidence from a sample of energy efficiency measures internationally and found that best results are achieved when mandatory prescriptions are implemented alongside information and education activities and financial incentives. The research highlights the importance of contextual factors, and outlines a three-step process of identifying priority targets, choosing policy types and designing policy instruments<sup>4</sup>. After investigating similar empirical evidence, the Wuppertal Institute also found that the impact of well-combined policies is often larger than the sum of the expected impact of the individual instruments<sup>5</sup>, and recommended an evolutionary cycle approach to plan, design, implement and evaluate policies<sup>6</sup>. Overall, international experience shows that successful policy packages combine a range of different ‘carrot and stick’ instruments that complement each other, have long-term targets, involve multiple stakeholders and are continuously monitored and revised based on available evidence.

### Assessing the effectiveness of policy packages

The literature regarding the effectiveness of energy efficiency policies varies in quality, and does not conclusively value the energy savings delivered.

One way to assess the success of an energy efficiency policy is to measure the scale of its energy savings. This can be calculated by comparing the eventual energy use of users to either that of a control group, or an estimate based on historical data. Such calculations are not always straightforward, however, and a direct comparison of different studies can be misleading, since there are inconsistencies in the methods followed and the assumptions being made. For example, there is a range of factors that may affect energy use, including external influences (e.g. fuel costs), spill overs (participants taking up further energy efficiency initiatives which are not directly driven by the policy), rebound (behavior change by participants that adversely affects energy savings) and free-riding (energy users that would have taken these initiatives anyway participate in the programs to gain from the financial support)<sup>7</sup>. Excluding these effects from calculations may lead to significant under- or overestimation of the policy’s outcomes.

An alternative indicator of policy success is cost effectiveness, in terms of cost per unit of energy saving or carbon emissions reduction (\$/tCO<sub>2</sub> or \$/kWh). Again, it is important to note that these calculations should be used with caution due to inconsistent assumptions, especially regarding the time-span of policy impacts.

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<sup>4</sup> United Nations Development Programme. Promoting Energy Efficiency in buildings: Lessons Learned from International experience. 2010. [https://www.thegef.org/sites/default/files/publications/EEBuilding\\_WEB\\_2.pdf](https://www.thegef.org/sites/default/files/publications/EEBuilding_WEB_2.pdf)

<sup>5</sup> Wuppertal Institute. How policies need to interact in packages. 2012 [http://www.bigee.net/media/filer\\_public/2013/11/28/bigee\\_txt\\_0006\\_pg\\_how\\_policies\\_need\\_to\\_interact\\_2.pdf](http://www.bigee.net/media/filer_public/2013/11/28/bigee_txt_0006_pg_how_policies_need_to_interact_2.pdf)

<sup>6</sup> Wuppertal Institute. How to design and implement energy efficiency policies. 2012 [http://www.bigee.net/media/filer\\_public/2013/11/28/bigee\\_txt\\_0007\\_pg\\_how\\_to\\_design\\_and\\_implement\\_policies.pdf](http://www.bigee.net/media/filer_public/2013/11/28/bigee_txt_0007_pg_how_to_design_and_implement_policies.pdf)

<sup>7</sup> Wade, J & Eyre, N. Energy Efficiency Evaluation: The evidence for real energy savings from energy efficiency programmes in the household sector. 2015 <http://www.ukerc.ac.uk/programmes/technology-and-policy-assessment/energy-efficiency-evaluation.html>

In addition to economic and environmental benefits, energy efficiency measures may have a positive social impact by reducing fuel poverty, improving living conditions of vulnerable citizens and stimulating job creation. An indicative example is the Irish Better Energy Warmer Homes Scheme<sup>8</sup>, which provided advice and grants to over 95,000 homes from 2000 to 2013. Due to the scheme, the number of beneficiaries unable to pay their utility bills on time decreased from 48% to 28%, the number of families with children that could keep a comfortable temperature at home increased from 27% to 71%, and the number of beneficiaries who suffered from long-term illness or disorders decreased by 88%<sup>9</sup>.

### Energy efficiency policy instruments

Policy interventions that aim to improve the energy performance of existing and new buildings fall into six broad categories:

1. Energy labelling refers to the evaluation of the energy performance of a building. Although in isolation it has not demonstrated any significant effect on energy saving<sup>10</sup>, it can be a very cost-effective measure when combined with building codes, which are mandatory regulations regarding both new and existing buildings<sup>11</sup>.
2. Information and advice campaigns aim to raise awareness and stimulate the voluntary engagement of building owners and users. They are very low-cost and generally more popular than mandates, but tend to have a short-term impact on user behaviors<sup>12</sup>.
3. Smart metering and billing feedback are utility-led initiatives that also aim to educate energy users. They may only offer small-scale energy savings, but in a very cost-effective way. A well-documented example is the energy feedback letters by OPOWER in the USA, which resulted in an average electricity use reduction of 2%, at a cost of \$0.03/kWh<sup>13</sup>.
4. Investment and refurbishment programs are financial subsidies on energy efficiency measures. One example is the Energy Efficiency Commitment in the UK, which is an obligation on energy suppliers to offer energy-saving improvements<sup>14</sup>. During the last 5-year period the scheme has offered 235TWh of energy savings at a cost of £0.007/kWh. The CO<sub>2</sub> Building Rehabilitation Program in Germany is a low-interest loan scheme, which in the same time-frame delivered savings of 173TWh at a cost of €0.02/kWh<sup>15</sup>.

8 <https://www.seai.ie/grants/home-grants/warmer-homes-scheme/>

9 Buildings Performance Institute Europe. Reducing Energy Poverty With National Renovation Strategies: A Unique Opportunity

<http://bpie.eu/publication/reducing-energy-poverty-with-national-renovation-strategies-a-unique-opportunity/>

10 Kjaerbye, V. H. Does energy labelling on residential housing cause energy savings? European Council for an Energy Efficient Economy Summer Study. 2009

11 Rogan, F. and O Gallachoir, B. Ex-post evaluation of a residential energy efficiency policy measure using empirical data. European Council for an Energy Efficient Economy Summer Study. 2011

12 Diffney, S., Lyons, S. & Malaguzzi Valeri, L. Evaluation of the effect of the Power of One campaign on natural gas consumption. Energy Policy, 62, 978-988. 2013

13 Allcott, H. Social norms and energy conservation. Journal of Public Economics, 95, 1082-1095. 2011

14 Hough, D. ECO, the Energy Company Obligation. Briefing paper for the House Of Commons library. 2017

15 Rosenow, J. and Galvin, R. Evaluating the evaluations: Evidence from energy efficiency programmes in Germany and the UK. Energy and Buildings, 62, 450-458. 2013

5. Market transformation activities are mandates or financial incentives that target particular segments of the energy market, for example promotion and subsidization of LEDs or energy rating of electrical appliances. They may have a significant impact on respective market segments, while also triggering wider spill-over effects<sup>16</sup>.
6. Community-led initiatives are small-scale interventions, which are implemented by local authorities and usually focus on improving the uptake of centrally designed policies. The scope of such initiatives is often restricted by bureaucratic challenges, including the limited capabilities and resources of municipalities.<sup>17</sup>

A useful resource for energy efficiency policies in the European Union is the MURE database, which is available at <http://www.measures-odyssee-mure.eu/>

### Additional initiatives that focus on stimulating renovation

Although mandating energy performance standards for new buildings has been widely implemented, it is much more challenging to develop policies that increase both the breadth (number of buildings being affected) and depth (extent of energy-saving measures) of renovation in existing buildings.

A method that has proven to be effective in several national renovation strategies is the requirement for energy improvements at certain trigger points. These are key moments in the life of a building (e.g. rental, sale, change of use, extension, maintenance or reaching a certain age) when carrying out energy efficiency works is less disruptive and more economically advantageous<sup>18</sup>. One other way to encourage renovation activities is to subsidize loans for bundles of energy and non-energy improvements that are known to increase the value of the building (e.g. garden landscaping, kitchen upgrades or solar panels)<sup>19</sup>. These bundles provide a more immediate and secure investment proposition for building owners.

### Innovative financing

Public funding alone is not able to meet the required rate of retrofitting, and therefore it needs to be used in a way that maximizes private investment. Governments are able to leverage private finance by offering advantageous loans and partial subsidies for energy efficiency works<sup>20</sup>. Some successful examples of financial leveraging initiatives include:

- The zero-interest eco-loans in France (Éco-prêt à taux zéro<sup>21</sup>), offered to building owners and landlords from 2009 to 2015, resulted in nearly 25,000 energy renovations each year and stimulated €12 of private investment for every €1 of public expenditure.

<sup>16</sup> Baillargeon, P., Schmitt, B., Michaud, N. & Megdal, L. Evaluating the market transformation impacts of a DSM program in the Province of Quebec. Energy Efficiency. 2012

<sup>17</sup> Ferreira, F., Antunes, A. R., Alves, F. and Ramos, S. EcoFamilies: evaluating and promoting energy savings. European Council for an Energy Efficient Economy Summer Study. 2009

<sup>18</sup> Buildings Performance Institute Europe. Trigger Points As A “Must” In National Renovation Strategies. 2017. <http://bpie.eu/publication/trigger-points-as-a-must-in-national-renovation-strategies/>

<sup>19</sup> Arup. Incentivising Home Retrofits. <http://thoughts.arup.com/post/details/300/incentivising-home-retrofits>

<sup>20</sup> Buildings Performance Institute Europe. Attracting Investment In Building Renovation. 2017. <http://bpie.eu/publication/attracting-investment-in-building-renovation/>

<sup>21</sup> <https://www.service-public.fr/particuliers/vosdroits/F19905>

- The Green Funding Scheme in the Netherlands<sup>22</sup> enables green investors to borrow at a preferential interest rate, leveraging 83 times the amount of public support.
- The incentive scheme for building envelope improvement in Malta (part of Malta's National Energy Efficiency Action Plan<sup>23</sup>), offers grants towards the cost of double glazing windows and insulating roofs, with a leveraging ratio of 10 to 1.
- The reconstruction of apartment blocks in Estonia (Korterelamulaenu Käendus<sup>24</sup>), where public funding (including national and EU funds) is used to provide grants and subsidies for renovation works and supporting activities (design and planning), has leveraged an average of €2.33 of private finance for every €1 of public money

## GOVERNMENT PROFILES

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### Alberta, Canada

With a population of 4 million, Alberta has one of the highest per capita gross domestic products in the world, mainly due to a prosperous fossil-fuel industry. Although policy initiatives that support energy efficiency improvements are relatively new, there is currently a strong interest in expanding their scope and reach.

#### Case study - Energy Efficiency Alberta<sup>25</sup>

Energy Efficiency Alberta was created in November 2016 to promote energy efficiency throughout the province using education, outreach and specific programs for commercial buildings and homeowners:

- The Residential retail products program<sup>26</sup> is a \$24 million program providing opportunities to purchase energy efficient appliances and products. It includes instant rebates on energy efficient products, several informational campaigns, online rebates on more expensive equipment and home improvement rebates for windows, insulation, water heaters etc. with participating contractors.
- The Residential no charge energy savings program<sup>27</sup> offers direct, no-charge installation of energy efficient products across the province.
- Energy Efficiency Alberta installers conduct walkthroughs to identify potential opportunities for energy-efficient upgrades, inform people about how they can be more energy efficient

<sup>22</sup> <https://www.rvo.nl/subsidies-regelingen/regeling-groenprojecten>

<sup>23</sup> <https://www.rews.org.mt/#/en/a/28-roof-thermal-insulation-and-double-glazing-2012-2016>

<sup>24</sup> <http://kredex.ee/energy-efficiency/energiatohusus-korterelamus/>

<sup>25</sup> <https://www.encyalberta.ca/>

<sup>26</sup> <https://www.encyalberta.ca/residential-retail/>

<sup>27</sup> <https://www.encyalberta.ca/residential-no-charge/>

and present other existing programs. Although the initial goal was to reach 70,000 homes, already double that number of households have expressed interest in a two-month period.

- The Business, non-profit and institutional energy savings program<sup>28</sup> encourages organizations to choose high-efficiency products (efficient lighting, heating, ventilation and air conditioning or water heating equipment) via rebates.

### Enabling conditions

- The Climate Leadership Act 2016 imposes a carbon levy on all natural gas and liquid fuel (propane) used in buildings. This levy is reinvested into green initiatives and initiatives to help lower income people and smaller businesses, and funds Energy Efficiency Alberta.
- Code. It contains requirements for energy efficiency as part of the minimum standard for new builds and major retrofits.
- Energy audits will help determine a baseline and calculate how much energy will be saved when implementing different energy efficiency technologies.

### Challenges and barriers

- The contractors involved in the home improvement rebates program are not endorsed by the government, only minimum governance/regulatory requirements were checked.
- Energy prices are very low requiring a carbon levy (currently at 20 dollars/ton) to incentivize energy efficiency.

Energy efficiency policies in Alberta are still at the explorative phase, as the province is trying to identify the most effective mechanisms to achieve its carbon reduction goals. The main priority of the provincial administration is to focus on low income households and indigenous communities. The government is also in the process of developing a program to stimulate capacity-building within local authorities, and a grant program to subsidize retrofitting for homeowners and municipalities.



<sup>28</sup> <https://www.encyalberta.ca/business-non-profit-and-institutional/>

### Basque Country, Spain

The Basque Country is an autonomous community of over 2 million citizens located in northern Spain. It has a strong industrial economy and the highest income per capita among the regions of Spain. The region depends heavily on imported energy resources and is therefore eager to develop a strategy around the reduction of energy consumption<sup>29</sup>. In recent years, the government has implemented a range of energy-efficiency policies targeting new and public buildings and has set energy reduction and fossil-fuel eradication targets. However, the existing stock of residential buildings remains poor in terms of both structural quality and energy performance.

The regional government aims to improve energy efficiency, increase the use of renewables in buildings and reach zero oil consumption by 2050. Having identified the lack of financial resources and public awareness as the main challenges, the administration is considering creating a dedicated public fund for consumers and design an intensive advice campaign to reach out to more home-owners. Additionally, the government is exploring new ways to i) support municipalities to comply with existing energy-related legislation and ii) develop industrial interventions that will reduce the inertia within the boiler manufacturing industry, which is slowing down the progress of renovation activities.

### California, US

With almost 50 million inhabitants, California is the most populous and prosperous state of the United States. The state offers several incentives for energy efficiency investments in private and public buildings, and has set the target to double energy efficiency savings in electricity and gas final end-use by 2030, compared to a 2015 baseline<sup>30</sup>. Most of the policies implemented so far have focused on new buildings, and an ambitious mandate for all new residential and non-residential buildings to be Zero Net Energy by 2020 and 2030 respectively is already in place<sup>31</sup>. The state government is now shifting its focus to the existing building stock, as well as the low-income sector.

#### Case study: Existing Building Energy Efficiency Action Plan

The Existing Building Energy Efficiency Action Plan is a 10-year roadmap to activate market forces and transform California's existing residential, commercial, and public building stock into high-performing and energy-efficient buildings. Adopted in September 2015<sup>32</sup> and updated in December 2016<sup>33</sup> it focuses on five goals:

1. Government leadership: setting energy savings targets, energy requirements and benchmarking energy usage for state buildings;

29 [http://www.ingurumena.ejgv.euskadi.eus/contenidos/informacion/klima\\_2050/en\\_def/adjuntos/KLIMA2050\\_en.pdf](http://www.ingurumena.ejgv.euskadi.eus/contenidos/informacion/klima_2050/en_def/adjuntos/KLIMA2050_en.pdf)

30 [http://docketpublic.energy.ca.gov/PublicDocuments/17-IEPR-06/TN220927\\_20170828T144323\\_Senate\\_Bill\\_350\\_Doubling\\_Energy\\_Efficiency\\_Savings\\_by\\_2030.pdf](http://docketpublic.energy.ca.gov/PublicDocuments/17-IEPR-06/TN220927_20170828T144323_Senate_Bill_350_Doubling_Energy_Efficiency_Savings_by_2030.pdf)

31 <http://database.aceee.org/state/california>

32 [http://docketpublic.energy.ca.gov/PublicDocuments/15-IEPR-05/TN205919\\_20150828T153953\\_Existing\\_Buildings\\_Energy\\_Efficiency\\_Action\\_Plan.pdf](http://docketpublic.energy.ca.gov/PublicDocuments/15-IEPR-05/TN205919_20150828T153953_Existing_Buildings_Energy_Efficiency_Action_Plan.pdf)

33 [http://docketpublic.energy.ca.gov/PublicDocuments/16-EBP-01/TN214801\\_20161214T155117\\_Existing\\_Building\\_Energy\\_Efficiency\\_Plan\\_Update\\_Deceber\\_2016\\_Thi.pdf](http://docketpublic.energy.ca.gov/PublicDocuments/16-EBP-01/TN214801_20161214T155117_Existing_Building_Energy_Efficiency_Plan_Update_Deceber_2016_Thi.pdf)

3. Efficient industry: expanding reach of efficiency programs, aligning workforce, etc.;
4. Improved consumer value: including clean-energy related data in real estate property listings and developing educational and awareness campaigns;
5. Increased efficiency financing: setting priorities and developing alternative financing models.

#### **Enabling conditions**

- Strong political will and ambitious targets in place
- Extensive research and development on energy efficiency technologies
- Current electricity rates in California are relatively high, making energy efficiency a compelling investment proposition

#### **Complementary policies**

- New state-wide Building Energy Use Benchmarking and Public Disclosure Program to offer access to energy consumption data
- Utilities ratepayer incentive: voluntary mechanism with a \$2 billion annual budget
- Regulation of appliances: energy efficiency standards for appliances
- Assembly Bill 1088 to improve the accessibility of California's numerous programs for residents in rental properties.

#### **Challenges and barriers**

- Lack of sufficient finance, public awareness and data on building energy performance
- Buildings are not valued based on their energy performance (as it is more often the case in Europe). That gap is partly linked to the lack of buy in from some stakeholders
- Gap in research on the social, market and behavioral side
- Bureaucratic processes and long-term uncertainties tend to limit participation rate.

To reach its energy efficiency targets, the government of California seeks to develop additional energy efficiency policy packages, improve the quality of installations by expanding workforce training, design appropriate fuel-substitution initiatives and build partnerships among local and regional administrations. The state administration is also actively seeking ways to develop mandates for renovation, increase funding for the programs by attracting and leveraging private capital, simplify and reduce the cost of program participation, and improve the assessment and reporting of savings from energy-efficiency measures.

## Lombardy, Italy

Lombardy is the wealthiest and most populous of the 20 administrative regions in Italy. It consists of about 1,400 municipalities, which have relatively limited authority to develop low-carbon policies and mandates. The main aim of the energy efficiency strategy in the region is to renovate the existing building stock, focusing primarily on public buildings.

### Case study: Public retrofitting programs in Lombardy

Two schemes were launched in March 2016 to support renovation efforts:

- The first targets small municipalities and provides 90% free grants. Until May 2017, the scheme enabled energy saving works in 102 public buildings (mainly offices) for a total budget of €21 million.
- The Nearly Zero Energy Building Compliance<sup>34</sup> targets larger municipalities and has fostered renovation in 32 buildings (mainly schools and sporting centers) at a budget of €43 million. Part of this budget has been used to promote sustainable architecture in the region.
- The tendering process for both schemes has improved the government's understanding of the challenges of such initiatives, and the need for more structured informational documents, communication platforms and further engagement with energy professionals and stakeholders.

#### Enabling conditions

- Availability of EU funds that can be directed to the region

#### Challenges and barriers

- Most of the buildings are owned by municipalities which lack the financial and technical capabilities to renovate.
- Municipalities need to overcome complex bureaucratic processes.

The main priorities of the Lombardy administration are to improve the roll-out of existing schemes, and to develop more standardized guidelines for municipalities on accessing different European and national funding streams in a more integrated way. The government considers the incentivization of public building retrofits as a chance to improve the organizational and technical capacity in municipalities, stimulate the diffusion of enhanced design skills, and promote similar retrofits in the private sector.

<sup>34</sup> <http://climatescorecard.org/2017/02/11/italy-subnational-best-practices/>

## North Rhine-Westphalia (NRW), Germany

NRW is the most populous region of Germany, making up a quarter of the country's population and economy. The region has set ambitious energy reduction and decarbonization targets and has been implementing policies that facilitate a low-carbon transition for decades. However, there is still limited progress with regards to energy efficiency in buildings, with the renovation rate at below 1% per year.

### Case study: Retrofit programs in NRW<sup>35</sup>

NRW's building retrofit programs aim at increasing the motivation for building refurbishment and engaging a wider range of stakeholders.

- The ALTBAUNEU<sup>36</sup> program, developed in 2008, created a network of energy professionals, municipalities and counties to facilitate the exchange of information and the collaborative development of measures to realize energy improvement actions.
- Focusing on house owners, the project ENerWin<sup>37</sup> provides information and guidance on energy-saving measures to motivate people and encourage them to invest in energy-related refurbishment of their houses.
- Progress.nrw<sup>38</sup> is a subsidy scheme to support the uptake of emerging energy-saving technologies, including solar thermal, biomass heating systems, batteries in combination with PV and other technologies. The scheme also supports the development of climate-friendly buildings and urban districts.

#### Enabling conditions

- Availability of federal public funding and multiple enabling subsidy schemes
- Long-term expertise in awareness raising and information campaigns

#### Challenges and barriers

- Low energy prices render energy-saving interventions less attractive
- The large share of rented accommodation creates issues regarding the responsibility of the costs and benefits of renovation works.

The main priority of the NRW administration is to engage enough stakeholders to realize its ambitious environmental targets. The state is currently trying to simplify the complex regional and federal financing systems and ensure the appropriate training of suppliers. The NRW government

<sup>35</sup> <http://www.energieagentur.nrw/gebaeude>

<sup>36</sup> [www.alt-bau-neu.de](http://www.alt-bau-neu.de)

<sup>37</sup> [www.verbraucherzentrale.nrw.de](http://www.verbraucherzentrale.nrw.de)

<sup>38</sup> [www.progres.nrw.de](http://www.progres.nrw.de)

also aims to improve existing advice services for tenants, owners and energy providers, and identify modern ways to reach a wider audience and communicate the social, environmental and financial benefits of energy efficiency in a more customized way.

### Silesia, Poland

With 8 million inhabitants, Silesia is Poland's most industrialized and urbanized region. The main energy efficiency objectives of Silesia's administration are to raise awareness among residents and businesses, as well as to improve the vertical integration of energy efficiency policies by coordinating actions among the city, regional and national levels.

#### Case study: Fund for Environmental Protection

##### The Fund supports Silesia's environmental policy in three ways:

- Eco-education to increase awareness and promote the principle of sustainable development through workshops, seminars and other educational activities.
- Financial support for the construction of near-zero carbon public buildings and buildings retrofitting.
- A team of certified energy advisors supports the planning and implementation of environmentally friendly investments in the region, indicate available sources of financing and facilitate educational activities.

##### Challenges and barriers

- Individuals' and local authorities' reluctance to change their behaviors
- Prohibitive cost of buildings retrofitting
- Lack of capabilities within municipalities

Silesia's main priorities are to implement the European Union's energy efficiency directives, as well as to develop more creative initiatives to empower the collaboration between the different administrative levels and increase awareness on the benefits of a transition to a low-carbon economy

### Wales, UK

Although energy efficiency policy remains the prerogative of the UK government, the Welsh administration maintains significant powers over housing regulations. The Welsh Climate Change Strategy<sup>39</sup> aims at a 3% reduction in GHG emissions per annum, leading to a total GHG emissions reduction of 40% by 2020 against a 1990 baseline, as well as the eradication of fuel poverty by 2018. The main concern for the regional government is the low rate of energy efficiency measures in existing public buildings and the social-housing sector. Additional challenges include the rising energy prices due to the devaluation of the pound after the vote to leave the EU and the capacity lost within the Welsh public sector as the consequence of the UK government's austerity policy.

<sup>39</sup> <http://gov.wales/topics/environmentcountryside/climatechange/emissions/climate-change-strategy-for-wales/?lang=en>

### Case study: Warm Homes<sup>40</sup>

The main goal of the program is to improve energy efficiency in low-income households in the most deprived areas of Wales. Since 2011, a total of £217 million were dedicated to providing advice and support to 85,000 homes, and another £104 million will be spent over the next four years for building improvements. The Warm Homes program includes the Nest<sup>41</sup> and Arbed<sup>42</sup> investment schemes, which help provide insulation, efficient heating and renewable energy technologies for vulnerable households

#### Enabling conditions

- Energy Performance Certificates identify vulnerable buildings
- Ability to leverage finances from multiple sources, including EU funding, national energy supplier obligations, and other funds from local authorities and social housing providers

#### Challenges and barriers

- Limited powers of the Welsh government to tackle energy prices and the low-income sector



<sup>40</sup> <http://gov.wales/topics/environmentcountryside/energy/efficiency/warm-homes/?lang=en>

<sup>41</sup> <https://www.nestwales.org.uk/>

<sup>42</sup> <http://gov.wales/topics/environmentcountryside/energy/efficiency/arbed/?lang=en>

### Case study: Re:Fit

Re:Fit is a procurement initiative to improve the energy performance of public buildings. It enables public organizations to partner with energy contractors, which are contractually obligated to provide energy savings for a period of time after the implementation of renovation works. It covers administrative operations and access to low-interest loans. During its first 15 months, the scheme has delivered interventions that will provide 25-30% energy savings in affected buildings, with an average payback period of 7-8 years.

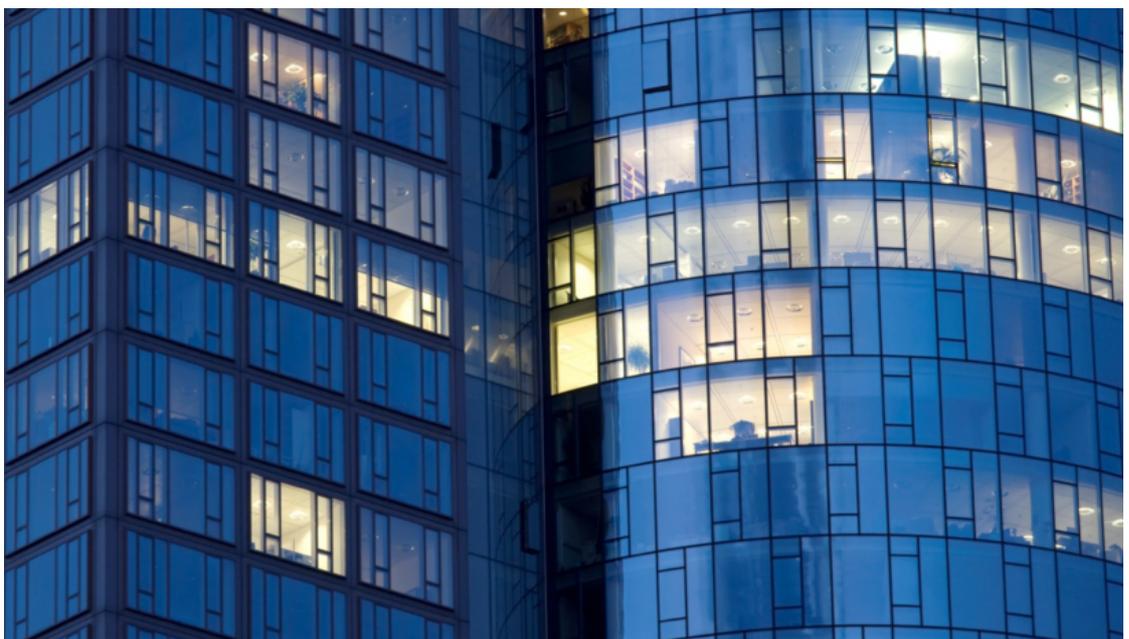
#### Enabling conditions

- Program funded by the European Investment Bank initiative ELENA
- Building owners are offered long term security by the energy suppliers

#### Challenges and barriers

- Poor public image of retrofitting after a series of low-quality renovation works in the past
- Very low engagement of building owners, fear of bureaucratic procedures

The main priority for the Welsh government is to increase the adoption of existing schemes by combining the stimulation of bottom-up voluntary action with the development of further top-down regulations. To do so, the administration will need to integrate the various initiatives into a structured system and remove the significant bureaucratic barriers. The Government also aims to adapt its energy performance contracts scheme to the private sector and maintain a set of indicators that monitor the efficacy of its policies and their wider impacts on the environment and the public health.



## LESSONS LEARNT AND RECOMMENDATIONS

The Energy Transition Platform Innovation Lab on Energy Efficiency in Buildings has supported government partners to explore region-specific policy priorities and challenges, and further to identify common issues and learn from the collective experience. This section summarizes some of the overarching findings.

- **Policy Mix:** Successful policy packages include a range of mandates and incentives, which respectively force growth in the energy efficiency sector and stimulate voluntary engagement of stakeholders. Retrofitting the existing building stock is the hardest policy challenge, but offers the highest energy efficiency improvement potential. Educational activities and awareness-raising campaigns are cost-effective ways to improve the quality and voluntary involvement to energy-efficiency initiatives;
- **Impact Assessment:** Continuous monitoring and revisions of the policy mechanisms using feedback loops and evidence-based assessment is crucial for long-term success. To be able to compare the effectiveness of policy interventions, standardized benchmarking and assessment methods that take into consideration all relevant factors need to be developed. When assessing the impact of policies, a whole-system approach that includes all environmental, economic and social benefits is required;
- **Financing:** Regional administrations need to identify all potential streams of financing at the municipal, regional, national and international levels, and develop frameworks that integrate them. Public funding alone is not able to meet the required rate of investment, and therefore should be used to leverage private financing in the most cost-effective way;
- **Procedural barriers:** Overcoming bureaucratic procedures and complex funding systems seems to be a common issue among the partners. A way to overcome this barrier is to develop comprehensive and structured guidelines, and make energy efficiency improvements more attractive;
- **Capacity building:** The development of all required technical, commercial, administrative and financial capabilities at the municipal and regional levels is not always a realistic goal, so coordinated collaborative networks across public and private bodies are key to realizing energy efficiency targets.

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