

Designing an optimal Energy Efficient Mortgage value chain – lessons from Scotland and the Autonomous Province of Trento

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1 Executive Summary

Work Package 5 under the Energy Efficiency Mortgage Market Implementation Plan ('EeMMiP') aims to facilitate Energy Efficiency mortgage market development, by defining and developing market demonstrators that will provide the perfect environment to align the incentive chains among all market participating actors. These include, amongst others, the following players: lending institutions, investors, regulators, energy assessors, utility companies, contractors, valuers, and consumers / borrowers. This alignment requires mutual confidence (transparency and reliable performance data) and increasing awareness of the benefits of energy efficiency by consumer demand.

A previous report was produced as part of Work package 5.1 that outlined the key pillars of the whole market chain as experienced by a consumer during their customer journey in implementing energy efficiency measures within their properties, and the key attributes that each of these for successful market pillars require development. These elements can help support creation of a broader market framework that allows financial investment via mortgages and other potential financial products to be efficiently and effectively delivered.

This Technical Report looks at how these specific pillars are being applied and developed within the jurisdictions of Scotland and The Province of Trento, Italy, and identifies "best practice" examples of energy efficiency market development, together with challenges that may exist. This



will hopefully support other European jurisdictions in developing their own market frameworks and providing examples of how this might be done to accelerate the much-needed investment and financing in Energy Efficiency and heat decarbonisation measures.



The key objectives under each of these pillars are summarised below:

Delivery mechanisms, Skills & Supply	To provide support and actively promote the opportunities of the market in energy efficiency in buildings for companies in the jurisdictions, as well as ensuring that the quality of the work carried out by the supply chain is of a high standard and that installers are suitably qualified
Branding, marketing & communication	To build communications that motivate owners and occupiers to access the advice and support on offer, based on a strong brand for the Programme that inspires trust and raises awareness, as well as targeted messages for each sector that make the case for improving energy efficiency.
Advice & Information	To provide all households with access to good quality, independent advice and information on improving the energy efficiency of their property and reducing their fuel bills.
Assessment	To undertake and assessment and provide an action plan that records both the improvement targets and the measures that will be undertaken to meet them
Finance	To catalyse financing mechanisms, for example, grant and loan funding, fiscal advantages, across different tenure and sectors to support improvements to the local building stock.
Quality Assurance & Consumer Protection	To ensure robust consumer protection, focussed on high standards of quality, customer care, competence, skills and training, and health and safety.
Monitoring & Evaluation	To monitor and evaluate progress to ensure that aims and objectives are met. This monitoring and evaluation should allow for adaptation and flexibility where necessary.



2 Scotland

2.1 Introduction

There are around 2.7 million properties in Scotland. They vary widely in terms of building type, use, size, age, construction, and energy efficiency, and are situated across all corners of Scotland. Improving the energy efficiency of these buildings to support its work on eradicating fuel poverty and reducing greenhouse gas emissions brings challenges. The work encompassing the change needed within Scotland's buildings is captured within its broad ranging Energy Efficiency Scotland Programme.

2.1.1 Profile of domestic housing

In 2016 there were around 2.5 million domestic properties in Scotland, and it is likely that over 80% of them will still be in use in 2050. These homes are inter-generational resources and improving these properties today provides better homes for our children and grandchildren. Three quarters of Scotland's homes were built before 1982. A fifth were built before 1919 using traditional methods of construction. The research and development of new approaches for the energy efficiency of these pre 1919 buildings is overseen by Historic Environment Scotland. Approximately 61% of homes are owner occupied, 15% are privately rented, and 23% are socially rented. The energy efficiency of Scotland's homes has been improving in recent years. In 2016, 39% of homes achieved an Energy Performance Certificate (EPC) rating of C or above. Social housing is generally more energy efficient with 53% rated EPC C or better, above, and has risen to 55% by 2020. This compares to the private sector where 35% achieve a similar rating. Heating Scotland's homes and the water used in them accounts for over three-quarters of the energy Scotland uses in their homes. Most households use mains gas for their heating, with smaller proportions using electricity and oil as their main fuel source.

2.1.2 Policy Framework

The overarching programme in Scotland for supporting the delivery of energy efficiency and heat decarbonisation measures is called Energy Efficient Scotland and it combines national support mechanisms alongside locally focussed delivery structures and these are outlined below.





Figure 2 – National Policy Framework and Delivery

In developing its programmes, the Scottish Government has had ongoing engagement with many stakeholders operating within the energy efficiency market since 2016, discussing approaches to the development of initiatives and gathering their experience of energy efficiency programmes and what they consider to be the important policy considerations for ensuring delivery of a successful Energy Efficiency programme.

Common themes included the following:

- **Keep it simple** All organisations stated emphatically that any scheme should be kept as simple as possible in terms of product offering, financing, and delivery mechanism.
- Scottish Government support and incentives To generate trust, Government is seen as being key to unlocking growth in this largely undeveloped market. Financial support to initiatives demonstrates commitment, raises the attractiveness for lenders and promotes potential uptake of offerings.
- **Certainty of demand is paramount** Experience of financiers with the Green Deal and elsewhere has made financiers significantly cautious regarding any energy efficiency related schemes. Robustness of demand uptake is considered critical for securing any future private finance.
- Easily identifiable routes to market Local and well-known routes to market are considered key for ensuring uptake of measures. This needs to be coupled with an accredited supply chain to ensure efficient, effective, and quality delivery of efficiency measures.



2.2 Delivery mechanisms, Skills & Supply

Objective: to provide support and actively promote the opportunities of the market in energy efficiency in buildings for companies in the jurisdictions, as well as ensuring that the quality of the work carried out by the supply chain is of a high standard and that installers are suitably qualified.

2.2.1 National programmes

Nationally delivered support is provided to those households and businesses which are not covered by an area-based scheme at any given time, who wish to improve their property earlier than any scheduled area based scheme proposed or need to improve their property to meet any regulations introduced. These include the following:

- national advice services (currently Home Energy Scotland (domestic) and Resource Efficient Scotland (non-domestic)
- domestic fuel poverty programme (currently Warmer Homes Scotland)
- domestic energy efficiency loan programme (currently HES Loans)
- non-domestic loan programme (currently SME Loans)
- district heating loan funding (currently District Heating Loan Fund)
- public sector energy efficiency programmes (currently NDEE Procurement Framework and the Project Development Unit)

For both domestic and non-domestic loans there is ongoing engagement with stakeholders to explore what is required to incentivise uptake and adapting Scotland's schemes to reflect ongoing findings.

2.2.2 Warmer Homes Scotland

This scheme is the Scottish Government's national fuel poverty scheme. Launched on 1st September 2015, it provides insulation, efficient heating, and renewable technologies in the homes of households who are struggling with the cost of high energy bills, making homes warmer, more comfortable and more affordable to heat.

After receiving referrals to the Warmer Homes Scotland scheme from Home Energy Scotland, an organisation called Warmworks manages the whole process from the moment of referral through to installation and inspection.

They provide an inclusive service, understanding that some occupants are often in need of extra support – the service has been specifically designed to try and provide that wherever possible. Below we have outlined what the typical process might look like for a customer who applies to the Warmer Homes Scotland scheme.





Figure 3 - Warmer Homes Scotland

2.2.3 Home Energy Scotland

This is a network of local advice centres covering all of Scotland. Expert advisors offer free, impartial advice on energy saving, keeping warm at home, renewable energy, funding options (including Scottish Government grants and interest free loans), greener travel, cutting water waste and more. The network is funded by the Scottish Government and managed by an organisation called the Energy Saving Trust, with the mission to help people in Scotland create warmer homes, reduce their bills, and help tackle climate change.

2.2.4 Local Authorities

In addition at the local level, delivery is also organised through local authorities via a scheme called Home Energy Efficiency Programme Scotland: Area Based Scheme (HEEPS:ABS). In this scheme local authorities are provided with direct grant support from the Scottish Government to help deliver energy efficiency measures within their local government areas. Scotland's local authorities have been successfully delivering area based fuel poverty programmes for a number of years and are well placed to continue this approach, and are to be used to expand into the "able-to-pay" or "self-funding" demographic, necessary for the Energy Efficient Scotland long term standard to be achieved. Local Heat and Energy Efficiency Strategies (described further below) set out a cost delivery plan for a local authority area, showing how the local authority intends to provide a service to households and businesses to assist them in improving the energy efficiency of their buildings to meet the Government's long-term targets.

The intention is that local authorities build on their existing area-based approach and expand into sectors currently covered by national programmes, offering a facilitated, integrated, area based approach which covers:



- advice, support, and assessment for domestic and non-domestic buildings
- tackling fuel poverty
- domestic and non-domestic able-to-pay energy efficiency (with loan funding provided by the national loan scheme)
- public sector energy efficiency
- low regrets heat decarbonisation approaches where relevant, e.g. renewable heat in off-gas areas and district heating where appropriate

The Scottish Government recognises that this proposal will require local authorities to expand current approaches and, in some cases, develop new ways of working. These steps will need to see an expansion in current:

- promotion activity
- household and business engagement and sign-up
- provision of advice and guidance
- management of customer installations

The Scottish Government also recognises that there will be a cost associated with expanding local authority activity. That is why the Scottish Government has been testing and trialling this approach as part of a Transition Programme (a combination of Scottish Government support measures and mechanisms that help develop the market for energy efficiency improvements), working closely with local authorities and other delivery bodies to better understand the costs. Over time the Scottish Government anticipated that much of this activity could become self-financing.

2.2.5 Local Heat and Energy Efficiency Strategies ('LHEES')

The introduction of LHEES sets the strategy and framework for reducing energy demand and decarbonising the heat supply to buildings.

These set out long-term strategic approaches and plans to reduce emissions from buildings and tackle fuel poverty by identifying a solution tailored to the local area, as well as identifying zones suitable for the development of heat networks.

The strategies have a vital role in planning the Government's long-term approach to decarbonising the heat supply to the Nations homes and buildings and respond directly to recommendations made by the Committee on Climate Change. The Scottish Government is working with local government to put the strategies on a statutory footing and bring forward the timescale for implementation.

The Scottish Government began a pilot programme to shape and test the development of LHEES. This allowed all 32 local authorities in Scotland to trial different aspects and to support the building of capacity and capability within the Energy Efficiency market. Two pilot phases have run so far, with 23 local authorities receiving funding¹.

¹ https://www.gov.scot/publications/synthesis-evaluation-local-heat-energy-efficiency-strategy-lhees-pilot-programme/



2.2.6 Skills & Supply

The continued rollout of Energy Efficient Scotland has the potential to create a substantial Scottish market and supply chain for energy efficiency services and technologies, with every £100 million spent on energy efficiency improvements in 2018 estimated to support approximately 1,200 fulltime equivalent jobs across the Scottish economy. As part of its overall commitment to the Programme the Scottish Government is working to provide support and actively promote the opportunities of this market.

As well as making sure local companies can benefit from the opportunities, the Scottish Government needs to ensure that the quality of the work carried out by the supply chain is of a high standard and that installers are suitably qualified.

The Scottish Government recognises that activity in the skills and supply chain needs to be increased during the 2020s. The country already has an existing energy efficiency skills base and people and businesses in place to perform energy efficiency work. However, the Scottish Government wants to ensure that as the Programme expands, they can capture the new opportunities and that these opportunities are available to the nation's SMEs as well as larger businesses.

Because of the close connection between quality assurance, consumer protection and the skills and supply chain, Scottish Government are considering these issues in the round through work undertaken by the Short Life Working Group on Quality Assurance, Consumer Protection, Skills and Supply Chain².

The Group had representatives from across industry, consumer organisations, and enterprise and skills agencies, and is considering:

1. The current capacity and capability within the supply chain and whether it is likely to meet the demand for the Programme.

2. How best to keep the supply chain informed of the work and training opportunities available through the Programme during and after the transition period.

3. How best to provide clarity on the quality assurance and consumer standards expected from supply chain participants as part of the Programme delivery framework.

4. How to assess and address the barriers that industries, both small and large scale, face in successfully participating in the Programme.

5. How best to promote skills and training opportunities for the supply chain.

6. How the Scottish Government can best help the energy efficiency industry overcome inefficiencies and keep their costs low, making participation in the Programme financially viable.

7. How the Scottish Government can best promote the opportunities available to small and medium enterprises (SMEs) throughout Scotland and help ensure that participating in the Programme is financially viable for them.

8. How best to include industry and support them through the Programme transition period and beyond.

² https://www.gov.scot/publications/quality-assurance-short-life-working-group-report/



As a first stage to inform the Short Life Working Group, the Scottish Government is looking at its existing supply chain to determine the current capacity and capability. Scottish Government have undertaken the following research:

A Home Energy Efficiency Programme – Area Based Scheme (HEEPS: ABS) – Lessons Learned report for the Development of the Programme. This will help us ascertain areas for improvement in procurement that would help SMEs to compete and participate in the Programme³.

An Energy Efficiency and Low Carbon Market Research report was produced in October 2021, identifying⁴:

- What the likely future demand is from key buyers in Scotland.
- What the current supply chain characteristics are in Scotland.
- Insights to assess the supply chain's ability to respond to the tenders to be issued as part of the Programme.
- Barriers and gaps in the supply chain's ability to meet the needs of buyers.
- Recommendations and feedback for the Scottish Government and partners.

Scottish Government have also commissioned work specifically relating to the supply chain and its requirements under the Programme, including:

- looking at raising industry awareness of the Programme
- obtaining details of current market knowledge of the scheme
- providing customer service training and behavioural advice to the supply chain
- collating a bespoke communications plan specifically relating to the supply chain industry.

This work is on-going and the Scottish Government intends to publish further details of how the Scottish Government will assist and support the supply chain. Scottish Enterprise (A Government Agency) has recently commissioned sighting work to identify Scottish capability and capacity, prior to developing a Scottish supply chain programme to support Energy Efficient Scotland and to help develop a strategic approach to maximizing the associated economic benefits for industry.

The actions and recommendations from this research and the findings from the Working Group will be used to develop the specific skills, quality assurance and consumer protection outcomes that are required to be incorporated into the Programme.

³ https://www.gov.scot/publications/home-energy-efficiency-programmes-energy-efficient-scotland-delivery-report-2018-2019/pages/3/#:~:text=The%20Home%20Energy%20Efficiency%20Programmes,to%2Dtreat%20cavity%20wall%20insulation.

⁴ https://energysavingtrust.org.uk/wp-content/uploads/2020/09/Energy-Efficiency-Low-Carbon-Research-Exec-Summary-Oct-2017.pdf



2.3 Branding, marketing & Communication

Objective: To build communications that motivate owners and occupiers to access the advice and support on offer, based on a strong brand for the Programme that inspires trust and raises awareness, as well as targeted messages for each sector that make the case for improving energy efficiency.

2.3.1 Communication and Knowledge Sharing

To deliver Scotland's targets and ensure owners and occupiers need to act at the appropriate time, the Scottish Government recognises the need for communications that motivate owners and occupiers to access the advice and support on offer. To support this, the Scottish Government has developed a strong brand for the Programme that inspires trust and raises awareness. Some branding images used in campaigns are provided below.



Figure 4 – Official brands

Going forward, the Scottish Government will continue to develop targeted messages for each sector that make the case for improving energy efficiency and switching to low carbon heat. The Scottish Government will learn lessons from and build upon successful marketing campaigns such as Greener Scotland and existing programmes such as Home Energy Scotland and Resource Efficient Scotland and look for opportunities to promote the Programme and raise awareness of energy efficiency. Sharing information between those involved in delivery will also be important. The Scottish Government will put in place suitable forums for communication between delivery partners to provide opportunities for sharing best practice, coordinating delivery and gathering feedback on programme performance.

2.4 Advice & Information

Objective: To provide all households with access to good quality, independent advice and information on improving the energy efficiency of their property and reducing their fuel bills.



Advice to homeowners can be accessed in a variety of ways, including online, via telephone and, if needed, face-to-face. Advice is offered at both national and area-based levels, both to the domestic and non-domestic sectors, and these are outlined below.

2.4.1 Domestic advice & information support.

Domestic consumer advice is provided by the Energy Savings Trust under the Home Energy Scotland programme. This is the provision of free, independent advice on energy efficiency and low and zero emission heating. This also acts as a referral scheme for the Warmer Homes Scotland scheme (described above) and includes a Portal for accessing a number of support packages including Home Energy Scotland loans, Private Rental Sector loans, cash back incentives, equity loan pilot and Warmer Homes Scotland. These schemes were outlined above.

The commitment to provide a free and impartial advice service was set out in Scottish Government's Energy Efficient Scotland route map in May 2018 and has formed part of the foundations of Scottish Government's work on energy efficiency from the outset. Advice is provided independently and free of charge and considers all aspects of energy efficiency including energy saving, keeping warm at home, reducing energy bills, renewable energy, lowering carbon footprint and income maximisation. The advice helps those in, or at risk of falling into fuel poverty and the service acts as the referral mechanism for customers to access grants, tailored advice and practical delivery of measures, such as Warmer Homes Scotland. Over the next 5 years research will help inform us of the best form of service to provide, taking account of likely increases in demand, changes in the way people access information, and reacting to changes to government grant and loan schemes to help people achieve their aims.

2.4.2 Advice and Support to small and medium enterprises ('SMEs')

Substantial, free advice and support offering to Scottish SMEs to help them understand how to improve energy efficiency and decarbonise heating in their premises. The two main offers of support are an initial energy opportunities assessment which identifies where and how energy savings can be made and a comprehensive report including a site visit to highlight possible improvements, further advice and funding. Once SMEs have been through the Energy Efficiency Business Support Service, they can apply for interest free SME loans up to a maximum of £100,000 with cashback incentives also available.



2.5 Assessment

Objective: An Action Plan that records both the improvement targets and the measures that will be undertaken to meet them.

2.5.1 Use of EPCs in Scotland

Dwelling owners are legally required, under the Energy Performance of Buildings (Scotland) Regulations 2008 to provide an Energy Performance Certificate⁵ on construction, sale or rental of a building to a new tenant. These regulations transposed the original European Union's (EU) Energy Performance in Buildings Directive 2002 (EPBD) into Scottish statute and the Scottish Government remains committed to its continued alignment of this European directive through the Continuity (Scotland) Act 2020. The Energy Performance of Buildings (Scotland) Regulations 2008 established two types of EPC – one used for dwellings (domestic) and one for all other building types (non-domestic). The format for each and method of calculation is different for both and is established through these regulations.

The purpose of the EPC is to provide an indication of how energy efficient a building is, including the running costs associated with that, and to provide advice on how the energy efficiency of the building could be improved. On completion, they are valid for a period of 10 years. Buildings are rated on a scale from A to G, with A being the most efficient and G the least efficient. Information is also provided on measures which could be made to improve the energy efficiency (the Recommendations Report), and an indication of cost and typical savings for each improvement over 3 years. EPCs are lodged on the EPC register website⁶ where single EPCs can be viewed via a public search facility.

The EPC assessment records specific information such as the dwelling type, floor area, construction type, insulation, heating, ventilation and lighting. It also provides a primary energy indicator which is the amount of energy used to produce one kilowatt of power for the household.

The calculation is based on standard assumptions of occupancy and use, and does not take into consideration variations in behaviour of occupants, or the state of repair of the property, and uses a UK-wide calculation methodology⁷, managed and implemented by the UK Government with input from the devolved administrations. The EPC assessment process generates a set of suggested improvements and indicates what EPC score might be achieved if these improvements were cumulatively undertaken. This list of recommendations is advisory only and are generated as part of the calculation methodology and software tools used by the EPC assessor.

EPCs for existing dwellings are produced using Reduced Standard Assessment Procedure (RdSAP) – a simplified implementation of the Standard Assessment Procedure (SAP) methodology. RdSAP was developed by the government for use in existing dwellings based on a site survey of the property,

⁵ https://www.gov.scot/publications/energy-performance-certificates-introduction/

⁶ https://www.scottishepcregister.org.uk/

⁷ https://www.bregroup.com/sap/standard-assessment-procedure-sap-2012/



when the complete data set for a SAP calculation is not available. It consists of a system of data collection together with defaults and inference procedures, defined by the rules in Appendix S of the SAP methodology.

In January 2017, the Scottish Government published a series of consultations to inform its policy decisions on the overall design and operation of Energy Efficient Scotland (previously called Scotland's Energy Efficiency Programme – 'SEEP'). During pre-consultation workshops for the consultation on SEEP, stakeholders raised a range of issues and challenges that need to be considered as the programme is developed. This included concerns around the application, limitations and quality of EPC-based building assessments for broader purposes such as setting standards. EPCs and their underlying assessment methodologies are used to underpin Scottish Government actions to improve properties.

A robust assessment of the issues raised around EPCs is needed to ensure these issues are investigated, responded to and, where appropriate, addressed through further review. In December 2017, the Scottish Government commissioned a strategic examination of EPCs and their underlying calculation methodology to support the development of EES, and specifically:

- to examine the concerns raised in terms of using EPC-based building assessments to underpin the Scottish Government's actions to improve the energy performance of buildings;
- to determine if these concerns merited a material change to the EPC-based building assessment methodologies;
- to assess the changes that could be made to the EPC-based building assessment methodologies to address these concerns;
- to evaluate the impact of the proposed changes on the information reported on domestic and non-domestic EPC certificates;
- to consider the potential cost and time implications for implementing the proposed changes; and,
- to determine the changes that could be implemented within the scope and competency of the currently defined for the role of EPC assessor.

The UK Climate Change Committee (CCC) in its sixth Carbon Budget report⁸ (Dec 20201) identified that high quality advice and information is critical for guiding householders' decisions to improve the energy performance of their home. Energy Performance Certificates (EPCs) are a useful source of basic comparable information. However, the CCC have acknowledged that there are extensive issues with using them as a basis upon which to set standards. These are mainly poor quality or low robustness; modelled data rather than actual energy performance; they do not incentivise or show benefits of decarbonising heat or include the savings possible from smart tariffs. In previous Energy Efficient Scotland consultations, stakeholders have echoed the need for a more effective EPC process.

⁸ https://www.theccc.org.uk/2021/04/20/sixth-carbon-budget-ccc-lauds-historic-milestone-on-path-to-net-zero-uk/#:~:text=News%20%26%20insights%20%2F%20News-

[,]Sixth%20Carbon%20Budget%3A%20CCC%20lauds%20historic%20milestone%20on%20path%20to,in%20less%20than%203 0%20years.



As set out in a draft Heat in Building Strategy published in October 2021⁹, the Scottish Government is revising their approach to energy efficiency and heat. They are proposing to develop a regulatory framework for energy efficiency and heat supply that will be based on a reformed assessment process using metrics from EPCs which will ensure standards meet both climate change and fuel poverty targets.

	The Proposed Standard	Dates to lay regulations	Dates to meet the standards	Backstop dates for compliance
Private rented Sector	To reach a level equivalent to EPC D for new tenancies	Autumn 2021 (not confirmed)	From April 2022	31 March 2025 for all tenancies
	To reach a level equivalent to EPC C for new tenancies	Ву 2025	2025-2027	2028 for all tenancies
	Zero Emissions Heating*	By 2025		2045
Owner Occupier	To reach a level equivalent to EPC C	Ву 2025	Triggers proposed between 2025- 2034	2035
	Zero Emissions Heating*	By 2025		2045
Social Housing	To reach EPC B	Standards reviewed in 2023	2024-2031	2032
Multi tenure/Mixed use	To reach a level equivalent to EPC C	Ву 2025	2025-2044	2045
	Zero Emissions Heating*	By 2025		2045

Table 1 – Proposed Standard

The draft HBS identifies the need for an EPC framework that helps dwelling owners understand:

- the measures required to improve the energy efficiency of their property in order to reduce the demand for heat;
- the changes required to have zero emissions a heating system; and

⁹ https://www.gov.scot/publications/heat-buildings-strategy-achieving-net-zero-emissions-scotlands-buildings/



• the impact of these changes on running costs.

The proposed new format will therefore contain three metrics:

- Energy Use Rating Provides indicative energy use based on kWh/m2 /year. The energy use rating is a new metric on the EPC.
- **Carbon Emissions Rating** Provides calculated carbon dioxide emissions for a dwelling in kg CO2/M2 /year. This metric is the current EPC EIR.
- Energy Cost Rating Energy Cost Rating: Provides indicative running costs expressed in pounds per year. This metric is the current EPC EER.

In December 2019, the consultation on Improving Energy Efficiency of Owner Occupied Homes¹⁰, proposed the use of alternative metrics to the current cost-based Energy Efficiency Rating on the EPC citing the example where the rating can worsen for zero or low emissions heating systems. In that consultation document, the Scottish Government set out draft interim proposals for a reformed Assessment/EPC process.

The feedback from that consultation was analysed and published in February 2021¹¹. One of the cross cutting themes identified was the need for change in the EPC process since many respondents raised concerns about its effectiveness and accuracy. Individuals and representatives of professional bodies were most concerned that it was not an appropriate measure of energy efficiency in homes. Some called for it to be revised while others felt that another mechanism entirely should be used.

On 22 June 2021, a report commissioned by the UK Government on making SAP & RdSAP 11 fit for Net Zero was published¹². The report produced in conjunction with a number of stakeholders and industry experts, including input from the Scottish Government, set out 25 key recommendations based under 5 broad categories. The categories are:

- Alignment between SAP/RdSAP and its strategic objectives
- Improvements to the methodology
- Improvements to SAP/RdSAP and its ecosystem for Net Zero
- A better evaluation of energy use
- Support to decarbonise heat and electricity

The report sets out some of the key issues for net zero carbon and the strategic objectives of SAP. One issue which is relevant to this consultation was that the main metric currently used in policy to improve the housing stock is an energy cost metric and not an energy efficiency or carbon metric. At current SAP energy prices, this means that fossil fuels would still be encouraged by EPC ratings.

This is a criticism that the Climate Change Committee has also previously made in various reports, including its most recent 2021 Progress Report to Parliament where it recommends that governments must ensure that EPCs 'do not disincentive low-carbon heat', and that they must 'implement

¹⁰ https://www.gov.scot/publications/energy-efficient-scotland-improving-energy-efficiency-owner-occupied-homes/

¹¹ https://consult.gov.scot/housing-and-social-justice/energy-efficient-scotland-owner-occupier-proposals/

¹² https://www.levittbernstein.co.uk/research-writing/making-sap-and-rdsap-11-fit-for-net-zero/



improvements'. Supporting delivery objectives across both energy efficiency and low-carbon heat, and valuing properly the benefits of low-carbon and flexible technologies.

The UK Government commissioned report outlines that a significant improvement to the key metric in SAP/RdSAP would be to provide information on "energy use" (kWh/m2 /year), which the report views as the best indicator of energy efficiency. The report contains results of an online survey which received 337 responses. Of the respondents, 85% think energy use (kWh/m2 /yr) should be a key metric.

The report recommends under the Improvements to SAP/RdSAP and its ecosystem for Net Zero category – "New EPC Ratings from SAP/RdSAP to support Net Zero and fuel poverty objectives". These recommendations for an energy use indicator in kWh/m² /year align with, and reinforce, the Scottish Government's own proposal in this consultation document for a new kWh/m² /year energy efficiency metric.

A further consultation was issued in July 2021¹³ setting out proposals to change the Energy Performance Certificates (EPC) format, leading on from the proposals set out in the draft Heat in Buildings Strategy (as highlighted above) with a view to reforming the EPC framework - identified as needed through the owner occupied consultation and CCC recommendations referred to earlier. It confirms the Scottish Government's commitment to the ongoing use of EPCs as the basis against which standards will be set. It also makes clear that the Scottish Government does hear the concerns about EPCs, and reforms are needed if the Scottish Government intends to use this measure to improve energy efficiency and ultimately achieve zero emissions from heating. This is likely to be a common challenge across European jurisdictions.

¹³ https://www.gov.scot/publications/domestic-epc-reform-consultation/



2.6 Finance

Objective: To catalyse financing mechanisms, for example, grant and loan funding, fiscal advantages, across different tenure and sectors to support improvements to the local building stock.

2.6.1 Summary of GB Wide Funding for Heat and Energy Efficiency

Domestic Renewable Heat Incentive (RHI)

The GB wide Domestic Renewable Heat Incentive (Domestic RHI) is a UK Government financial incentive to promote the use of renewable heat. Successful applicants to the scheme receive quarterly payments for seven years for the amount of clean, green renewable heat their system is estimated to produce. The scheme opened in April 2014, and will run until 31 March 2022, having recently been extended by a year with only minor changes to the scheme. These include allowing those who commissioned their plant on or after 1 March 2019 to apply for accreditation up until the closure of the scheme, rather than within 12 months of the commissioning date. Currently 19% of installations accredited under the Domestic RHI are located in Scotland.

Non-Domestic Renewable Heat Incentive (NDRHI)

The GB wide Non-Domestic Renewable Heat Incentive (RHI) is a UK government environmental programme that provides financial incentives to increase the uptake of renewable heat by businesses, the public sector and non-profit organizations. Eligible installations receive quarterly payments over 20 years based on the amount of heat generated. The scheme is scheduled to close on 31 March 2021. While some changes have been made with regards to tariff guarantees and some commissioning deadlines extended beyond the closure of the scheme, no payments will be made beyond 31 March 2041. Applicants who commission after the closure of the scheme on 31 March 2021 will receive a shorter payment lifetime. Currently 19% of installations accredited under the Non-Domestic RHI are located in Scotland, more than its pro-rata share.

Clean Heat Grant Scheme (in development)

The UK Government has announced the Clean Heat Grant Scheme, which will begin in April 2022 and run for 2 years until March 2024¹⁴. The Scheme is intended to provide a £4,000 flat-rate technology neutral upfront grant to successful applicants. It will fund heat pumps, and biomass where a heat pump is not suitable, up to 45kw in capacity via a voucher mechanism. £100 million funding will support the scheme. Green Gas Support Scheme (in development) The UK Government has also announced the Green Gas Support Scheme, which will run for four years from autumn 2021. The scheme will support biomethane injection into the gas grid and is expected to contribute 21.6MtCO2e of carbon savings over its lifetime. The scheme is to be funded by the Green Gas Levy, and will use a tariff mechanism similar to the Nondomestic RHI.

¹⁴ https://www.gov.uk/government/consultations/future-support-for-low-carbon-heat



Energy Company Obligation (ECO)

The Energy Company Obligation (ECO) is a UK Government programme to deliver energy efficiency measures across Great Britain (GB). The legislation obliges eligible energy providers to deliver energy efficiency improvements to help fuel poor households to reduce the cost of heating their homes (HHCRO or the Help to Heat Cost Reduction Obligation). ECO is funded through a charge on the energy bills of all customers of regulated energy companies with over 250,000 customers. As of December 2020, BEIS reported that 287,996 households in Scotland have received ECO finance (13.4% of GB); or an average of 118 measures per 1000 households (compared to 81 in Wales and 77 in England). The council with the highest reported number of ECO measures per household (number of measures per 1000 households) in GB is the Comhairle nan eilean siar (Western Isles council).

Warm Home Discount (WHD)

Warm Homes Discount is a GB wide scheme that provides an annual one off discount on electricity bills paid by energy companies between September and March. Currently the Warm Homes Discount is worth £140, and the costs of the discount are applied to all household bills. In 2017-18 Scottish households represented around 10.9% of WHD recipients compared with 9.2% of all households in Great Britain. Two groups are eligible: a "core" group where the household receives the Guarantee Credit element of Pension Credit (income under £167.25 for a single pensioner or £255.25 for a couple); and a "broader" group on a low income as set by suppliers - some households receiving income related benefits must be included on a `first come, first serve basis'. 9.6% of all rebates were to the overall 'core' group in Scotland (117,020 Scottish households) and 12.5% to the 'broader' group (121,425 Scottish households).

2.6.2 Scotland specific support schemes

Private rented sector landlord loan

The loan offers funding to landlords for improvements to domestic dwellings which are listed on the Scottish Landlord Register and not used as a holiday or second home. Landlords with five properties or fewer in their portfolio can borrow up to £100,000 and those with six or more properties in their portfolio can borrow up to £250,000. Funding is available for installation of energy efficiency improvements, renewable technologies and energy storage systems.

Loans are administered by the Energy Saving Trust (under an externally procured contract). Successful loans are subject to an administrative fee of 1.5% of the total loan value, up to a maximum of £250. Landlords with five or fewer properties in their portfolio, pay 0% interest on the loan, but those with 6 or more are subject to interest at 3.5% per annum.

Energy Efficiency Scotland – Area Based Scheme

Changeworks (as described earlier), works in partnership with the Scottish Government, local authorities and Home Energy Scotland to deliver the Energy Efficient Scotland: Area Based Schemes (EES: ABS). This hasbeen in operation for over 12 years, supporting low income and vulnerable households across Scotland to install energy efficiency measures such as air source heat pumps, internal, external or cavity wall insulation. Financial support is provided by way of grant up to a total value of £12,000.

Other solutions:

Market demonstrator pilot in Scotland

Currently, support for energy efficiency measures in the self-funding or owner occupier sector is provided by the Scottish Government through the Home Energy Scotland loans scheme described above. There are no significant alternative financial products widely available in the market that are tailored for this purpose, especially for those on lower incomes.

Given the scale of ambition to decarbonise Scotland's homes, it will not be possible for the Scottish Government to fund the level of financial assistance that will be required to support delivery. Consequently, other mechanisms have been considered in understanding how government support can be effectively used to leverage other(private sector) forms of funding.

Initial Development Work on Demonstrator project

The Scottish Government has been working with Glasgow Credit Union ('GCU') (a financial mutual, owned by its members, and operated on a not-for-profit basis) to scope out potential financial products that might be offered to its customers. GCU is the largest and most successful credit union in the UK with over 50,000 members. They offer loans, savings and mortgages exclusively to people who live or work within the Glasgow 'G' postcode area.

Taking account of developing policy in relation to the likely targets and timelines for the owner occupied sector, which highlights the sale of a property as a potential intervention point, and the capacity of the credit union to support delivery, the following products are being developed as part of the market demonstrator:



Energy Efficient Mortgage 'top-up' loan

A potential scheme is being considered where mortgage borrowers could be offered a top up loan from GCU's funds to allow them to undertake an agreed package of measures to improve the energy efficiency and / or heat decarbonisation of the property they are purchasing.

The Scottish Government could then provide a guarantee to GCU that underwrites the risk of the topup loan provided by the credit union to householders, which will be made at zero or below market rates of interest. The use of a guarantee is from Scottish Government has several benefits from a public sector perspective;

- **Route to market** GCU can engage with members regarding energy efficiency improvements, that would not ordinarily occur otherwise
- Crowds in private money Capital provided by GCU and so the public sector balance sheet is protected
- Scalable creation of template documentation that might permit expansion to other national institutes
- Low Risk For mortgage top-ups, there is likely to be a very low rate of default

The alignment with mortgage borrowing is central to the proposal as it maps to emerging thinking on possible regulatory approaches that would come into play at the point of sale of a domestic property and a house-purchase or refinancing of existing mortgage is a key point when borrowers may be considering the need for upgrade work on a property.

Development of Green Mortgage Label

The aim is for the mortgage product could also fulfil the requirements of the EEMI definition of a 'green mortgage' and so enable a practical delivered example of this within the market. It is considered as key to have a label that is used across Europe to attract private market actors in financing the energy transition.

Unsecured energy efficiency loan

A similar Scottish Government guarantee might be provided for unsecured loans that borrowers may wish to use for undertaking energy efficiency and / or heat decarbonisation improvements.

Supporting the Customer journey

Scottish Government and GCU staff are also working together to look to develop the "customer journey" for borrowers, with the aim that the financial lending and advice, as well as delivery support for implementing the energy efficiency measures are aligned – an overview is provided below.





2.7 Quality Assurance & Consumer Protection

Objective: To ensure robust consumer protection, focussed on high standards of quality, customer care, competence, skills and training, and health and safety.

During 2020, the Scottish Government established a Quality Assurance framework following the work established by a Short Life Working Group on Quality Assurance, Consumer Protection, Skills and Supply Chain¹⁵. It embodies the following key principles.

2.7.1 The Energy Efficient Scotland Quality Assurance (QA) Principles

- Across the board there will be robust consumer protection that focuses on high standards of quality, customer care, competence, skills, training and health and safety.
- Individuals and businesses carrying out work under the Programme umbrella should be competent, appropriately trained and should agree to adhere to the Programme Code of Conduct.
- Individuals or businesses who fail to adhere to the standards or Code of Conduct will be removed from the scheme.
- There will be sufficient capacity in the supply chain to meet the demand for the Programme and be able to deliver the Programme offer.
- The Programme finance will only be made available where the Programme approved individuals or businesses are used.

¹⁵ https://www.gov.scot/publications/quality-assurance-short-life-working-group-report/pages/2/



- The Programme consumer protection should build on existing standards and frameworks and should represent good value for money.
- The Programme standards will be robustly enforced.
- Consumers will have access to simple and effective redress if things go wrong.

Establishing trust in Energy Efficiency Scotland will be key to its success and it is therefore important that products and services provided by the Programme are of the highest quality. The Scottish Government intends to achieve this by putting in place robust quality assurance requirements at every stage of the delivery process from the marketing and communications to the assessment and installation. This will ensure that consumers are protected, confidence in the programme is boosted and investment is attracted.

This Route Map sets out Scotland's commitment to developing a robust quality assurance framework covering all aspects of the Programme. In recent years, shortcomings in consumer protection and in the expected quality standards of installations in the renewable energy, energy efficiency and district heating sectors have emerged.

Citizens Advice Scotland and other organisations with consumers' interests at heart have highlighted this as an area of growing concern. Specific concerns have been raised about cold calling and misselling in the energy efficiency sector. In October 2015, the UK Government commissioned Dr Peter Bonfield to chair an Independent Review of Consumer Advice, Protection, Standards and Enforcement for UK home energy efficiency and renewable energy measures.

The Each Home Counts review identified many examples of exemplary performance of installing energy efficiency measures. However, it also found that too often interventions were not appropriately targeted, and, in a minority of cases, there was poor practice and substandard work being carried out. When considering the government's ambition to reduce fuel poverty and carbon emissions, it was evident that more was needed to be done in order to improve the UK's existing housing stock. The review was established to tackle the high level of failure present in domestic retrofit, and determine a better process for the retrofit of energy efficiency and renewable energy measures. As a result of this review PAS 2035 was introduced as the standards framework document for the end-to-end delivery of domestic retrofit work.

Establishment of PAS 2035

PAS 2035 (PAS 2035:2019 Specification for the energy retrofit of domestic buildings) was developed as part of the Each Home Counts process and is the overarching document in the retrofit standards framework, with which holders of the quality mark will be required to comply when carrying out domestic retrofit work.

This new framework provides a whole building approach to the retrofit process. Rather than retrofit work being considered in isolation (which can unintentionally damage the overall building performance), the new approach looks at the home, environment, occupancy and the householders' improvement objectives when determining suitable measures to install. Overall the process introduced by PAS 2035 is designed to improve the quality of retrofit work for domestic properties.



Ensuring that funding from banks and lenders is used towards good quality work which will actually improve the energy efficiency of housing.

From 1 July 2021 ECO, and all other UK government supported retrofit projects, will require compliance with PAS 2035. In Scotland, the Demonstrator project intends to use the standard to understand and develop the practical implication of the Standard on the ground, with the view to hopefully expanding and scaling its use more widely.

2.7.2 Use of the Standard

PAS 2035 aims to be used equally across the able-to-pay and funded markets. The retrofit standards framework may be applied to all domestic retrofit activity and embrace work that is initiated, procured, funded and delivered in a wide variety of ways including:

- Retrofit promoted/ funded by national or local government schemes
- Retrofit promoted/ funded by landlords, including social housing organisations, private landlords in the domestic sector and commercial property portfolio holders.
- Retrofit of individual buildings by their owners and/ or occupants, including both domestic and commercial owner-occupiers.
- Retrofit that is integrated with and forms part of broader repairs, maintenance and improvement (RMI) activity related to individual buildings or building stocks.

2.7.3 The quality mark



Figure 6 – Official brand

A quality mark has been introduced for the domestic retrofit sector, which is overseen by the Government Endorsed Quality Scheme, TrustMark. Retrofit Assessors, and Coordinators require this quality mark to show that they have been certified by an approved scheme (such as Elmhurst Energy) to deliver retrofit work in accordance with PAS 2035. With this quality mark they can also demonstrate to consumers that they have the skills and knowledge to deliver the best practice standards and trading practices in the sector.

Scope of the retrofit process

It is important to understand by what the retrofit process, and PAS 2035 includes the following:

- Assessment of dwellings for retrofit.
- Identification and evaluation of improvement options as part of the design process.
- Monitoring and Evaluation of retrofit projects.



The measures and intent include:

- Improvements to the insulation of the elements of the building fabric and reducing thermal bridging.
- Improvements to building services.
- Improvements to the airtightness of the building envelope.
- Establishing a safe dynamic moisture equilibrium through each element of the building fabric.
- Improving the resistance of the building envelope to water penetration.
- Providing metering and monitoring systems to promote the efficient use of energy.
- Advising building occupants about improvement options appropriate to their homes.
- Commissioning and handover of all of the above.

Application of Energy Hierarchy

Whatever the scale of retrofit, a 'fabric first' approach is encouraged as the most cost effective and technically sound. The five stages to this approach are: 1) Bring the building fabric into good repair, by dealing with defects that inhibit energy efficiency and compromise improvement measures such as water penetration, damp, structural defects and poor pointing masonry 2) Implement "low hanging fruit" measures that are low cost and easy to install, e.g. energy efficiency lighting, basic heating controls, better control settings 3) Improve the building fabric by means of insulation and air-tightness measures, and by minimising thermal bridging, in order to reduce heat losses and demand 4) Satisfy the remaining heat demand as efficiently as possible using efficient heating technology and responsive controls 5) Use LZC "renewable" energy technologies to reduce emissions further.

Key roles within the retrofit process

Retrofit Advisor – Gives advice to a client or householder during the retrofit process, the evaluation of improvement options, the selection of improvement measures (EEM), the retrofit design, the operation and maintenance of installed measures, as well as how to operate a home in an energy efficient way after retrofit.

Retrofit Assessors – Retrofit Assessors are trained to undertake a retrofit assessment for dwellings in accordance with PAS 2035. The activities completed within the retrofit assessment include the production of an RdSAP assessment, a detailed floor plan, a condition report and an occupancy assessment.

The data collected from these sources is used by the Retrofit Coordinator to formulate a Medium-Term Improvement Plan. Accredited DEAs are well placed to become qualified Retrofit Assessors due to their extensive knowledge and experience with RdSAP methodology and assessment of existing dwellings.

Retrofit Coordinator – Retrofit Coordinators are required for all domestic retrofit projects in order to comply with PAS 2035. The Retrofit Coordinator occupies a vital project management role within the retrofit process and is needed to protect both the interest of clients and the public. They are



responsible for overseeing a domestic retrofit project from inception to completion, and will liaise with building owners, and other retrofit project stakeholders in order to ensure effective project management. A Retrofit Coordinator can prepare a Medium-Term Improvement Plan using data from retrofit assessments, to provide a scope for improvement over a 20-30 year period.

Retrofit Designer – Package of information prepared by a Retrofit Designer that determines the unique combination of EEM systems, products, materials and their interrelationships, to be installed in a building in order to achieve specified energy efficiency and other outcomes for that building.

Retrofit Evaluators – Person qualified to monitor and evaluate the effectiveness of a retrofit project and provide feedback to the client / and or the project team.

Retrofit Installers – Person or organisation undertaking the physical placement of an energy efficiency measure(s) in an existing building. Installers are required to be compliant with an associated set of standards defined under PAS 2030.



The interaction of the roles are outlined in the following diagram

Figure 7 - Interaction of the roles

2.7.4 Application of PAS 2035

PAS 2035, although a lengthy and detailed document, in overview the PAS introduces a simple sixstage process that all retrofit projects must follow.





Figure 8 – PAS six-stage process

An example of a customer journey employing the principles highlighted above are included as an Appendix – Overview of a customer journey. The wide-ranging and still evolving nature of the



Programme, which includes a number of installation scenarios from individual properties to district heating networks covering householders, non-domestic premises and businesses, creates new challenges in developing protections that will be applicable in all circumstances. However, the programme also provides an opportunity to build on existing provisions and create an integrated, accessible and effective quality assurance framework.

The 2016 SNP manifesto committed to creating a consumer body to protect consumers. This represents another opportunity to ensure consumers are able to engage confidently with providers and suppliers and to make energy efficiency choices that suit their particular circumstances.

2.7.5 Consumer protection

Responsibility for consumer protection in energy efficiency, renewable energy and district heating is provided by a number of bodies - Trading Standards Scotland, Ofgem, ombudsman organisations and independent guarantee schemes. Quality standards, inspection, and levels of redress vary significantly between different organisations and compliance schemes.

Redress processes, where they exist, can be unclear, slow and difficult for consumers to navigate. Ultimately, they may not satisfactorily resolve the consumer's complaint. It is also important to note that consumer protection enforcement powers are reserved to the UK Government, although the Scottish Government has new powers to provide consumer advocacy and advice and is able to set quality requirements for installers on work carried out through the Programme incentives and other Scottish Government schemes.

Consumer protection and quality assurance must underpin the Programme. Through consultation feedback the Scottish Government has identified a set of key principles that will sit at the heart of Scotland's work in this area. These principles will ensure that across the board there is robust consumer protection, focussed on high standards of quality, customer care, competence, skills and training, and health and safety. The Scottish Government set up a Short Life Working Group that will use these principles to develop a quality assurance framework that became operational in 2020.

The Bank of England prudently regulates and supervises financial services firms through the Prudential Regulation Authority (PRA), which sets standards and supervises financial institutions at the level of the individual firm, and ensures that consumers are protected and treated fairly. Glasgow Credit Union, as a retail finance institution, is required to follow and comply with the rules detailed in the PRAs Credit Union Rulebook. This covers various key areas including; governance and organisation, capital, liquidity, additional activities, maximum deposit levels, fixed-rate shares and deposits, lending, and investment. As part of any market demonstrator project development, GCU will be required to ensure that the Regulatory requirements are met in relation to the products offered as part of the pilot.



Integration with Energy Efficient Scotland Work

In addition to testing the market delivery of financial products, the market demonstrator project provides an opportunity to test some of the emerging approaches being developed within Scotland to support the delivery of heat decarbonisation more generally within the domestic market going forward.

Quality assurance and consumer confidence are a key consideration for promoting uptake of measures by homeowners, and the market demonstrator allows development and access to good quality advice on appropriate measures, ensuring that these measures are delivered by dependable contractors and to a suitable quality standard is ongoing.

The market demonstrator project has been identified as an opportunity to test out some of the emerging quality assurance approaches in a real-world environment. Customers taking up the financial products under the demonstrator project could be offered quality assurance options as part of their customer journey, allowing a range of approaches to be tested that could form part of the eventual support offer to owner occupiers as the programme expands. This would increase the overall understanding of public attitudes and appetite for support mechanisms, including paid for "handholding" services, and assist future development work in this area. The demonstrator can support testing of emerging approaches to assessment and advice on suitable energy efficiency measures, together with supporting supply chain development. These areas will utilise the recently established PAS 2035 standards which are detailed further below.



2.8 Monitoring & Evaluation

Objective: Monitoring and evaluation of progress to ensure that aims and objectives are met. This monitoring and evaluation should allow for adaptation and flexibility where necessary.

2.8.1 Current monitoring

In order to ensure the Scottish carbon emissions from buildings, and ensuring the aims and objectives set out in its Heat in Buildings Strategy¹⁶, that a monitoring and evaluating the programme throughout its lifetime is key.

Currently, monitoring of progress is undertaken via periodic publication of Climate Change updates which occur every 4 years. Additionally, certain aspects of energy efficiency improvement are reflected in an annual review called the Scottish House Condition Survey. This is the largest single housing research project in Scotland, and the only national survey to look at the physical condition of Scotland's homes as well as the experiences of householders. Key measures such as EPC ratings across various building tenure types (private rented, owner occupied, and social housing) and form of property e.g. flat, detached, semi-detached, or 4-in-a-block. The survey fieldwork runs from January to December each year, and provides an overview of improvements in energy efficiency within Scotland's housing stock. This monitoring and evaluation allows the Scottish Government to adapt and flex its programmes where necessary.

2.8.2 Additional monitoring

As well as looking at the broad outputs described above, the Scottish Government will be monitoring and measuring outcomes, capturing the impact that programmes have on people and communities.

Scottish Government will be publishing a monitoring and evaluation framework which is ready for implementation by the end of the transition period, setting out:

- A comprehensive framework covering both the domestic and non-domestic sectors;
- A range of output and outcome indicators to inform an annual statement of progress, taking account of the Climate Change Plan monitoring framework, monitoring and evaluation requirements for Fuel Poverty as set out in the Fuel Poverty (Scotland) Bill and other appropriate policies; and
- A commitment to regular, multi-year review (anticipated to be every 4 years) and evaluation of the programme, aligned where appropriate with reporting processes for key policy areas such as Fuel Poverty and the Climate Change Plan. This will include the commissioning of external evaluation of key elements of the Programme at key points across the 20 year period.

¹⁶ https://www.gov.scot/publications/heat-buildings-strategy-achieving-net-zero-emissions-scotlands-buildings/



As part of this work Scottish Government will be reviewing the available data, identifying where any gaps exist and where it can draw on existing evidence, ensuring the Scottish Government has the most accurate possible baseline for its domestic and non-domestic building stock. The Scottish Government is committed to working with relevant bodies to collect good quality data to support the monitoring of the programme. The Scottish Government will also be engaging with stakeholders on the development of its monitoring and evaluation framework to ensure that it meets a range of needs.

To underpin the monitoring and evaluation cycle, in 2020 Scottish Government will be publishing a baseline setting out the state of Scotland's building stock against which the Scottish Government will track improvements over the duration of the Programme. This monitoring and evaluation approach will ensure there is clarity from the outset on the information which will determine whether the Programme aims and objectives have been achieved.



3 Autonomous Province of Trento ('PAT')

3.1 Introduction

The Province of Trento (Italy) is a frontier land in the heart of the Alps with 533,000 inhabitants. The province constitutes, together with the autonomous Province of Bolzano, the Trentino Alto-Adige Italian region. The Statute of Autonomy, codified in a specific agreement signed by Italy and Austria, grants the Autonomous Province direct legislative, administrative and financial jurisdiction in fundamental areas, allowing it to manage 90% of direct and indirect income collected within the Province.

In the last years, the PAT (Autonomous Province of Trento) has developed a powerful stimulus for developing new ways of conceiving, producing, and selling goods and services that combine innovation and environmental sustainability. Today Trentino can boast excellent technical knowledge and production know-how in green technology, sustainable wood buildings, renewable energy, and innovative technologies associated with sustainable mobility. Trentino is the second Region in Italy in terms of clean energy production, having energy exceeding its daily requirements with its hydroelectric power stations.

Trentino is the first Italian technological district for sustainable building and renewable energy. The expertise of Trentino businesses and research centres in "green" technology was recognized by the Italian Ministry for Universities and Scientific Research, set up in 2006 as the first Italian technological district in the environmental technology sector.¹⁷

The 2021-2030 Provincial plan for energy and environment (PEAP 2021-2030¹⁸, see assessment section) incisively deals with reducing energy consumption and consequent emissions, with particular reference primarily to the construction sector, representing 40% of the local energy needs in terms of consumption.¹⁹ The PAT plan (PEAP 2021-2030) defines that in 10 years, all buildings in Trentino will have to be significantly different, and the EPCs are a tool for accelerating and attesting to this change. In fact, the sector that most affects energy consumption in Trentino is the civil sector (40-43%), followed by the transport sector (30-33%), while the industrial sector affects 24-25%. The agricultural industry and electrical losses finally cover 2% and 1%, respectively. The four industries consume energy from different sources. In fact, in the transport sector, the primary source of consumption is oil products.²⁰

¹⁷ Trentino, to be small means great things, available at:

https://trentinosviluppo.it/public/file/brochure/Piccola_TERRA_inglese_2013.pdf

¹⁸ Available at: http://www.energia.provincia.tn.it/peap/

¹⁹ PEAP: PIANO ENERGETICO AMBIENTALE PROVINCIALE 2021-2030, Aprie, page 5

²⁰ Data retrievable from PEAP: PIANO ENERGETICO AMBIENTALE PROVINCIALE 2021-2030, Aprie, page 37



This report is the result of interviews conducted by Crif in partnership with the Provincial Agency for water resources and energy (APRIE²¹), responsible for the environmental energy plan of the province of Trento, and local credit institutions.

²¹ http://www.energia.provincia.tn.it/



3.2 Delivery mechanisms, Skills & Supply

Objective: to provide support and actively promote the opportunities of the market in energy efficiency in buildings for companies in the jurisdictions, as well as ensuring that the quality of the work carried out by the supply chain is of a high standard and that installers are suitably qualified.

In June 2021, the PEAP 2021-2030 defines the political strategy of the Province of Trento to reduce CO2 emissions and mitigate the effects of climate change. Concerning the building sector, the energy plan published a recent study by the University of Trento that shows that around 40% of the current energy consumption in Trento is related to private residential buildings. Notably, the most energy-intensive building type is multifamily, particularly those properties built between 1945 and 1990, as shown in the Figure below²².



Figure 9 - From PEAP 2021-2030

So, the energy plan supports building renovation public policy, namely instruments and tools, among them some initiatives and economic incentives directed to the most relevant target of buildings: condominiums built before 1993. Since 2016 the Province of Trento has focused on supporting the energy efficiency renovation of condominiums with local incentives concentrating on sustaining the inhabitants' expenses related to energy audits, aimed at checking the current retrofitting opportunities based on the as-is status of the building, projecting, and the mortgage's interests. The Province created a network among all the local stakeholders to support the process shown in the following Figure.

²² PEAP: PIANO ENERGETICO AMBIENTALE PROVINCIALE 2021-2030, Aprie, Figura 1, page 93





Figure 10 - from 'ENERGY EFFICIENCY RENOVATION OF PRIVATE BUILDINGS' presentation, Aprie

Additionally, PAT encouraged the creation of a board of stakeholders with representatives of professional figures, the financial sector, local government, and enterprises, as shown below.



Figure 11 - From 'ENERGY EFFICIENCY RENOVATION OF PRIVATE BUILDINGS' presentation, Aprie

Due to the modification of the European and national framework, in February 2021, the board of stakeholders changed, including the *Consorzio dei Comuni trentini* (a consortium of all the



municipalities and the local authorities in Trentino), the professional association of accountants (to help us to use the fiscal incentives) and the *Polo Edilizia* 4.0²³, an association between enterprises and technical figures who is working promoting the renovation of buildings.

The new network supports the Province of Trento for delivery mechanisms, provides information to different categories, and promotes local and national incentives and market opportunities for buildings' energy efficiency. Trento's experience proved to be successful as, for the first time, all the critical actors involved in the retrofitting process have been collaborating on the same board, also building new strategic relationships; allowing actors to focalize on the existing obstacles of the process and how to deal with them, such as:

- Stimulating the local production chain and enterprises networking;
- Creating exchanges between the participants to compare strategies and measures;
- Sharing knowledge of specific tools;
- Supporting diffusion and access to financing and facilitation mechanisms;
- Suggesting and coordinating information and training initiatives.

The *Tavolo Condomini* has, in particular, contributed to the development of tools that were presented during events, including a *Vademecum* for reporting procedures to condominium administrators and the "*condominium tool*": an electronic tool capable of representing the payback times and a booklet intended for all citizens with an explanation of the different procedures and intervention phases of the redevelopment process. The Province is trying to stimulate this market segment which represents the most challenging part in terms of engagement and intervention application. Indeed, the Province has defined its strategy based on the fact that it can show in the condominium meetings the advantages of the renovation's interventions, stimulating the interest of the inhabitants. Building administrators are crucial actors in the process, so they should be able to promote the opportunities of the market for energy efficiency in buildings. In the last years, the Autonomous Province of Trento has also activated measures in favour of companies and local banks for mortgages and credits corresponding to the tax deduction.

Finally, thanks to "Tavolo Condomini", PAT has also collected some examples; however, some of the actors participated only passively, reducing the potential of this network. New types of incentives or new patterns for creating partnerships will be fundamental in the future to make initiatives like these most successful.

²³ "The associationPolo Edilizia 4.0 was officially born in October 2019. A new and operational reality that brings together the Trentino entities involved in the construction sector." See https://poloedilizia.tn.it/



3.3 Branding, marketing & Comms

Objective: To build communications that motivate owners and occupiers to access the advice and support on offer, based on a strong brand for the Programme that inspires trust and raises awareness, as well as targeted messages for each sector that make the case for improving energy efficiency.

The stakeholder network was essential to provide education and information. In 2020-22 the Superbonus 110% initiative was the Italian target, and Trento worked to gather and show some best practices of renovation and energy efficiency works. The Superbonus framework is an example of standardization regarding goals and standards. From the last quarter of 2020 to May 2022, over 700 million euros have been invested throughout the Trentino-Alto Adige region²⁴. Indeed, the national Superbonus 110% schema changed the panorama of the energy efficiency market. In 2020-2021, ventures were focused on strengthening and facilitating the local application of this national fiscal incentive. Specifically, the Province of Trento modified its economic stimulus on the existing building stock's green transition to facilitate its use and amplify provincial investments. The Superbonus has made the initiatives less attractive to citizens. Energy efficiency and its economic convenience were less important for people because the reimbursement of 110% of the expenses. So with the so-called Superbonus110%, the Provincial decided to modify the incentives to broaden the knowledge of the energy and seismic state of the Trentino building heritage.

²⁴ Data from ENEA monthly report on Superbonus: https://www.efficienzaenergetica.enea.it/detrazionifiscali/superbonus/risultati-superbonus.html





Figure 12 - Iconography from infoenergia.provincia.tn.it - Superbonus 110%

The change of scenario due to the Superbonus highlighted that banks are crucial to providing information on the initiatives for energy redevelopment. For this reason, it is essential to create partnerships with banks to communicate with citizens, increase channels to stimulate the population, and increase energy redevelopment interventions.

Now the Italian local administration should be able to keep high the attention to these topics, including building administrators, as Trento did for "II tuo condominio green".²⁵ The goal is to stimulate the energy diagnosis in every case and the consciousness of the inhabitants concerning the current energy performances of the owned properties. The Autonomous Province of Trento encourages the diagnosis of condominiums even if the works are not planned or realized. If action is taken, the Province contributes to the expense. This incentive scheme is eligible for:

²⁵ The Autonomous Province of Trento has made resources available for over 2 million euros since 2016, intended to redevelop about 15,000 condominiums. **Condominiums are key factors to improve energy efficiency, and fiscal incentives has been designed for them since 2016.**



- expenses related to the role of the buildings' administrator in the case of condominium decides to start with the renovation process
- expenses related to the energy audit on the building, only if after the energy audit, the condominium decides not to start with the renovation process. If the renovation starts, this expenses can be included in 110%.
- expenses for anti-seismic systems (in a specific area of the Province that is formally at risk).

Indeed, the Province has defined its strategy based on the fact that everyone can show in the condominium meetings the advantages of the renovation's interventions, stimulating the interest of the inhabitants: landlords, technicians that are invited to participate in that meetings, and also condominium managers. This step is critical because, when it comes to condominiums, the possibility of retrofitting the property passes through a general agreement between all, or at least the majority of the owners. With all this in mind, the Province's communication campaign was based flyers (see Figure below), articles on different platforms, social media, and official websites, videos, ad hoc meetings with technical experts and financial actors (e.g. banks).



Figure 13 - Iconography from infoenergia.provincia.tn.it - Superbonus 110%

The strategy of the Province includes the boost to the sustainable energy, in order to cover the energy that renovated buildings need. In this perspective, a provincial law related to the renewable sources has been approved, n. 4/2022, and some initiatives has been put in place.

One of this is "Photovoltaic for families" is another Trentino project on sustainable energy, a territorial collaboration to facilitate the construction of a photovoltaic system, allowing each family to impact their energy bill positively. The motto is "energy from the territory and for the territory". With the



approved rules, the Province has made practical tools available to citizens, families, and companies to encourage sustainable energy production. It represents a response in a moment of energetic crisis, helping the decarbonization objectives that the Province has given itself with the provincial environmental energy plan 2021-2030.



3.4 Advice & Information

Objective: To provide all households with access to good quality, independent advice and information on improving the energy efficiency of their property and reducing their fuel bills.

The Province of Trento built a dedicated website to orientate citizens on the existing public (national and local) economic and financial mechanisms. The homepage contains the following sentence: *these sections show the main financing possibilities, both provincial and nationwide, for the energy requalification of private and public buildings*. The website provides information about financing the building stock's renovation and sustainable mobility, energy production, news, and events.



Figure 14 - From infoenergia.provincia.tn.it



Figure 15 - From infoenergia.provincia.tn.it

These sections show the main financing possibilities, both provincial and national, for the energy requalification of private (Edifici Privati) and public buildings (Edifici Pubblici).



Mobilità sostenibile



Figure 16 - From infoenergia.provincia.tn.it

The website provides information also on sustainable mobility: For the transition to less polluting modes of transport, provincial incentives are available for citizens, businesses, and public bodies.

The focus of the analysis is a section of the website that shows the main types of financing for the energy requalification of private buildings, organised according to the interventions that can be implemented (figure below). Tables indicate the most common interventions and report the different funding channels that can be activated. Each type of financing identified corresponds to a form containing the preliminary information and the interventions that can be financed, the respective legislation and useful links. The tables below are designed to indicate the most common interventions and report the different financing channels that can be activated. The first type of financing shown for each intervention is the most convenient. It is also highlighted that the Province adds resources for the energy redevelopment of condominiums. And that it is always possible to activate an energy performance/EPC contract, which provides that an external company takes over the cost of the investment.





Figure 17 - From infoenergia.provincia.tn.it

Each type of financing identified corresponds to a page where citizens can find information on the interventions, the respective legislation, and useful links. The overviews of each fiscal deduction permit knowing the initiatives, including mechanisms and benefits. With this webpage, the Province has reorganized the current legislative framework for revaluating building stock. With the Superbonus are also reported new initiatives such as plans to encourage photovoltaic installation.

One of the sections of the site Infoenenergia²⁶ collects good practices in Trentino, providing details on opportunities in the field of energy efficiency through examples. As constructions of the early 80s that passes from the energy class E to the A1 class, with some interventions on windows, walls insulation and boilers.

A table with information on building permits and energy certifications was published to support those planning to access the Superbonus 110%. Through a web portal developed by the local administration, the landlords can collect information on the incentives and then access the service related to the provincial incentives, uploading all the tax documents of the payments to the web portal and, of

²⁶ https://infoenergia.provincia.tn.it/



course, all the identification data of the applicant and the property. The Superbonus was a great communication opportunity because it contributed to spreading the energy efficiency culture. However, there are critical issues, and it can be improved. One of his inheritances is that today all the population knows that improving energy performance is possible. If banks, enterprises, and administration find ways to provide even more consultancy to families, the energy efficiency sector will benefit from it.

The communication campaigns are not focused only on restructuring the real estate portfolio. Indeed, initiatives to increase clean energy production, such as "Photovoltaic for families", are part of the strategy to reduce emissions. Following the European directive on renewable energy of 2018, and implemented in Italy by Legislative Decree 8 November 2021 n.199, Trento defines communities of self-consumption of renewable energy. In particular, citizens are not only consumers. They can produce energy from renewable sources for their own needs or car consumption by networking with others through a community. The provincial environmental energy plan 2021-2030 inserted a strategic line to encourage the development of the energy communities. It will have an essential role in pursuing the local objective of reducing 55% emissions by 2030. From a preliminary analysis emerges that, for a single user, the self-consumption of a fraction greater than 40% of the self-produced energy from the photovoltaic source is complicated. The analysis showed that benefits are available by sharing electricity with other domestic users. The results show how self-consumption can be increased by 3% if the exchange occurs at the condominium level or by 6% if the exchange occurs at the district level and involves buildings with different construction characteristics. These benefits can be further increased if the operations of large appliances are optimized.



3.5 Assessment

Objective: An Action Plan' that records both the improvement targets and the measures that will be undertaken to meet them.

In October 2020, with the "Renovation Wave Strategy" communication, the European Commission aimed to double redevelopment rates in the next ten years. The objectives of this Renovation Wave are:

- the strengthening of the rules on the energy performance of the buildings;
- to guarantee accessible and targeted funding, including those of the Nextgeneration EU;
- the strengthening of skills for the redevelopment of buildings;
- the expansion of the market of products and services for sustainable constructions;
- the creation of an interdisciplinary network and the creation of Zero-Energy Districts through a local approach.

Furthermore, the revision of the EPB Directive will be a significant legislative change to refer to new minimum energy performance standards for different buildings (public and private, non residential and residential).



Figure 18 – PEAP cover

The Provincial Environmental Energy Plan 2021-2030 (PEAP) was drawn up by the Provincial Agency for water resources and energy (APRIE). Energy and environment are the two themes addressed by the plan that concern many sectors and involve all the actors: institutions, citizens, and businesses. These strategic actions must be planned responsibly and consciously to program the sustainable development of the territory.

One of the pieces at the base of the plan is the fight against climate change: the reduction of energy consumption and the transition to renewable energy. The goal for reducing gas emissions is very high, but the latest European indications brought the emissions reduction target in 2030 to 55% compared to 1990. For decarbonization objectives, the program plans to continue transitioning actions to renewable sources by aiming for the energy autonomy of our province. Trentino starts from a good position, but the plan provides, in addition to maintaining hydroelectric production, a strategic sector for Trentino, also necessary actions that concern woody biomass, with particular regard to district heating systems as renewable energy production sources.



The PEAP has a crucial and strategic role in identifying the lines to achieve the purposes of decarbonization of the provincial territory and defining the priority strategies to reduce emissions. In particular, it is planned to improve the energy and emissive performance of buildings and thermal systems and on the promotion of sources of renewable energy. In concrete terms, actions identified are the promotion of energy-saving and the energy redevelopment of buildings, the renewal of woodburning domestic heat generators, and the awareness of the population on good combustion practices of the wood. Adopting technologies capable of guaranteeing optimal combustion processes of wood biomass represents an aspect of great importance not only against the protection of air quality but also in reducing climbing emissions. Considering three types of intervention - opaque insulation envelope, window replacement, condensing boiler installation - and related combinations, the total potential associated with energy redevelopment has been evaluated. According to a cost-optimal methodology, the most effective interventions have been identified to effectively identify the best strategies to direct investments in the energy efficiency field. By ordering the most convenient investments, it was possible to create an investment/energy saving curve, the so-called "marginal curve of investment intensity", which has made it possible to analyse different levels of intervention, recognizing in the replacement of boilers and the wall insulation the two key actions. These interventions and the self-production of clean energy will be crucial in achieving the objectives. To better manage the transformation of the building stock, it is necessary that each building of the territory has an EPC.

The document also set goals for mobility, hydroelectric plans, and industry, focusing on Covid-19 impacts, and defining the scenario for reducing emissions before 2030.

For a drastic reduction in energy consumption, the deep energy redevelopment of existing civil buildings and an increase in individual and collective self-consumption are the first of twelve objectives. Another goal is related to the high-efficiency industry and the development of high-efficiency industrial production technologies, combined with storage technologies, generation from renewables, and integrated management approach.

Sustainable mobility and differentiation of energy production from renewable sources are other points for the "intelligent" management of energy flows in buildings and energy communities. The last goal is to promote education, training, and information to involve citizens in the transition to clean energy.



3.6 Finance

Objective: To catalyse financing mechanisms, for example, grant and loan funding, fiscal advantages, across different tenure and sectors to support improvements to the local building stock.

3.6.1 Public incentives in Trento

The Autonomous Province of Trento has actively promoted the energy efficiency market since 1980.

Recently, the Province of Trento has helped owners to enter and begin the process of renovation financing. In 2021-22 the local administration covered the expenses in cases such as:

- 50% of the costs of energetic diagnosis, if the intervention does not access the Superbonus 110%;
- 50% of the expenses of the condominium's administrator if the interventions are eligible under the Superbonus 110% measure. Local policies, therefore, aim to remunerate the administrators of condominiums, who are central to defining the strategy of the condominium. The local administration acted complementary and parallel to the national legislation because, at the national level, it is not envisaged that administrators can be remunerated for carrying out energy redevelopment projects.

The Province has incentives covering 100% of the initial energy audits and 90% of the designing and mortgage interest costs. That was possible also thanks to the established cooperation between local banks, public institutions, and the stakeholders' network. Additionally, as described in section 3, the Province actively promotes the energy efficiency market through awareness campaigns and digital tools. Clear information allows citizens to exploit the opportunities for subsidized funding and/or to exploit national resources for redevelopment. The local administration has supported a network of specialists to achieve the objectives of lower emissions. Estate owners, technicians (as architects and professionals such as thermal engineers), condominium administrators, and credit institutions have been involved in Tavolo condominiums, a Province's initiative to support owners in defining an energy-efficient renovation plan.

When the current national incentives change and the Superbonus are no longer usable, interventions on boilers, wall insulation, and self-generation of electricity remain crucial to reduce the emissions of the building stock. The provincial administration aims to incentivize renewable energy and energy communities in the near future by investing in bureaucratic simplification. For now, banks have not defined ecosystems in which they are central, but they are still an active part in the development of the energy efficiency market (see Superbonus) and will be so for the energy communities, central to the strategies of the local administration.

One of the pillars of the EeMMIP project was to identify a building to be used as a case study to analyse the application of technical and financial solutions. Indeed, the Province of Trento published an official document of interest in the project to stimulate the project's awareness in the stakeholder network. This building would be subject to renovation, reaching a high energy efficiency and providing the data related to energy consumption over time. To guarantee the impartiality and transparency required at



public offices, APRIE has published a declaration of interest. It was published in 30+30 days, and the stakeholder network helped the diffusion of the news. The expression of interest did not perform good results in terms of examples; finding cases studied in a preliminary stage was not possible. However, two local banks, parts of the existing network, collaborated to analyse the financing products currently active for energy efficiency in Trento.

3.6.2 An example of Green Loan

*Cassa Rurale Vallagarina*²⁷ is a cooperative credit bank with 18 branches, over 7,000 members, and 31,000 customers. The Bank undertakes to make the principle of mutuality concrete, trying to meet the financial needs of shareholders and customers and promote initiatives of various kinds to contribute to the development and improvement of the territories. Initiatives and interventions are listed each year in the Social Report. The Bank is connected to households and small and medium-sized enterprises, creating a virtuous circuit with and reinvesting resources in the local economy through loans to businesses and families and supporting growth and employment in local communities.



Figure 19 - From crvallagarina.it - Cooperative, sustainable, responsible

The institute has been equipped with a specific product for the energy requalification of buildings for ten years. The product was created in response to a need to redevelop buildings and repopulate a territory that risks impoverishing real estate values and socio-economic demographics. The Bank's actions focus on knowledge and relationships with its shareholders. Trust between the parties is distinctive, and as a result, less documentation is required for the benefit of all parties. The relationship created is not limited to that bank customer; the close customer/supplier relationship is a characteristic element of the product, and the developed network acts as an instrument to increase quality. The promotion of local technicians and businesses is an objective of the Bank and this product. To connect the local supply chain to the initiative, the Bank developed an initiative to grant for businesses reduced rate lines in advance. Therefore, an ecosystem of "bank's customers" was activated. If the technician is a banking customer (verification takes place with bank transfer control),

²⁷ Information available at: https://www.crvallagarina.it



the rate of the end customer is reduced. To obtain this benefit, a criterion of prevalence has been designed: the customer must employ local businesses that are bank customers for at least 50% of the work amount.

With the local dimension and knowledge of the artisans, the Bank has a natural ability to monitoring the progress of the works. This possibility is a competitive advantage that allows you to reduce control and verification processes. Other distinctive features are:

- The loan is typically used to purchase and install heat pumps and photovoltaic systems.
- Through this product, the institute guarantees an increase in the property's value or greater stability over time.
- The product created is simple, with a limit of 50,000 euros and a maximum duration of 10 years (consistent with the duration of the tax benefits).
- The product is flexible in defining the duration and calibrated according to the expected tax benefits, aiming to make the instalment coincide with the cash flow deriving from the benefit.
- In the event of purchase plus renovation, this product joins the mortgage.
- The customer provides a declaration of the increase of two energy classes and the technician one of the installation.

3.6.3 Green Loans and other initiative

*Cassa Rurale Alta Valsugana*²⁸ was born from the merger of 4 realities belonging to the territory of Alta Valsugana. The four rural banks have been the protagonists of the community's social life for over a century. The Cassa Rurale Alta Valsugana was born in 2016 from a common strategic design to adequately support the families and businesses of the territory by safeguarding a heritage of economic, financial, and cooperative values. Today there are 17 branches, over 9,000 members and 40,000 customers.

Recently, the institution has equipped itself with a line of funding for those who make choices that have sustainable mobility and life within high energy efficiency and low environmental impact. Concerning homes, there is a product for improving energy efficiency that finances the installation of photovoltaic systems, hydraulic panels, domestic fuel cells, heat pumps, and bioclimatic greenhouses. A product has been launched to support customers for the Superbonus 110% journey. And finally, a mortgage that has an exceptional rate if the customer buy, renovate or build a property that obtains the Arca or CasaClima certification. The name of the product is "zero impact", to which a customer sensitization campaign has been refined to buy, build, or renovate properties with low environmental impact.

The development of green products is not the only activity to finance energy efficiency, in fact, in April 2022, the project "Mountain University Village Lagorai" (Muv Lagorai) was presented, that satisfies the growing housing needs of those who chose Trentino as a destination for their university course. The project is promoted and supported by the *Cassa Rurale Alta Valsugana* through the relative Foundation, with the support of the Municipality of Pergine Valsugana and the sharing of the University of Trento, which will be able to host up to 400 beds.

²⁸ Information available at: www.cr-altavalsugana.net





Figure 20 - From cr-altavalsugana.net

Muv Lagorai was born from an urban regeneration operation of an unused area. The constructions include an articulated residential complex and related services for students, an urban park, public Wi-Fi, and a square. The housing function is inserted in a series of green buildings equipped with support services that can meet the needs of modern and qualified student residents. Particular attention has been paid to the most recent technologies for the management of energy needs covered in the majority by renewable sources. Nearby there are numerous commercial activities, services, and cultural spaces. The project is PPP (Public-Private Partnership), where the subjects are: Foundation, local administrations, Funds from the National Resilience Plan and private individuals.



3.7 Quality Assurance & Consumer Protection

Objective: To ensure robust consumer protection, focussed on high standards of quality, customer care, competence, skills and training, and health and safety.

The autonomous province of Trento for urban planning, regulatory plans and landscape protection has also defined KPIs. These indicators have been defined to promote sustainable and durable development through saving the territory, incentivizing redevelopment techniques, and limiting the use of new territorial resources. One of the purposes of the legislation is to ensure the development and social cohesion of the provincial territory within the framework of national and European development processes and in the growth and safeguarding and local cultural safeguard.

KPIs²⁹:

- a) environmental impact of the building and the construction site;
- b) overall energy consumption for different functions;
- c) water consumption with the recovery of rainwater;
- d) use of recycled materials and natural products;
- e) the origin of the building materials;
- f) use of the certified wood of regional origin;
- g) internal comfort about air quality and natural lighting;
- h) use of renewable energy sources;
- i) management and maintenance costs of the complex building plants;
- j) integrated design of structures and plants;
- k) certification process according to international rules or standards.

The existing regulation in the Province of Trento already requires high energy performance, namely "zero energy building", in case of new buildings and major renovations. In addition, Trentino supported private institutions in elaborating sustainability and quality protocols for buildings. The headquarters of GBC is hosted in Rovereto (TN) and developed the Italian transposition of some LEED protocols, such as GBC Home, GBC Historical Building and GBC Neighbourhood. In addition, Trentino Sviluppo, the in-house company dedicated to business, has developed the ARCA protocol for the quality construction of wooden buildings. All these labels are now recognized quality assurance labels, and local law gives some primality to new construction that uses these protocols.

As mentioned before, EPCs are a useful tool for accelerating and attesting energy efficiency of buildings. Trentino has chosen a "fixed intervals" energy classification scale, differentiating the local Energy Performance Certificate from the national regulation. Fixed values identify the intervals of energy classes in terms of needed energy. The calculation of the EPC class is standardized according to the climatic conditions of the Municipality of Trento (2567 degrees day, climatic zone E, altitude 194 m a.s.l.) according to the defined needs for the heating service, the production of domestic hot

²⁹ Urbanistic Law, Art. 85, resolution n. 2091, 3th December 2021



water, and for the possible mechanical ventilation. There are some cases in which the energy performance certificate drawn up according to the state legislation is required, such as in the case of access to tax deductions for interventions aimed at energy saving, generating the need to draw up two certificates (local and national one), each for a different purpose.

Since 2009, the Autonomous Province of Trento, implementing the European Directive 2002/91/CE on Energy Performance of Buildings, has legislated defining the regulation for its territory and the energy needings measures. A specific code defines the characteristics of the energy performance certificate and its calculation method. Academic studies have shown that actual consumption tends to deviate from those indicated in the EPC. In particular, the consumption in the best energy classes (from A to C) is higher than estimated values in the certificate, while no-efficient buildings have lower consumption than expectations. The result is a flattening of consumption towards those of the central EPC classes. This effect is mainly attributable to significant or lower management costs and consequent user habits change. This trend is confirmed from the analysis carried out on the provincial territory [Baggio et al., Article in elaboration], as reported in **the graph below**.





To manage the transformation of the construction sector, it is necessary that each building in the area has its EPC, as a starting point for energy redevelopment, together with a possible final audit. The combination of monitoring actual consumption both before and after the refurbishment works will be fundamental, also to encourage a more significant commitment to the building's use, as well as constant monitoring by the competent organs in terms of power. Instead to obtain more comprehensive protection of consumers and optimize quality standards, increasing them together with health and safety, it is necessary to delegate the local administrations and provide them to control them to apply regulations and laws strictly. The centralized management of the Superbonus data makes it more challenging to know the expected results for local administrations and therefore develop new strategies relating to the properties subject to interventions relating to this incentive.



3.8 Monitoring & Evaluation

Objective: Monitoring and evaluation of progress to ensure that aims and objectives are met. This monitoring and evaluation should allow for adaptation and flexibility where necessary.

Since 2010 the Province has started recording the number of buildings that have been refurbished, keeping track of the progress in buildings' energy efficiency. To facilitate energy efficiency analysis, the Province built an open-access database on EPCs. The dataset is public, and it gathers all the necessary information related to the geo-localisation of the building, physical characteristics, existing energy systems and related energy performances.

By analysing the "motivation" field in the cadastre database, it is possible to note that the energy requalifications, tax deductions and the renovations (important and non-important) represent an increasingly largest share for which the certificates are requested, going from 3% in 2017 to 12, 7% of 2022.

Analysing the energy performance certificates recorded in the Energetic cadaster of Trento since 2010 and until 20 May 2022, it appears that the residential construction is the more common category of buildings for which an EPC has been issued. The chart shows the distribution in terms of EPC Class and building typology.





The 5% of the 135.000 registered EPCs is in class A, but it becomes 4% analysing only commercial properties. About half of the real estate stock is in the A-C classes, and only 25% are in categories F or G. Buying and selling real estate or rent are the most common reasons why the EPC has been issued.



Analysing the data available in the energy cadastre and focusing only on the residential properties in the climatic zone 'E', the threshold for the TOP15% in Trento is about 85 kWh/m2 per year. The same threshold is over 120 in the Lombard Energy Cadastre. This result is not only due to the methods of calculating the certificate but instead affirms a more excellent quality of the buildings and the success of policies for energy efficiency.

The energy strategy of Trentino to 2030 must be supported by statistical data for a solid decisionmaking process. For this purpose, energy budgets are basic information for energy policy evaluation. Since energy is vital for many sectors of the economy, the data on energy is also used in other sectors, among which the most important are transport and the fight against climate change. Energy budgets facilitate the evaluation of progress also in these sectors. The current energy balance is developed in the years 2014-2016, and the reference year for the subsequent elaborations of the provincial environmental energy plan 2021-2030 is 2016. Indicators for monitoring measure the PEAP's result have been defined to be coherent with:

- European legislation;
- The new water protection plan;
- The 5th update of the provincial waste management plan (urban waste sections)
- The plan of sustainable mobility;
- The results of the SPROSS.

4 Conclusion of report findings

The following table provides a summary of key activities undertaken in the jurisdictions of Scotland and the Province of Trento, that support each of the key seven pillars described to successfully develop and build a customer journey for decarbonisation and retrofit of buildings.

Area Objective	Scotland	Province of Trento
Delivery mechanisms, skills and supply	Scotland uses a combination of both National (Government run) and Locally supported (Local Authority supported) delivery mechanisms to support the domestic & SME sectors as well as those in fuel poverty.	All the critical actors involved in the retrofitting process have been collaborating across the board, building new strategic relationships for energy efficiency deployment. Participants have focussed on the existing obstacles of energy efficiency delivery, such as stimulating the local production chain and enterprise networking, as well as proposing and coordinating information and training initiatives, amongst others
Branding, Marketing and Communications	Scottish Government has developed a strong brand for its programmes that inspires trust and raises awareness. It learns from and builds upon successful marketing campaigns and looks for opportunities to promote the programme and raise awareness of energy efficiency	The Province of Trento has seen the use of banks as being crucial to providing information on the initiatives available for energy efficiency improvements. They are seen as crucial actors to stimulate the energy efficiency market.
Advice & Information	Advice is offered at both national and area-based levels, to the domestic and non-domestic sectors. Advice to homeowners can be accessed in a variety of ways, including online, via telephone and, if needed, face-to- face. Advice services are procured from third part organisations.	The province of Trento's main advice and information for decarbonisation improvements is provided by way of a dedicated website and provides details on both national and provincial financing options and funding channels that can be activated.
Assessment	There are concerns around the application, limitations and quality of EPC-based building assessments for purposes such as setting standards. A robust assessment of the issues raised around EPCs is needed to ensure these issues are investigated, responded to and, where appropriate, addressed through further review. A strategic examination of EPCs and their underlying calculation methodology is underway.	Trento has implemented a Provincial Environmental Energy Plan ('PEAP') that considers various types of interventions to find the most cost optimal interventions and combinations that might be applied to the Province of Trento's buildings.
Finance	Financing presents a significant challenge to Scotland where £33bn is	In Italy, and the Province of Trento, homeowners are entitled to a tax

Table 2 - Summary



	needed to decarbonise Scotland's buildings and direct Scottish Government support is limited £1.8bn over the next 4 years. Some financing mechanisms are provided at a UK government level, with local specific support in certain areas. Scotland has certain devolved powers that can support heat decarbonisation policy, but several areas are under UK Government control.	credit of up to 110% on the cost of upgrading their home, such as installing insulation systems, heat pumps and solar panels etc. Alongside this, there has been extensive development of green loans and other initiatives.
Quality Assurance & Consumer protection	Establishing trust in Energy Efficiency is considered key to ensure that products and services provided under any programme are of the highest quality. The Scottish Government intends to achieve this by putting in place robust quality assurance requirements at every stage of the delivery process from the marketing and communications to the assessment and installation. A short life working group has been established to address this area.	The province in areas of urban planning, regulatory plans and landscape protection has developed defined KPIs. These have been defined to promote sustainable and durable development, incentivizing robust redevelopment techniques, and limiting the use of new resources.
Monitoring & Evaluation	Monitoring of progress is undertaken via periodic publication of Climate Change updates which occur every 4 years. Additionally, certain aspects of energy efficiency improvement are reflected in an annual review called the Scottish House Condition Survey. Scottish Government will be publishing a monitoring and evaluation framework which is ready for implementation monitoring and measurement of outcomes, capturing the impact that programmes have on people and communities.	Since 2010 the Province records the number of buildings that have been refurbished, keeping track of the progress in buildings' energy efficiency. To facilitate energy efficiency analysis, the Province built an open-access database on EPCs. The dataset is public, and it gathers all the necessary information related to the geo-localisation of the building, physical characteristics, existing energy systems and related energy performance.

It is interesting to note that some areas have adopted similar solutions across the jurisdictions for particular pillars of the customer journey. For instance, the use of websites for the provision of consumer advice and other important information for supporting decarbonisation, alongside the development of green lending products. Conversely, there are jurisdictional differences that



necessitate different approaches such as the use of fiscal measures in Italy (through use of the 100% Superbonus) but are more restrictive within Scotland where devolved powers limit what fiscal levers are available.

Transformation of Europe's buildings and energy markets at the scale and pace required is unprecedented. The imperative to make progress means we must learn as we go, and these market demonstrators provide valuable insights that can be shared to understand how this challenge can be met. This includes delivering heat and energy efficiency solutions in settings we know are low regrets; ensuring low income and vulnerable households can afford to keep their homes warm, and rapidly developing the evidence base to resolve uncertainties where they exist.

5 **APPENDIX - Overview of customer journey**

The following steps provide a broad overview of the indicative steps of a customer journey where the principles and methodology of PAS 2035 might applied to facilitate appropriate and quality retrofit installation of energy efficiency measures.

- 1. A retrofit adviser discusses options for reducing energy consumption with the householder, both through improvements to the property and changes in occupant behaviour.
- 2. If the householder opts to further explore improvement opportunities, the retrofit coordinator must conduct a risk assessment using information including existing Energy Performance Certificates, surveys, interviews with occupants/owners and observations during site visits. This data will be used to grade the property risk from A (lowest) to C (highest) and will determine which path the project follows during subsequent stages. The risk assessment must be repeated and updated as new measures are implemented.
- 3. A whole-dwelling assessment is undertaken by a retrofit assessor. This assessment includes:
- A comprehensive appraisal of the dwelling's heritage, construction, any installed services and existing defects
- Identification of any planning constraints
- An appraisal of the building envelope dimensions, U-values, moisture properties and suitability for improvement.
- For projects on risk paths B or C, additional assessments must be undertaken. These may include:
- An appraisal of occupants and any special requirements they may have
- Assessment of existing ventilation
- Estimate of annual fuel use and emissions
- Assessment of air permeability
- Assessment of the significance of the building using the guidance in BS 7913:2013 Guide to the conservation of historic buildings.
- 4. A retrofit designer uses the outputs from the whole-dwelling assessment to design a package of suitable EEMs. The designer is expected to pay particularly close attention to construction details for any fabric EEMs and how measures that do not physically connect may interact for example, considering how changes to the insulation level will impact the capacity requirements for new heating systems. For projects on risk paths B or C, the retrofit coordinator must carry out an improvement option evaluation prior to the retrofit design to calculate the payback period and carbon cost-effectiveness of the improvement options.
- 5. The retrofit coordinator creates a medium-term improvement plan for the next 20 to 30 years, creating a sequence for implementing the EEMs to maximise long-term benefits for the owner. This sequencing will also be designed to prevent one measure negatively impacting another or preventing the implementation of future measures.
- 6. The coordinator communicates the improvement plan to the client, outlining any statutory approvals that may be required and obtaining their approval for any work. They will then provide retrofit installers with briefings to explain the design intent, sequencing and provide advice on any new technologies.
- 7. Installation of the EEMs is carried out by the retrofit installers in accordance with PAS 2030. It is the installers' responsibility to demonstrate these processes comply with PAS 2030 and to provide evidence of this to the retrofit coordinator.



- 8. The retrofit installer will also oversee any testing and commissioning of EEMs. The requirements for both these stages should be contained within the retrofit design and be carried out in accordance with PAS 2030.
- 9. The retrofit co-ordinator will arrange to ensure handover is completed with the occupant and owner of the property. This includes a physical inspection of the measures and clear information about safe operation, care and maintenance. The co-ordinator will retain any testing certificates, commissioning records and other manuals and paperwork, making copies available to the client. They will also recommend that a new EPC is prepared and, if accepted, undertake this work.
- 10. PAS 2035 also requires that retrofit projects are subject to evaluation and potentially monitoring to confirm if the expected outcomes have been achieved and to feed lessons back to all parts of the supply chain, including the building owner and occupants. This work is carried out by a retrofit evaluator.
- 11. Initially, the retrofit evaluator carries out a basic evaluation within three months of handover. This includes a measure-specific questionnaire for homeowners, confirming if the expected outcomes have been achieved and allowing them to raise any points of dissatisfaction or highlight unintended consequences of the work. If the homeowner, evaluator or co-ordinator feels the outcomes are significantly different than expected then two further levels of evaluation and monitoring can be carried out: intermediate and advanced. These include a variety of assessments such as airtightness tests, fuel use metering and thermographic surveys, and must be completed with six months of handover for the intermediate and two years of handover for the advanced. The retrofit evaluator makes recommendations for any remedial actions and circulates these to all other parties within the retrofit process.