
Annex 3 - Best practice in residential energy efficiency policy: A review of international experience

This Annex supports the main report by providing a summary of the evidence on the effectiveness of different types of policy aimed at improving residential energy efficiency and the factors that are associated with successful policy design and implementation. It uses examples from the UK and international experience and is structured in four sections:

1. Overview
2. Policy instruments
3. Success factors for policy design and implementation
4. Case studies

1. Overview

There is a sizable gap between optimal and actual implementation of energy efficient technologies, due to a range of barriers to uptake and market failures. These include energy prices that do not reflect the full cost of energy use to society, information failures and a lack of access to capital. There is a role for governments to address these barriers and to improve the energy efficiency of fuel-poor households for equity reasons. A range of policies are used internationally to these ends.

No single policy is superior and typically a holistic package of measures is needed to tackle different barriers to the uptake of energy efficiency investment. Providing information to consumers and aligning energy prices to their cost to society through taxation can make the market for energy efficiency measures more efficient. Providing access to low-cost finance facilitates households to take action where there are high upfront costs. Standards can remove the least-efficient products from the market and shift social norms. Often further motivation is needed through incentives, such as subsidies, for some measures or types of household. Subsidies can make a large impact and can be cost-effective, generating social benefits beyond energy savings, but are costly and often need targeting.

A sustained government commitment is needed and a stable policy framework is important to give confidence to consumers and suppliers. Successful policies tend to have a strong consumer focus in their design and implementation. Common success factors include being able to gain consumer trust, minimising the hassle and complexity for consumers, and targeting policies at times when consumers are considering renovation. Communication and marketing of schemes has an important role in gaining interest and is most effective when conveying a simple, targeted message in a streamlined way.

2. Policy instruments

A range of different policy instruments are necessary to tackle different barriers to uptake (e.g. information failure, high up-front costs, lack of access to capital) and to target different segments of the housing market. The Global Buildings Performance Network (GBPN) finds that the countries and states that are most successful in reducing energy consumption have holistic policy packages in place that address all aspects of the renovation process.¹ They also suggest that there is not one single overall best policy package and that measures need to be locally adapted.

In assessing evidence on the role and effectiveness of different policy instruments, we have grouped those instruments into the following broad classes: information and advice, energy and CO₂ taxes, financial incentives, access to capital and minimum standards. Within each class of policy the merits of some different approaches are discussed, although this is not intended to cover the full range of possible approaches exhaustively.

The theoretical literature offers some insights into designing a coherent policy package, taking account of synergies and trade-offs. Rosenow et al (2016) find that standards and norms for measuring energy provide a foundation for other policies, that energy and CO₂ taxes are compatible with all other instruments and that information and feedback programmes reinforce the impact of other instruments. Meanwhile, there can be some overlap between measures improving access to capital and subsidies for the same technology, and additional incentives may not increase savings where a supplier obligation is in place.²

2.1 Information and advice

Information and advice have an essential role to support consumers in the face of information failures. For example, there can be issues with incomplete or asymmetric information, uncertainty, hidden costs and high transaction costs including the search for knowledge. Programmes providing information and advice have had varying results, but are often a relatively cheap intervention and able to facilitate and reinforce other policies.

Energy certificates and labels help consumers to make efficient decisions through the provision of direct, reliable and costless information. They can be instrumental in creating transparency over the energy performance of a home and seem to be an effective signalling device that is capitalized into home prices:

- In the EU, energy performance certificates are mandatory for buildings and must be shown to prospective renters and buyers. A range of studies across Europe, including Ireland, the Netherlands, Germany and Sweden, show a premium in rents or sale value for more-efficient homes. After controlling for other factors affecting quality, Brounen and Kok (2011) find a 3.6% premium for A, B and C rated homes compared to other properties in the Netherlands.³ Hyland et al. (2013) similarly find premiums for the more efficient homes in Ireland with a premium relative to a D-rated property, other things equal, of

¹ GBPD (2014) *A Comparative Analysis of Best Practice Renovation Policies from Europe and the United States*, <http://www.gbpn.org/newsroom/report-comparative-analysis-best-practice-renovation-policies-europe-and-united-states>

² Rosenow, J. et al (2016) *Energy efficiency and the policy mix*. Building research & information, Vol. 44, Nos. 5–6, 562–574

³ Brounen, D. and Kok, N. (2011) *On the economics of energy labels in the housing market*. Journal of Environmental Economics and Management, 62 (2011) 166–179

9.3% for properties with an A rating and of 5.2% for those with a B rating; conversely, properties with F and G ratings had a discount of 10.6%.⁴

- Evidence points to some characteristics for effective design of certificates including: greater reliability that might be provided by a public scheme; mandatory systems that increase the size of the effect; and framing the information in terms of monetary costs rather than in CO₂ emissions or energy units.⁵

Feedback programmes have an important role. Since energy is intangible, consumers may struggle to see how their habits convert into energy use and cost without feedback through mediums such as metering or bills:

- As well as providing information on household energy usage, bills can be used to provide advice and comparative information. Evidence suggests that the use of social norms can generate energy savings of 5-10%.⁶ The US utility company OPower is one of the only organisations to deploy descriptive norms in this way. It ran a number of programmes with feedback via billing, providing customers with monthly or quarterly reports on electricity use including neighbour comparisons and tailored tips for saving energy. A number of experimental studies have assessed the impacts of this scheme. Allcott (2011) finds an average reduction in energy use of 2%, with the highest users decreasing consumption by 6.3%.⁷ The energy savings of feedback schemes are often persistent, but many studies find that the persistence of energy savings relies on continued feedback.⁸
- Smart meters present a good opportunity to increase feedback to consumers, since they can provide persistent and real-time information. Research suggests that immediate feedback from a meter or display monitor can lead to energy savings of 5-15%.⁹ A meta-analysis of feedback schemes by ACEEE finds that real-time feedback down to the appliance level can produce energy savings of 12%, compared with savings of 4% for billing feedback.¹⁰

Energy audits are able to provide personalised information to make consumers aware of the potential for reducing energy use in their homes. Ramos et al (2015) note that audits are often higher cost and require support from public administrations and energy companies. The empirical results of such schemes are rather mixed with some studies finding some energy savings, but others finding no impact or even an increase in energy use.¹¹ Selection bias can also affect the results where audits are voluntary, as they are most likely to be taken up by those who are willing to make changes.

⁴ Hyland, M. et al (2013) *The value of domestic building energy efficiency — evidence from Ireland*. Energy Economics, 40 (2013) 943–952

⁵ Ramos, A. et al (2015) *The role of information for energy efficiency in the residential sector*. Energy Economics, 52 (2015) S17–S29

⁶ ACEEE (2010) *Advanced metering initiatives and residential feedback programs: A meta-review for household electricity-saving opportunities*, <http://aceee.org/research-report/e105>

⁷ Allcott, H. (2011) *Social norms and energy conservation*. Journal of Public Economics, 95 (2011) 1082–1095

⁸ ACEEE (2010)

⁹ Darby (2006) *The effectiveness of feedback on energy consumption, A review for Defra of the literature on metering, billing and direct displays*, <http://www.eci.ox.ac.uk/research/energy/downloads/smart-metering-report.pdf>

¹⁰ ACEEE (2010)

¹¹ Ramos, A. et al (2015)

2.2. Energy and emission taxes

Taxes on energy or CO₂ that raise the cost of energy provide price signals to consumers to adopt more energy efficient technologies or behaviours. Well-designed taxes can incorporate the external cost of energy use (e.g. impacts on the environment), into consumers' decision making. Such market-based approaches can be amongst the most cost-effective since they allow consumers to find the cheapest way to reduce their use, they generate revenue that can be used for environmental or other social purposes, and there is evidence to suggest they can work better in practice than other instruments.¹² Taxes are complementary to other policies, reinforcing their impact.¹³

Some of the countries with the best energy efficiency performance, such as Denmark and Germany, have very high energy taxes and populations conscious of saving energy. For example, in Denmark taxation makes up 69% of the final price of electricity and 57% of the price of natural gas for residential consumers.¹⁴

2.3 Financial incentives

Incentives such as supplier obligations, grants, tax incentives and feed in tariffs encourage households to take up measures by lowering the cost faced by consumers.

Supplier obligations that put a requirement on energy suppliers to deliver energy efficiency improvements in buildings have been used widely across Europe and have, with rare exception, delivered their targets:

- Supplier obligations can deliver energy savings at low cost, because energy suppliers have competitive incentives to deliver measures as cheaply as possible. They also have the advantage of working through suppliers that have marketing skills and a wide range of established touch points with customers, enabling them to deliver improvements on a large scale and, as funding is not dependent on public expenditure, progress can be resilient to budget cuts.¹⁵
- Successful obligations in Europe have tended to start with low targets that increase over time, allowing supplier learning. ENSPOL note that the majority of savings to date have come from relatively low-cost measures, which means they have been cost-effective and spread savings across a large number of households. They note that going forward it will become more challenging for obligations to deliver savings as the potential for low-cost mass-market technologies reduces. It will be a challenge to see whether obligations can deliver deep, complex retrofits and stimulate innovation and behavioural change.¹⁶

¹² OECD (2015) *Taxing Energy Use*, http://www.oecd-ilibrary.org/taxation/taxing-energy-use-2015_9789264232334-en

¹³ Rosenow, J. et al (2016)

¹⁴ Eurostat (2016) *Energy price statistics* http://ec.europa.eu/eurostat/statistics-explained/index.php/Energy_price_statistics.

¹⁵ Rosenow, J. et al (2013) *Fuel poverty and energy efficiency obligations – A critical assessment of the supplier obligation in the UK*, *Energy Policy* 62(2013)1194–1203

¹⁶ ENSPOL (2015) *Report on existing and planned EEOs in the EU – Part I: Evaluation of existing schemes*, <http://enspol.eu/sites/default/files/results/D2.1.1%20Report%20on%20existing%20and%20planned%20EEOs%20in%20the%20EU%20-%20Part%20I%20Evaluation%20of%20existing%20schemes.pdf>

- An effective scheme needs to achieve a balance between rules and procedures that are simple enough for obliged parties to work with, while being complex enough to meet requirements for additionality, flexibility, auditability and transparency.¹⁷
- Learning from the experience of other countries is important, but schemes need to be tailored to their national context. Poland's obligation, introduced in 2012, following study of the schemes in France, Denmark and Italy, has not been well received and is already being redesigned.¹⁸
- The UK was the first European country to introduce an energy efficiency obligation, in 1994, and has had a succession of obligations since then. CERT and CESP, in place from 2008-2012, delivered annual savings of around 1.1% of final energy consumption in the household sector¹⁹ and are generally seen as a good example. CERT focused on delivering low-cost efficiency measures and used a simple scoring system which created certainty for suppliers. ECO which replaced these schemes from 2013 has been less successful. It has a reduced target; more complex scoring of measures and its focus has shifted towards more expensive measures and measures for fuel-poor households. These changes were intended to work with the Green Deal on-bill finance scheme (introduced at the same time), covering the scope that the Green Deal was unlikely to reach. Annual rates of cavity wall and loft insulation in 2013-2015 were 60% down and 90% down respectively on annual rates in 2008-2012.²⁰
- In some cases, such as the UK, supplier obligations are used to tackle fuel poverty as well as reduce energy use and emissions. Evidence suggests that supplier obligations are not the ideal tool for this purpose, as they can be regressive since the costs are recovered through energy bills (which are a greater proportion of poor households' income) and suppliers can deliver their obligation at least cost by providing measures to higher-income households that can contribute towards them.²¹

Grant schemes that provide measures at reduced or zero cost to households clearly encourage uptake, but are costly to the taxpayer. They have, therefore, tended to be targeted to particular users, e.g. towards fuel-poor households:

- Grant schemes are widely used (e.g. in Canada, Germany, Ireland, New Zealand and Sweden) and have delivered significant improvements in energy efficiency. An early evaluation of Ireland's Better Energy Homes scheme showed gas savings of 20% in treated homes and 60% of homes receiving grants achieved a C3 Building Energy Rating (200 -225 kWh/m²/year) or better, compared to 17% before the scheme (Box 1).
- In schemes that focus on delivering improvements to fuel-poor households there can be a significant rebound effect where households respond to the improved efficiency by heating their home more, which can limit the energy savings. Such schemes can still provide a good return on taxpayer money, due to the co-benefits of improving energy

¹⁷ ENSPOL (2015)

¹⁸ ENSPOL (2015)

¹⁹ Ricardo AEA for ClimateXChange (2015) *A Comparative Review of Housing Energy Efficiency Interventions*, <http://www.climateexchange.org.uk/reducing-emissions/comparative-review-housing-energy-efficiency-interventions/>

²⁰ CCC(2016) *Meeting Carbon Budgets – 2016 Progress Report to Parliament*,

<https://www.theccc.org.uk/publication/meeting-carbon-budgets-2016-progress-report-to-parliament/>

²¹ Rosenow, J. et al (2013)

efficiency such as improvements in health, as exemplified by Warm Up New Zealand (Box 2).

- Area-based schemes that roll out funded measures in particular districts, such as the Arbed scheme in Wales, can take advantage of economies of scale to lower costs and can help to regenerate an area.
- Grant schemes can be cost effective,²² though they can often suffer from free-ridership where subsidies are provided to households that would have completed the upgrade even without the subsidy. Several studies have suggested free-ridership rates of over 40%.²³ For example, Rivers and Shiell (2016) estimate that 50% of Canadian subsidy and tax-credit in place between 2007 and 2011 to drive energy efficiency and replacement of inefficient furnaces was directed to households that would have independently purchased the same product.²⁴

Tax incentives such as rebates typically compensate consumers for part of the cost of energy efficiency works. Like grants, these can be effective but are susceptible to free-riding. As rebates are usually paid back to the consumer after the work has been completed, they are often found to be taken up by higher-income households who can cover upfront costs:

- Tax credit schemes have been introduced in several countries including Belgium, France, Ireland, Italy, Sweden and some US states such as Oregon. The French tax credit scheme, *Crédit d'impôt développement durable* (CIDD) in place from 2005-12, covered 30% of refurbishment costs up to a limit dependant on household size and initially focused on low-cost measures before broadening its scope in 2012. 13% of the French housing stock benefitted from measures and the scheme generated significant energy savings.²⁵ However, the proportion of free-riders amongst CIDD beneficiaries is estimated to be over 40%, with free-riding rates higher on glazing measures than insulation of walls.²⁶
- Some countries such as the UK, Lithuania, and the Netherlands apply a lower VAT rate to energy-saving products.²⁷ This reduces the cost at the point of purchase, unlike with a rebate, but may still be more attractive to those already considering refurbishment. There is little information available to evaluate their effectiveness.

2.4 Access to capital

Measures to improve access to capital, such as low-cost loans and preferential-rate mortgages, have an important role in facilitating energy efficiency improvements that have large upfront costs and for households that have limited access to funds. However, a lack of financing is seldom the primary reason that energy efficiency projects do not go ahead. Financing is only useful once the product has been sold,²⁸ so grants covering part of the cost of works often accompany loans.

²² Ricardo AEA for ClimateXChange (2015)

²³ Rivers, N. and Shiell, S. (2016) *Free Riding on Energy Efficiency Subsidies: The Case of Natural Gas Furnaces in Canada*. The Energy Journal, Vol. 37, No. 4

²⁴ Rivers, N. and Shiell, S. (2016)

²⁵ Ricardo AEA for ClimateXChange (2015)

²⁶ Nauleau, M. (2014) *Free-riding on tax credits for home insulation in France: An Econometric assessment using panel data*. Energy Economics, 46 (2014) 78–92

²⁷ In the UK a reduced rate of VAT of 5% applies to energy saving products and also to residential energy use.

²⁸ Borgeson, M. (2014) *The Limits of Financing for Energy Efficiency*. Lawrence Berkley National Laboratory, <http://escholarship.org/uc/item/10b8d9zs>

Loan schemes are typically 'softened' by providing zero or low interest rates. These are often delivered through public-private partnerships where the government provides financial support to the bank, which in turn offers a preferential interest rate to its customers. An alternative approach is for a government to provide a guarantee which shares the credit risk with financial institutions, acting as a catalyst to scale up private investment. Guarantees are appropriate where financial institutions have sufficient liquidity, but a low appetite for risk.²⁹

There have been a range of successful loan schemes including:

- The KfW bank in Germany is often cited as a good example of loan provision (Box 3). It has been issuing loans for energy efficiency refurbishment since 1996, provided long-term stability and developed a strong brand with visibility and transparency. The scheme has evolved over time offering low-cost, long-term loans and a range of subsidies based on the energy performance of the building to encourage deeper retrofit.
- Estonia's KredEx scheme has successfully pulled in funding from a number of sources, gained credibility with financial institutions within a short space of time and made a self-sustaining system of revolving funds. The scheme provides loans and grants mainly targeted at apartment redevelopment. With 75% of the population living in multi-apartment buildings, it has tackled barriers to redevelopment by targeting housing associations. For apartment loans, the average predicted energy saving achieved with the reconstruction work is 39%.³⁰
- Japan's Flat 35 mortgage scheme provides preferential-rate mortgages for homes meeting certain standards including on energy efficiency (Box 4). The scheme is run by the Japan Housing Finance Agency (JHF) which has a position of trust and has good links with financial intermediaries. The JHF is able to provide low interest rates through selling large volumes of mortgage backed securities and then further reduce rates for the highest levels of efficiency using government funding.

Common factors that are important in designing effective financing for energy efficiency include: making the finance long-term and low-interest; reducing lender wariness e.g. by providing a state guarantee; minimising costs – such as for administration – to keep interest rates down; and having the potential to become self-sustaining e.g. through revolving funds or diversifying into deposit taking.³¹

2.5 Minimum standards

Minimum performance standards or building codes are widely used to regulate the standards that buildings, appliances, or boilers must comply with. These take the least-efficient products off the market, reframing consumers' choices. There is strong evidence that standards deliver energy savings, although usually well below engineering estimates for buildings.³²

²⁹ Association for the Conservation of Energy (ACE) for the World Energy Council (WEC) (2013) *Financing energy efficiency in buildings: an international review of best practice and innovation*, <http://www.eceee.org/all-news/press/2013/2013-10-22/WEC-EEC-Final>

³⁰ ACE for WEC (2013)

³¹ ACE for WEC (2013)

³² UKERC (2015) *Energy Efficiency Evaluation: The evidence for real energy savings from energy efficiency programmes in the household sector*, <http://www.ukerc.ac.uk/publications/energy-efficiency-report.html>

Standards on energy-using products and boilers have been very successful, with the advantage of focusing on an easily measurable outcome and having market innovation and relatively frequent turn-over of products:

- The UK Market Transformation Programme (MTP), underpinned by EU-wide policy, has introduced minimum energy performance standards (MEPs) and energy labelling on energy-using products (e.g. TVs and lighting). Manufacturers have successfully innovated to produce more efficient products. Labelling shows consumers the impact of their choice clearly and there are few incentives for manufacturers to continue to produce low-efficiency products when social norms have moved on. An evaluation of the MTP estimates that, taking into account the lifetime benefits of policy outcomes which MTP outputs have had a strong influence upon, the total programme benefits derived from 2007-2011 activities were 1.6MtCO₂, delivering net benefits of £28 for every £1 spent.³³
- The 2005 regulations requiring condensing boilers are a leading example of strong, well-implemented UK legislation. In this case, a clear commitment was made by government, industry was involved in developing the policy, with significant investment in training in the two years leading up to the introduction, and there were clear criteria for testing compliance.

Regulations setting out the minimum performance standards for buildings are common internationally for new-build properties, with standards raised over time to drive performance. Managing the performance gap between modelled performance and actual performance is important in making such standards effective. Enforcement is also needed to ensure regulations are adhered to. These factors can be more difficult at building scale where the impact of a technology can vary based on its situation.

A number of countries also apply standards at the point of renovation, for example where a significant extension is been made to a building (e.g. Denmark, Sweden and Germany). There is not clear evidence on the effectiveness of these policies to date. Standards at the point of sale have recently been introduced in France and are being considered in Scotland and Germany. In France, the sale of F and G-rated homes will be outlawed from 2025, with staged tightening of standards towards an A or B rating by 2050.³⁴

3. Success factors for policy design and implementation

Much of the effectiveness of a policy depends on its design, implementation and context. A range of outcomes can be seen for any given policy instrument. This section explores some of the key factors that lead to successful policy.

Policy stability and sustained funding

It is apparent that a level of commitment to policy is needed, as there are barriers to households taking up energy efficiency opportunities. The so called 'energy efficiency gap', with cost-effective investments not being made, is well documented.³⁵ RAP summarise that "it is

³³ Databuild (2012) *Evaluation of the Market Transformation Programme*

³⁴ ACE and RAP (2016) *Buildings and the 5th Carbon Budget*, <http://www.ukace.org/wp-content/uploads/2016/09/ACE-RAP-report-2016-10-Buildings-and-the-5th-Carbon-Budget.pdf>

³⁵ For example, Jaffe, A. and Stavins, R. (1994) *The energy efficiency gap: what does it mean?* Energy Policy 22 (10), 60–71 and Backlund, S. et al (2012) *Extending the energy efficiency gap*, Energy Policy 51 (2012) 392–396

abundantly clear that economically optimal levels of investment in energy efficiency will not be reached without substantial government or government mandated spending".³⁶

There is a general consensus that a stable policy framework is extremely helpful for developing energy efficiency improvements. This gives consumers and suppliers a degree of certainty on which to base their investment decisions and can avoid counter-productive situations such as suppliers downsizing only to need to train more staff later, or households not wanting to pay for measures that were previously subsidised.

Denmark is often cited as a leader in delivering energy efficiency in buildings and this can partly be attributed to the remarkable stability in energy policy that has been achieved through cross-party support despite changes in government.³⁷ Targets and standards that are signalled well in advance and show progression over time can set a stable framework. There are also examples of programmes that have been effective over a long period of time, such as the KfW bank which has been able to build a brand and a level of trust.

Targeting trigger points

Policies tend to be more effective when targeting trigger points, when households are considering renovation, since these are times when households are reviewing their options and are already likely to be exposed to a level of disruption. The ultimate influences on household renovation decisions are often periods of transition in life patterns, for example when moving home, retiring or having a child.³⁸ Some countries such as Denmark and Sweden require high levels of efficiency on extensions to a home and require certain upgrades to be made to the existing structure at the same time. Japan's Flat 35 scheme provides preferential-rate mortgages to households willing to buy a more energy efficient property.

Minimising hassle and complexity

If programmes are transparent and sufficiently simple from a household's perspective they are more likely to achieve their intended impacts.³⁹ However, there is a balance to be struck between one-size-fits-all policy and over-complexity,⁴⁰ which depends on the specific scheme and the need to target different consumers. It is advantageous to consider the consumer journey and provide a streamlined application process. Any breaks in the process result in householders losing interest and take-up rates falling.⁴¹

Warm Up New Zealand's well-designed website makes it easy for customers to see what help they will be eligible for, and to find registered providers in their area. This is in contrast to the process under the UK Green Deal (which struggled with take-up) where providers, assessors and installers had to each be found through a separate search facility. Ensuring that contractors have a formal on-site project management process can improve the consumer journey and extending loans to cover costs beyond the direct cost of measures, such as costs of making good and planning applications, can help. A number of loan schemes provide for wider costs of

³⁶ Wasserman, N. and Neme, C., RAP(2012) *Policies to Achieve Greater Energy Efficiency*

³⁷ BPIE, *The Danish Way: How Denmark takes a leading role in Europe to renovate its building stock*,

<http://bpie.eu/news/the-danish-way-how-denmark-takes-a-leading-role-in-europe-to-renovate-its-building-stock/>

³⁸ Wilson, C. et al (2015) *Why do homeowners renovate energy efficiently? Contrasting perspectives and implications for policy*. Energy Research & Social Science, 7 (2015) 12–22

³⁹ Ricardo AEA for ClimateXChange (2015)

⁴⁰ ACE for WEC (2013)

⁴¹ ACE for WEC (2013)

renovation, for example, KfW's CO₂ Refurbishment loans and Milan's A-Profitto low interest loans scheme.⁴²

Consumer trust

Gaining and maintaining consumer trust is important in making sustained progress. There is an important role for trusted intermediaries to make programmes well aligned and to manage the quality of delivery by setting high design standards and ensuring consumer protection. Many countries have a designated energy agency that performs this function.

There is also a strong need for a skilled supply chain. Providing the industry with enough clarity on policy to train its workforce is key, as are suitable minimum training requirements and rigorous accreditation. For example, Germany has developed a supply chain of trusted, highly qualified engineers over years of stable policy and with certification.

The delivery method for schemes can increase consumer trust. Targeting schemes at specific geographical areas, such as neighbourhoods, can improve take-up, as those delivering the measures are able to engage with existing social networks, such as schools and community groups, to spread the message and recommendations are passed between trusted sources, such as friends, family and neighbours.⁴³ The use of organisations with which consumers already have a relationship can help with trust and ease of delivery. For example, some loan schemes are arranged with the customers' existing high street bank (KfW loans), or repayments are made to local authorities through council tax (both are possible in Warm Up New Zealand).

Effective communication and marketing

Communication and marketing are essential to making the policy known and appealing to the public. Communication is best when conveying a simple message, targeted in terms of the messages that matter most to the group on which the policy is focused and ideally with one source of information providing a harmonised message and streamlined approach across schemes. Many countries have an agency that provides this function. For example, New Zealand's Energy Efficiency and Conservation Authority has been successful in communicating its programmes through its dedicated ENERGYWISE website, which has a high brand recognition and has used TV and leaflets displayed in a range of service providers and retailers to create visibility. It has been based on a long-term strategy changing the focus of the messaging over time and has tapped into household's desires to improve comfort and health. Experience in other countries shows that businesses are well placed to take a lead on marketing, for example where retail banks are the interface with consumers such as in schemes in Germany and Japan.

⁴² ACE for WEC (2013)

⁴³ ACE for WEC (2013)

4. Case studies

The following case studies provide more information on some of the policies mentioned; highlighting their strengths.

Box 1. Better Energy Homes - Ireland

Scheme description

Better Energy Homes (BEH) is a grant scheme run by the Sustainable Energy Authority of Ireland (SEAI), as an incentive to encourage people to improve the energy performance of their homes. Grants covering part of the cost of energy efficiency improvement are available for a range of insulation measures, heating controls and solar heating. The scheme has recently added a bonus grant for homeowners taking up three or four measures at a time to encourage a whole-house approach. The scheme is open to all homes built before 2006, with an accompanying scheme Better Energy Warmer Homes providing energy efficiency improvements to elderly and vulnerable households at no cost to the households.

Results

- Almost 190,000 homes had energy efficiency work completed under the BEH scheme from March 2009 to June 2016, with 270,000 applications.
- SEAI research comparing a sample of those participating in BEH and a control group showed householders who made approved home improvements under the scheme achieved net savings in gas usage of over 20% compared with the control group.
- Before making improvements under the BEH scheme, around 16.5% of homes in the sample had a Building Energy Rating of C3 (200 -225 kWh/m²/year) or more efficient, while after improvements, this had increased to 60%.
- Survey results from 2010 show a positive response to the scheme with 65% of respondents believing the value of their home had increased due to the works, 90% of respondents were satisfied with their contractor and 98.5% would recommend the scheme to other people.

Strengths

- The application process is **transparent and relatively simple**.
- The SEAI have carried out **consumer research to better understand the motivating factors** in renovation decisions and gain feedback on customer experience to better tailor the scheme.
- **Sustained funding and approach**.

Source: SEAI *Better Energy Homes Scheme: Impact Report – Billing Analysis*, http://www.seai.ie/Publications/Statistics_Publications/Energy_Modelling_Group_Publications/Better_Energy_Homes_Impact_Report_Billing_Analysis.pdf; SEAI (2010) *Bringing Energy Home: Understanding how people think about energy in their homes*, http://www.seai.ie/News_Events/Press_Releases/Bringing_Energy_Home_Report.pdf; SEAI statistics, http://www.seai.ie/Grants/Better_energy_homes/Better_Energy_Statistics/; Ricardo AEA for ClimateXChange (2015) *A Comparative Review of Housing Energy Efficiency Interventions*

Box 2. Warm Up New Zealand

Scheme description

Warm Up New Zealand: Heat Smart ran from 2009 to 2013 as a soft loan and grants scheme to promote insulation and clean heating to homeowners and landlords. Warm Up New Zealand: Healthy Homes is the current grant programme which subsidises landlords in delivering underfloor and ceiling insulation to low-income rental households. Loans are still available to all households either through local councils where repayment is added to rates bills, or retail banks that provide a mortgage top up. The state does not guarantee loans, rather the risk liability remains with local councils and banks. For example, Auckland runs loans over 9 years with a 7% interest rate. These schemes have been accompanied by a significant marketing campaign including a TV segment called Energy Spot which brings the energy efficiency message to a wide audience. The programmes are run by the Energy Efficiency and Conservation Authority (EECA).

Results

- Energy savings have been low, but this reflects that homes were under-heated prior to insulation.
- 84% of customers surveyed felt they had a warmer home after the insulation was installed and 42% had improved health.
- Energy Spot has been viewed by around 2.4 million people, with 41% saying they've taken action to reduce energy use as a result.
- Cost benefit analysis of Warm Up New Zealand: Heat Smart shows net benefits, with the vast majority of benefits coming through health improvements rather than energy savings.

Strengths

- **Marketing** has been comprehensive via the EECA website, TV, print media and leaflets available from Citizens Advice Bureaux, doctors' surgeries, Service Providers and installers and retail outlets.
- The EECA runs the range of programmes and is able to make sure they are well aligned. It's ENERGYWISE website acts as a gateway to all energy efficiency information and awareness of this is high. **The EECA is a trusted intermediary which has communicated effectively and runs a simple, joined up process for households.**
- **Resources were targeted** to properties built prior to 2000 and to improving floor and ceiling insulation to provide the greatest benefit and deliver energy savings in the most cost effective way.

Source: Grimes, A. et al for the New Zealand Ministry of Economic Development (2012) *Cost Benefit Analysis of the Warm Up New Zealand: Heat Smart Programme*; ACE for WEC (2013) *Financing energy efficiency in buildings: an international review of best practice and innovation*; Ricardo AEA for ClimateXChange (2015) *A Comparative Review of Housing Energy Efficiency Intervention*; EECA, <https://www.eeca.govt.nz/about-eeca/our-programmes/>

Scheme description

The German state bank, KfW, offers long-term fixed-rate low-interest loans and grants to support energy efficiency work during the general refurbishment of existing buildings and to encourage energy efficiency standards in new buildings that are higher than the legally required minimum standards. A number of schemes have been offered since 1996 with support increasing depending on the targeted level of house efficiency, and for packages or single efficiency measures and with grants available from 2007.

Results

- The entire budget is used each year, indicating good customer awareness or marketing by commercial banks.
- The Energy-efficient Construction programme supported around half of new build homes in 2011.
- The KfW estimates the measures installed from 2006 to 2012 are saving 5.7 MtCO₂e per annum.
- The heating system was renovated in 54% of refurbishment cases on the scheme.

Strengths

- **Harnessing of existing refurbishment levels** by adding energy efficiency into normal refurbishment activity.
- The KfW-Effizienzhaus brand creates **visibility and transparency**.
- The structure of incentives **encourages deep retrofits** with subsidies increasing with the level of energy efficiency attained.
- The scheme is **comprehensive** with most households being eligible.
- **Long-running and using trusted intermediaries** for delivery creating a good level of confidence.

Source: KfW (2013) *KfW programmes on energy-efficient housing substantially contribute to the German energy turnaround*, https://www.kfw.de/Download-Center/Konzernthemen/Research/PDF-Dokumente-Fokus-Volkswirtschaft/Fokus_Nr_14_January_2013.pdf; ACE for WEC (2013) *Financing energy efficiency in buildings: an international review of best practice and innovation*

Box 4. Flat 35 Mortgages - Japan

Scheme description

The Japan Housing Finance Agency (JHF), an incorporated administrative agency funded by government, has delivered the Flat 35 mortgage scheme since 2003. Japan's mandatory building codes do not specify a minimum energy performance standard, but voluntary standards exist and the Flat 35 mortgage scheme is offered to incentivise homebuyers to buy properties that exceed the voluntary standards. Flat 35 mortgages are low-interest loans for a period of up to 35 years where the interest rate remains fixed until maturity, helping homeowners to plan for the long-term. Homes meeting fundamental standards can obtain a market-rate loan, while those meeting tougher standards (on energy efficiency or a range of other factors such as earthquake resistance) are eligible for government subsidised interest rates. The mortgages are offered by private banks and securitised by the JHF. The JHF has also started to offer Flat 50 mortgages for loans of between 36 and 50 years.

Results

- A JHF survey in 2015 found that over a third of prospective loan applicants desire fixed rate mortgages.
- There has been strong take up, although rates have varied over time with changes in interest rates and modifications to the scheme. There were roughly 180,000 applications in 2010/11 falling to around 90,000 in 2014/15. For context, new home starts by owners and new properties for sale amounted to 544,000 in 2011.
- The majority of loans go into new construction and the vast majority of applications are for the preferential-rate mortgages achieved by meeting the higher quality standards (including energy efficiency).

Strengths

- The JHF is able to provide **low interest rates** as it is able to sell large volumes of high quality mortgage backed securities. It can then further reduce rates for high-quality homes using government funding.
- The JHF has **considerable links with financial institutions and has a position of trust** being a government agency and with a long history with its predecessor being founded to help with post-war reconstruction.

Source: JHF disclosure documents, <http://jhf.go.jp/english/index.html>; ACE for WEC (2013) *Financing energy efficiency in buildings: an international review of best practice and innovation*