The European Union's programme for India

Clean Energy Cooperation with India (CECI): Legal and policy support to the development and implementation of energy efficiency legislation for the building sector in India (ACE: E^2)

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EU Energy Efficiency Renovation Strategies

EU EXPERIENCE ON EPBD - POSITION PAPER No 10

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FOREWORD

This position paper has been developed by the project "Clean Energy Cooperation with India (CECI): Legal and policy support to the development and implementation of energy efficiency legislation for the building sector in India ("ACE:E²"[1])".

The ACE: E² project is financed by the European Union and managed by the Delegation of the European Union to India. It is carried out as part of the Framework Contract COM 2011 Lot 1 (Europeaid/129783) by EXERGIA S.A., member of SACO Consortium, in collaboration with PricewaterhouseCoopers (PwC) India, under the Specific Contract: FWC No. PI / 2015 / 368-474 signed between the Delegation of the European Union to India (EUD) and SACO on December 18th, 2015.

The contents of this paper are, however, the sole responsibility of the contractor and can in no way be taken to reflect the views of any particular individual or institution, including the European Union, the Delegation of the European Union to India, and the Bureau of Energy Efficiency (BEE) in India.

[1] ACE: E² – Adoption, Compliance, Enforcement – Energy Efficiency

ABBREVIATIONS

ACE: E2	Acronym of the project (Adoption, Compliance, Enforcement – Energy Efficiency)
BMS	Building Management Systems
BPIE	Building Performance Institute Europe
CECI	Clean Energy Cooperation with India
CEN	European Standards Body
ECBC	Energy Conservation Building Code
EED	Energy Efficiency Directive
EPBD	Energy Performance of Buildings Directive
EPC	Energy Performance Certificate
ESCO	Energy Service Company
EU	European Union
EUD	European Union to India
NEEAP	National Energy Efficiency Action Plan
NZEB	Nearly Zero Energy Buildings

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SUMMARY

Energy use in buildings in Europe accounts for 35-40% of greenhouse gas emissions and the EU is dependent on imports to provide over 50% of its energy needs. Improving the energy efficiency of the existing building stock is a key energy and climate policy objective in all EU Member States, running in parallel with the drive to achieve 'nearly zero energy buildings' (NZEB) in building energy codes by no later than 2021, as mandated by the Energy Performance of Buildings Directive (EPBD). This is because of the predominant impact of the existing building stock, most of which will still be operational in 30 to 50 years' time, whereas the annual rate of new building construction is typically less than 1% of the existing stock.

For the above reasons, the EU Energy Efficiency Directive of 2012 required Member State authorities to develop and publish **long term strategies for mobilising investment in 'deep' energy efficiency renovation of their existing building stocks** – effectively the modernisation of the building stock to be fit for purpose for the whole of the 21st century. This requirement has now been embedded in the revised EPBD of 2018 and demands a major upscaling in the volume and depth of energy efficiency renovation activity in the construction marketplace. **While newbuild construction rates in India are relatively higher than in most of the EU, the principles and rationale underlying the need for a strategy for energy efficiency renovation are equally applicable.**

The building sector in all Member States is a highly diverse and complex one, in terms of typologies, physical quality, demography, ownership and usage patterns, legal frameworks and economic circumstances. The supply chains and networks of stakeholders within the building industry are also highly complex, often weakly coordinated, with differing perspectives and priorities, and may not be well skilled to deliver on the ambitious goals required in the strategy. Indeed, the industry often does not have a strong record of successful innovation compared with other sectors. This makes the task of formulating and, more importantly, delivering a successful strategy a deeply challenging and multi-faceted one.

All EU Member States have prepared two cycles of such strategies, typically with a timescale that extends to years 2040 or 2050. This process and its implementation over the years ahead is built on a number of the foundations laid by the EPBD. A key focus in such strategies is the mobilisation of the banking and investment community to make finance available in a form suitable to the needs of building owners on an individual or collective scale. Substantial central EU wholesale finance ('Cohesion Funding') is available to partner with co-financing sources for this purpose. Associated with both the EPBD and EED, a structured dialogue has been ongoing between EU financial institutions with the support of the EU authorities aimed at unlocking this field of opportunity and led to a number of strong initiatives.

This Position Paper outlines a good practice approach to developing a long-term strategy for energy efficiency renovations, based on guidelines developed in a number of support documents and on review of a pool of such strategies developed and at least partly implemented by EU Member States to date. **The core of the paper is a series of nine steps, with each step containing a checklist of indicative issues/ questions to be considered when developing such a strategy**. These indicative nine steps are as follows:

1. Vision and time horizon
2. Stakeholder engagement
3. Market characterisation
4. Key barriers and challenges
5. Techno-economic appraisal
6. Financing
7. Policy measures
8. Shaping the offer – growing market confidence
9. Publication and implementation.

The paper also includes links to significant sources of reference material (including guidance documents containing relevant local policies, programmes, projects and case studies) which may help to address the issues/ questions posed. While it cannot identify or answer all the issues that need to be addressed, it is intended as a useful starting point for relevant authorities by way of posing a series of possible questions to be addressed in partnership with stakeholders, in a sequentially logical manner, and providing signposts to possible useful approaches to tackling particular challenges, including examples of relevant actions and experiences. The fundamental structured approach and the ingredients required for developing and implementing a successful strategy are expected to be similarly applicable to India's circumstances.

1 INTRODUCTION

Buildings account for 35-40% of Europe's energy consumption and associated CO_2 emissions. The single largest sectoral contribution to EU energy efficiency targets for 2020, and likely beyond, is required to come from improved energy efficiency in buildings – mainly existing buildings.

New buildings are increasingly constructed to demanding energy performance levels, and the path has already been laid within EU legislation1 for all new buildings to have nearly zero energy requirements (NZEB) within a matter of years. Yet the vast majority of existing buildings were constructed prior to any formal energy performance requirements, as a result of which the energy performance of the stock is considerably below the best that can be achieved today. However, at current rates of renovation, the full potential for cost-effective improvement will not be achieved before the end of the 21st century.

Newbuild construction rates in the EU add less than 1% to the building stock each year. Of Europe's existing buildings, less than 2% are renovated – not necessarily to their full energy efficiency potential - and 0.1-0.5% demolished per year. Even if all buildings were renovated at this rate to the highest energy efficiency standards, it would be insufficient to meet EU energy saving targets for 2020 or 2030, and in turn for 2050 (which aims at a reduction of 80% of energy demand relative to the 2005 level). Three important sets of actions are needed in order to achieve those targets: Firstly, whenever building renovation takes place, all available feasible energy saving technologies must be incorporated; it is estimated that 'deep' renovation can cut energy consumption by as much as 60% - 80% for the majority of Europe's buildings. Secondly, the annual rate of renovation must be tripled before 2020. Thirdly, financial instruments to accelerate building renovation must be identified and implemented.

But to make this happen in the real marketplace of property and construction is an immense societal challenge which calls for long term strategies and initiatives across Member States.

Against this background, with the goal of transforming the energy performance of the building stock, Article 4 of the EU Energy Efficiency Directive (EED) sets out obligations on each EU Member State to develop a strategy for building energy renovation, including particular elements, as follows:

'Member States shall establish a long-term strategy for mobilising investment in the renovation of the national stock of residential and commercial buildings, both public and private.
This strategy shall encompass:
(a) An overview of the national building stock based, as appropriate, on statistical sampling;
(b) Identification of cost-effective approaches to renovations relevant to the building type and climatic zone;
(c) Policies and measures to stimulate cost-effective deep renovations of buildings, including staged deep renovations;
(d) A forward-looking perspective to guide investment decisions of individuals, the construction industry and financial institutions;
(e) An evidence-based estimate of expected energy savings and wider benefits.
A first version of the strategy shall be published by 30 April 2014 and updated every three years thereafter and submitted to the Commission as part of the National Energy Efficiency Action Plans.'

An associated requirement, aimed at demonstrating public sector leadership, is for 3% of buildings owned and occupied by central government to undergo energy efficiency renovation each year to a performance standard consistent with the findings of the cost optimal analysis mandated by the EPBD (and described in Position Papers 2 and 3).

Developing such a strategy has typically required a period of over one year of analysis, drafting and consultation. More importantly, its delivery in practice requires an enormous multi-faceted national project in each Member State, transforming its building stock into one that is fit for purpose for the remainder of this century.

The aim of this paper is to outline the ingredients involved in developing and implementing a successful long term building energy renovation strategy, centred around a suggested structured approach to formulating the strategy. This is based on guidelines developed in a number of support documents and on review of a pool of such strategies developed and at least partly implemented by EU Member States to date. The core of the paper is a series of nine steps, with each step containing a checklist of indicative issues/ questions to be considered when developing such a strategy. These indicative nine steps are as follows:

1. Vision and time horizon
2. Stakeholder engagement
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4. Key barriers and challenges
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6. Financing
7. Policy measures
8. Shaping the offer – growing market confidence
9. Publication and implementation.

The paper contains links to a number of substantial guidance documents developed within the EU which include a selection of useful reference case examples of policy initiatives, programmes, projects, business models and information sources. Those case examples draw upon, and point to, a number of other publications and model approaches that authorities in India may find useful in their national or State circumstances.

2 CONTEXT, POLICY COMMITMENTS AND BENEFITS

2.1 EU energy and building stock status

The following is a profile of some background circumstances pertaining to energy use in buildings in the EU:

- The EU population is around 500 million (of which 120 million live in a 'warm' climatic zone)
- The gross floor area of the buildings stock is around 23 billion m2.
- The building stock comprises around 71% dwellings and 29% other buildings.
- Over 70% of the population lives in cities.
- Energy in buildings accounts for 41% of total energy consumption (and over 50% of electricity).
- Business and consumer energy costs are about €500 billion per annum.
- Average new construction rate is around 1% per annum.
- The average renovation/ retrofit rate has been estimated at 1.8% per annum.
- Average demolition rates range from 0.1% to 0.5% per annum.

While building energy codes apply to major renovation works, it is considered likely that many renovation and retrofit works to existing buildings are not specified and installed to best available energy efficiency standards.

There are differing estimates on the scale of investment required to implement the strategy over time. On one of the estimates in the mid-range, EU targets mean that annual investment in building renovation must grow from €12 billion to €60 billion and continue over at least a 20 year period.

Figures 2-1 and 2-2 schematically illustrate the goals of the strategies.

Figure 2-1 Idealised pathways to deep energy renovation targets

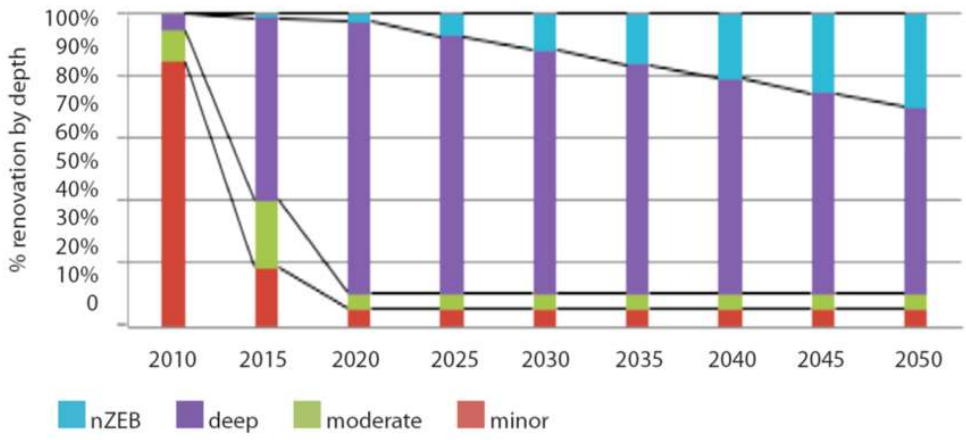
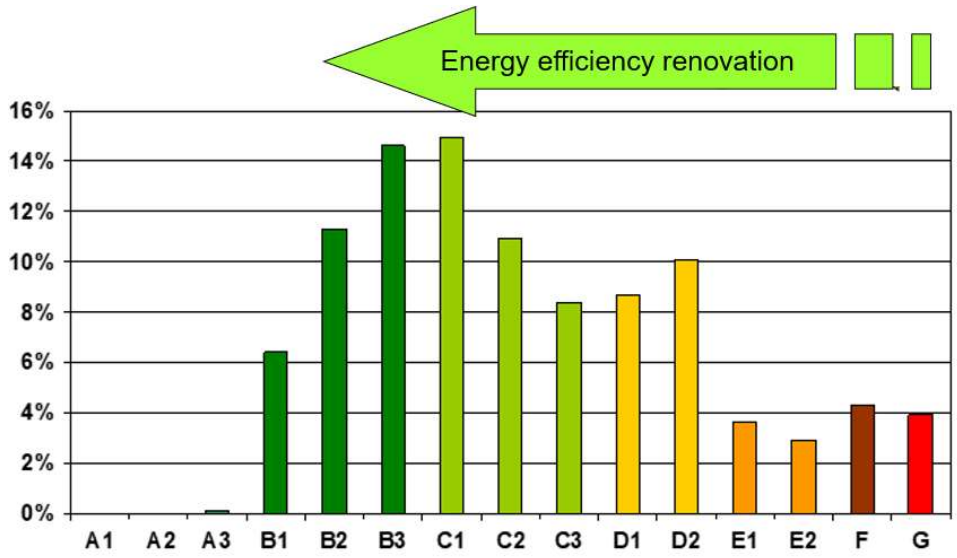


Figure 2-2 Schematic of strategy impact on energy performance labelling



2.2 Current regulatory framework

A preliminary step before commencing to develop a building energy renovation strategy is to assemble and review all operative legislative documents, government programmes, projects and case examples relevant to energy use in the buildings sector.

Consistent across almost all EU Member States are the following most relevant policies and associated documents:

- National Energy Efficiency Action Plans (NEEAP) and its targets. Indeed, the renovation strategy may often be considered to be a module within the NEEAP.
- National Renewable Energy Action Plans (NREAP) and its targets Building energy codes (including improvements driven by the EPBD).
- Mandatory energy performance certification/ labelling (EPC) under the EPBD.
- Public procurement policies and rules – relevant to public sector buildings and their role as exemplars.
- Municipal and local authority policies – e.g. Covenant of Mayors.
- Social housing policies aimed at ensuring energy affordability.
- Energy efficiency financial policy instruments – energy tax, carbon tax, grants or tax reliefs on energy efficiency products or building upgrades, energy efficiency funds etc.
- ESCOs and energy performance contracting frameworks.
- Energy Efficiency Obligations for energy supply utilities.
- Feed in Tariffs for CHP and renewable energy.

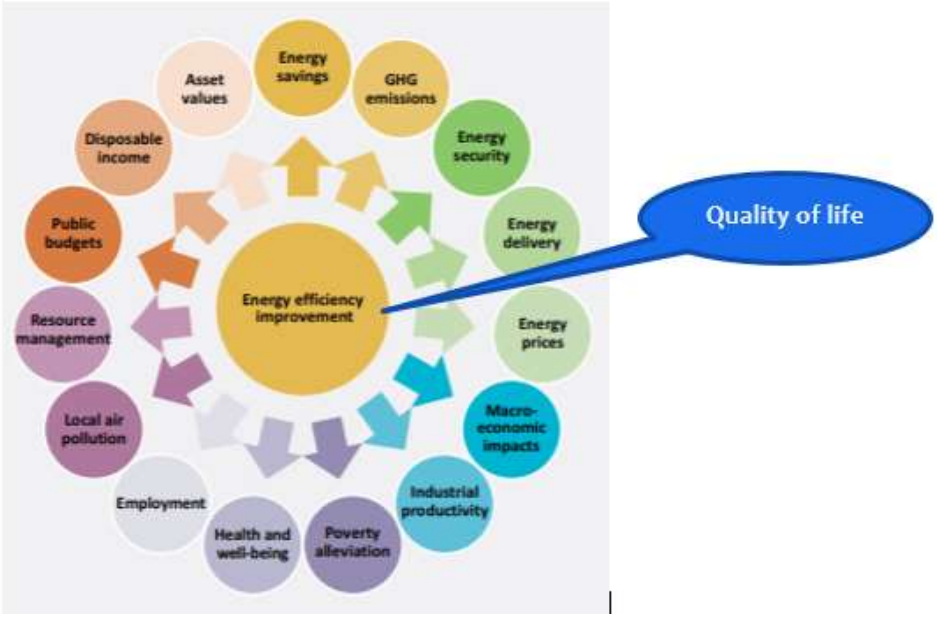
2.3 Multiple benefits

The policy case for adopting and implementing aggressive building energy efficiency renovation strategies has been made by many analysts. It has highlighted the multiple benefits expected to emerge from such a strategy include stimulating jobs, generating economic growth, improving living & working conditions, improving energy security and cutting the energy bills for households, business and the public sector alike. Specifically:

- Their capacity to bring direct returns in the form of reduced energy running costs. The potential annual financial savings are estimated at Euro 1,000 per European household.
- Future proofing against future energy price rises
- Bring additional value streams to private owners and asset operators, with asset values increasing due to the market influence of energy performance certificates/ labels
- Significant public benefits in terms of:
  - Increased employment
  - Lower emissions
  - Increased energy security and reduced dependence on foreign energy imports
  - Improvements to a country's fiscal balance
- Europe's Energy Efficiency Plan expects to deliver 2 million jobs
- Returns to State and society: Energy efficient building and renovation programmes in Germany, Estonia, Ireland and France indicate that every Euro invested returned 2-5 Euros to state coffers, mainly through job creation – and every Euro spent delivers a net benefit of 5 Euro to society.

Figure 2-3 (Source: IEA) summarises these and other benefits to investors, to government exchequers and to wider society.

Figure 2-3 Multiple benefits of energy efficiency policies and measures



A Building Performance Institute Europe (BPIE) report "Europe's Buildings Under The Microscope", published in 2011, modelled several renovation scenarios. Under the most ambitious scenarios, the estimated net present value benefits to the EU as a whole are in excess of €10 000 billion, around 1 million jobs on average are created throughout the period to 2050, resulting in CO_2 reductions in excess of 90%.

However, while the overall societal benefits and life cycle benefits are generally considerable, as reflected by life cycle analysis of costs and benefits, the payback periods on some measures are often long (over 20 years) or perceived to be long (for example, by businesses which – often illogically – set a payback criterion of less than five years). Therefore, a key issue for strategies is to address this dichotomy.

3 APPROACH TO STRATEGY DEVELOPMENT

3.1 Key reference publications

The value of a strategy consists not only of the end product (the published document), but also the process required in the development of that end product. The quality and effectiveness of its practical implementation on the ground depend very much on the quality of the analytical, consultative and stakeholder engagement processes.

To guide the process of development, it was therefore useful to highlight for EU Member States to consider the approaches suggested in three original reference publications which highlight common themes and stages in the strategy (or roadmap) development process:

- Assistance Documents for EU Member States in developing long term strategies for mobilising investment in building energy renovation, Joint Working Group of EU Concerted Actions on EPBD, EED and RES Directive, 2013, available at https://www.epbd-ca.eu/outcomes/EED-Article4-composite-document-final.pdf
- A Guide To Developing Strategies For Building Energy Renovation, BPIE, 2013, available at http://bpie.eu/publication/a-guide-to-developing-strategies-for-building-energy-renovation/
- Renovation Roadmaps for Buildings, Policy Partners (for Eurima), 2013, available at https://www.eurima.org/uploads/ModuleXtender/Publications/96/Renovation_Roadmaps_for_Buildings_PP_FINAL_Report_20_02_2013.pdf

Each of these documents in turn references a range of useful case examples of initiatives which are still relevant today.

A significant fourth document is a review of a selection of 10 Member State strategies carried out by the Building Performance Institute Europe (BPIE), entitled 'Renovation strategies of selected EU countries', and available at http://bpie.eu/publication/renovation-strategies-of-selected-eu-countries/.

While varying in emphasis the first three of the above documents are generally aligned in terms of the various stages in process or methodology that need to be pursued in the development of building energy renovation strategies. They generally divide the development process into four key stages. Although the sequence and elements of the stages can differ, they can usefully be broken down into the following categories:

Stage	Elements or tasks
Initiation	Identifying and engaging stakeholders
	Defining the vision, scale, boundaries and key elements of the strategy
Development	Identifying, analysing and detailing key issues, actions (including policy instruments) and responsibilities
Dissemination	Collating and publishing the strategy
Implementation, monitoring and review	Putting the strategy into practice, including regular reviews and updates

Figure 3-1 shows a wider range of publications supporting this mission.

Figure 3-1 Examples of guidance publications

3.2 Structure of this documentation

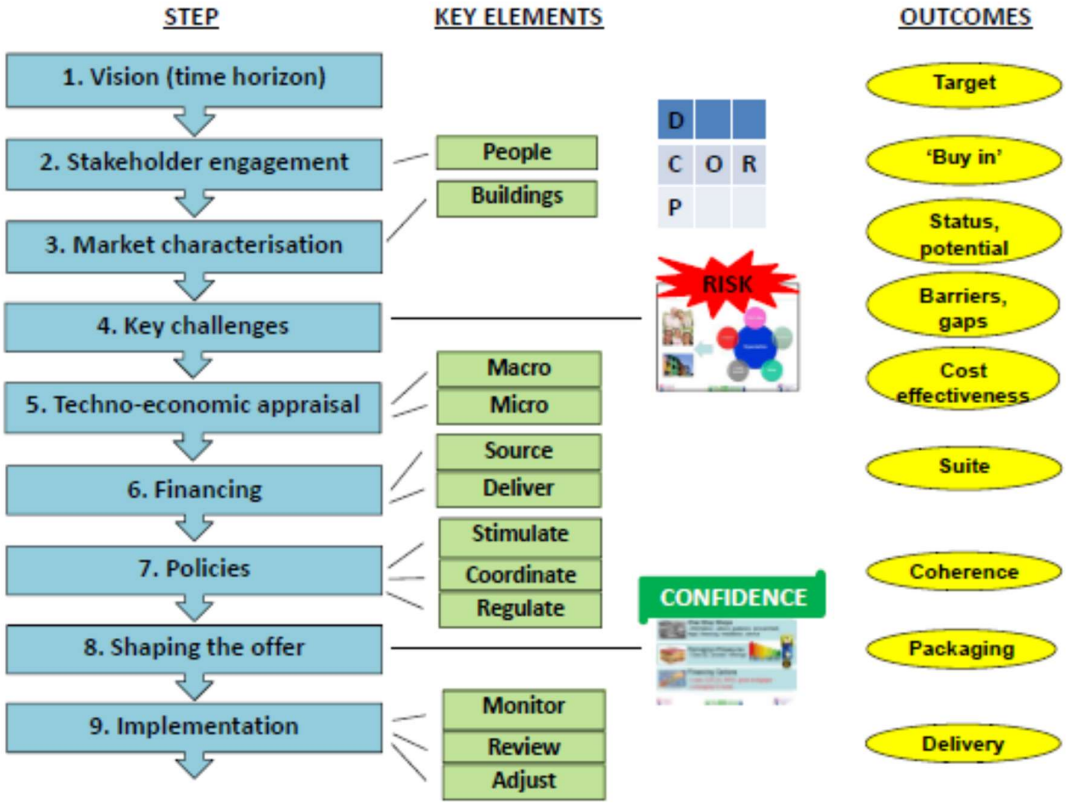
The core document underlying the structure of this Position Paper is a document pack (Figure 3-2) produced by a Joint Working Group of the three EU Concerted Actions of the EPBD, Energy Efficiency Directive and Renewable Energy Sources Directive to provide practical assistance to Member State authorities, and available at available at https://www.epbd-ca.eu/outcomes/EED-Article4-composite-document-final.pdf.

Figure 3-2 Primary guidance document referenced in this paper

This document pack consists of a main document and two annexes. The Main Document takes the form of a series of nine steps, each containing an introductory narrative that describes the context, role, and a checklist of 61 indicative issues/ questions/ outcomes sought in that step. This is followed by hyperlinked signposts to two annexes within the document pack: Annex 1, which contains a selection of 69 case examples of potentially useful approaches (policies, programmes, projects, studies, methodologies); and Annex 2, which offers detailed expanded menu from the checklist of 61 primary questions.

The indicative nine steps are shown in blue boxes in Figure 3-3. For each step, the green boxes show the corresponding key elements and the yellow boxes show the corresponding outcomes sought.

Figure 3-3 Suggested steps, key elements & outcomes in strategy formulation process



The steps can be summarised as follows:

1. **Vision and time horizon**: Issues and questions to consider in setting a vision and time horizon for the long-term strategy, and associated targets and milestones.
2. **Stakeholder engagement**: Issues and questions to consider in securing stakeholder engagement, understanding, alignment and commitment.
3. **Market characterisation**: Issues and questions to consider in segmenting, profiling and seeking to understand the marketplace of existing buildings, their owners/ occupiers/ investors, in order to identify the potential for energy performance improvement.
4. **Key barriers and challenges**: Issues and questions to consider in assessing and overcoming key challenges and barriers to mobilisation of this sector.

5. **Techno-economic appraisal**: Issues and questions to consider in assessing the technical, economic and other costs and benefits of building energy renovation, from individual investor, national exchequer and societal perspectives. This includes tackling of constraints and conflicts.
6. **Financing:** Issues and questions to consider in quantifying, sourcing, designing and delivering the necessary finance, and in managing risk.
7. **Policy measures**: Issues and questions to consider in assessing options and formulating policies to stimulate, coordinate and regulate large scale delivery of quality renovation activity.
8. **Shaping the offer – growing market confidence:** Issues and questions to consider in developing actions to create investor trust and confidence across the market segments.
9. **Implementation:** Issues and questions to consider in the process of mobilising the full breadth and depth of action for effective delivery in the short term and on the long term vision.

As an example, issues covered in Step 4 (assessing and overcoming key challenges and barriers) include the following:

- Have you identified actual and possible barriers to the upscaling of building energy renovation in your country?
- How do you resolve the dichotomy between societal and private investment perspectives?
- What are your particular challenges with older buildings? Do you have a national code of practice for building energy renovation?
- Do you have a national skills plan for building energy renovation?
- Is there a suitable support system for developing new products/services for building retrofit?
- Do you have a monitoring and verification system or guidelines for energy efficiency programmes?
- Is there a forum to co-ordinate the different ministries involved in building energy retrofit?

As examples of the later steps: 'Policy measures' cover issues to consider in assessing options to stimulate, coordinate and regulate large scale marketplace delivery of quality renovation activity in each market segment. 'Shaping the offer' covers issues to consider in developing actions to create investor trust and confidence across the market segments and is the integrating response to the set of barriers and risks assessed in earlier step 4. Such measures are particularly necessary to attract investors and close the gap between long term societal cost/benefit and private cost/benefit.

The process can be regarded as a logical cascade of stages, with the tasks in the later stages generally influenced by the outcomes of the earlier stages. In practice, there may also be some reverse interactions which lead to a degree of iteration or adjustment to the outcomes or earlier stages; for example the detailed levels of ambition in the Vision step (Step 1), covering diverse market sectors, might be adjusted as result of the tasks and findings of the Techno-economic appraisal step (Step 5). Overall, the aim is that the systematic process of

addressing the sets of questions outlined for each stage can help Member State authorities to arrive at well integrated and coordinated strategies.

With similar provisions in relation to the strong cross-links between the different stages of the overall process, the following is the approximate correspondence between the five specific provisions in the Directive and the Steps outlined above:

(a) an overview of the national building stock based, as appropriate, on statistical sampling – Step 3;
(b) identification of cost-effective approaches to renovations relevant to the building type and climatic zone – Steps 3 and 5;
(c) policies and measures to stimulate cost-effective deep renovations of buildings, including staged deep renovations – Steps 5 and 7;
(d) a forward-looking perspective to guide investment decisions of individuals, the construction industry and financial institutions – Steps 2, 5, 7 and 8;
(e) an evidence-based estimate of expected energy savings and wider benefits – Steps 3, 5 and 8.

3.3 Developing and delivering the strategy

While there is a wide range of individual institutional configurations, experience and traditions across Member States (and indeed extending to India) in relation to the buildings sector, many common principles apply.

The task of DEVELOPING the strategy typically includes two parallel interacting processes – namely (1) data, analysis and drafting – including drawing on key information resources, modelling, analysis and drafting elements of the strategy; and (2) engagement with key decision makers and stakeholders, including workshops and other consultative processes. These processes ideally lead to sufficient consensus and shared commitment to enable finalisation and launching of the strategy.

The task of DELIVERING the strategy typically requires: (1) transmission of that shared commitment into co-ordinated implementation of the different elements of the strategy to achieve the upscaling of building energy renovation activity that is necessary; and (2) a review of the effectiveness at least every three years, followed by adjustment and reinforcement of particular actions as required.

Throughout the process it is vital that demonstrable commitment and leadership is shown by the lead Ministry and the government as a whole. The overall development process and its ultimate implementation need to be seen to be driven and coordinated by the government, in a spirit of partnership with the stakeholder community, as outlined below.

Reflecting the structure and steps outlined above, the following Section (taking the form of 'tables of contents') is a 'walk through' illustration of the primary questions/ issues to be addressed at each stage of the process.

4 'TABLES OF CONTENTS' & ISSUES TO BE ADDRESSED

The purpose of this outline is to convey a sense of the logical shape and idealised checklist of content of the BRS document that is envisaged to emerge from the strategy development process.

Inputs will be invited from the steering group and wider TWG in relation to assisting in answering the questions raised in the third column.

In the final published document, it may also be considered more appropriate to present the strategy on an entirely sectoral basis, with the full process for each of the three principal sectors (residential, commercial, public sector) covering the following:

- Market characteristics of the sector
- Logical segmentation into sub-sectors: e.g. by age, built form, tenure, socio-economic circumstances etc
- Barriers to energy efficiency renovation
- Key decision makers
- Energy performance quality of the building stock (building stock model)
- Technical appraisal
- Economic appraisal
- Particular problem issues – e.g. landlord/tenant, energy poverty, heritage buildings
- Prioritisation of scaled actions
- Supplementation with pilot actions to inform future solutions
- Realisable energy efficiency investment actions and savings to defined timeframes: 2025, 2030, 2040+?
- Financing needs and delivery mechanisms
- Industry capacity needs and upskilling
- As applicable:
  - Specific regulatory policy actions
  - Specific financial policy actions
  - Specific developmental support actions
  - Specific promotional/ informational actions
- Projected energy efficiency renovation levels and target savings impacts – short, medium and long term (2025, 2030, 2040+).

4.1 Preliminary: Overview and preparation

Table 4-1 Indicative table of contents

Primary heading	Possible sub-headings or content elements	Questions to be addressed	Comment
Executive summary	Purpose Summary of long term and intermediate targets (renovation rate, level of energy savings) Priority sectoral actions Cross-sectoral actions Financial instruments Ongoing stakeholder engagement	What is the ultimate impact on energy and climate goals? What other benefits should be highlighted? What are the early priorities, tasks, responsibilities, timetable?	Strong statement of intent and commitment to a major upscaling and deepening of building energy efficiency renovation activity in all sectors.
Steering committee	Outline of the core Steering Group and Technical Working Group (and stakeholder outreach) terms of reference	What Ministry should lead? What agency provides lead assistance? What frequency and format of steering group meetings? What frequency and format of engagement with Technical Working Group?	Government leadership. Ongoing role in monitoring and reporting to government on implementation.
BACKGROUND			
Introduction	The scale of the challenge – and opportunity The goal of the strategy Key benefits Structure of the strategy document		A clear and cohesive commitment to tackle the entire building stock. Government led. Mobilising the decision makers on investment – from householder to institution.
Existing policy context and frameworks	Energy policy targets The NEEAP Legislation (driven by Directives in EU) – EED (including EEOs), EPBD, RES-D, EcoDesign, Labelling The nZEB objective Building Energy Codes Energy Performance Certificates Public sector renovation obligations Financial instruments (including ESCOs) Innovation	What is the state of progress and early intent with implementing these Directives? What performance standards currently apply? To what extent do they apply to renovation? Are they enforced? What is the state of progress and early intent in engaging with available financial instruments?	

Primary heading	Possible sub-headings or content elements	Questions to be addressed	Comment
National energy policy commitments	Listing and status of relevant national legislative documents and policies, including: Transposition of EU directives: EED (including EEOs), EPBD, RES-D, EcoDesign, Labelling State of progress on nZEB and EPCs National energy policy targets The NEEAP The significance of building energy renovation Existing levels of renovation activity	What are existing legislative and other national policy commitments in relation to building energy renovation? What are existing levels of building renovation activity (with or without energy efficiency)?	
Key information sources	National statistics Regulatory history & compliance/ enforcement evidence National or sectoral commissioned studies Preceding donor or academic studies EU studies and guidance (including BPIE and JRC) Existing policy instruments and programmes impacting renovation Published findings from EED and EPBD Concerted Actions Published findings from EU IEE and Horizon 2020 RD&D projects	What information is available from these national sources? What analogous information is available from comparable countries?	All available information sources need to be gathered

4.2 Step 1: Scope and vision

Primary heading	Possible sub-headings or content elements	Questions to be addressed	Comment
SCOPE and VISION			
Aim and vision of this strategy	A roadmap to a national stock of buildings of high efficiency and quality The vision for (2040, 2030)? A major scaling up of the volume and depth of energy efficiency renovation activity Progress with IMPLEMENTATION will be reviewed annually and updated/ reinforced every 3 years.	• Scope - What is to be included in the vision? • How long is a 'long term' strategy? • What ultimate targets? • What intermediate target?	Striking a balance: ambitious but firmly realisable. Strategically phased.

4.3 Step 2: Stakeholder engagement

Primary heading	Possible sub-headings or content elements	Questions to be addressed	Comment
THE STAKEHOLDER COMMUNITY			
Stakeholder community	The entire supply chain. The construction and property sector The financial institutions Local/ municipal authorities Key institutional bodies and influencers – partnership role/s The importance of their enabling roles Groupings: • Building owners and real estate sector • Regulatory authorities, national and local • Construction design and specification professionals • Building contractors and tradespersons	Who should be included? How to logically cluster the stakeholder groups? How to include not just 'the usual' groups? On what issues should they be engaged? Who are the key enablers of action? What are potential key partnerships? What mode and frequency of engagement with stakeholders? What resources? Roadshow?	Seeking an atmosphere of inclusiveness, partnership, collaborative expertise, consensus building with a committed long term perspective, but also focussed on early actions. Goal is to ensure a shared understanding of the roles and opportunities offered in the building energy renovation arena.

4.4 Step 3: Status appraisal of building stock

Primary heading	Possible sub-headings or content elements	Questions to be addressed	Comment
STATUS APPRAISAL			
Overview	This will contain separate sectoral chapters covering Residential, Commercial and Public buildings Status of construction industry Status of the residential and non-residential markets		'Mapping' the technical and market arena, the challenge, the potential This will differentiate by sector – between Residential, Commercial and Public buildings and is a foundational base to the whole strategy
Barriers and constraints	'Market failure' Market awareness among decision makers Technical deficits Skills (professional and trades) and capacity Capital costs & cost effectiveness Financial – availability, conditions, fragmentation Logistical Aesthetic, e.g. heritage buildings Split incentive – landlord/ tenant issue	For each sector: What are particular barriers to deep energy efficiency renovation? What are the most critical barriers? Are there successful programmes, initiatives, case examples that can help to tackle particular barriers and persuade the sceptical?	Overall lack of awareness, trust or capacity among decision makers to commit investment to this purpose

Primary heading	Possible sub-headings or content elements	Questions to be addressed	Comment
	Inertia Lack of trust in solutions Particular issues, e.g. energy poverty and affordability		
Profile of the existing building stock ***[THIS AND THE FOLLOWING SUB-CHAPTERS ADDRESS CLAUSE (a) OF EED ARTICLE 4]***	Common elements: Current building code/s Building stock model Current professional practices and skills Current builder and tradesperson practices and skills Supply availability of energy efficient building materials and products supply Existing energy efficiency policies, programmes and their impacts	Do you have a building stock model that covers all sectors? What are existing levels of building renovation, and of building energy renovation – shallow and deep? What is the current state of professional practice and skills? What is the current state of builder and tradesperson practices and skills? What is the availability and quality of energy efficient building materials and products?	Degree of refinement will depend on available statistics. In absence of statistics, patterns and experiences from analogous countries may be used to derive estimates.
Profile of the existing building stock - Residential	Age Size Ownership & decision makers Location – urban/rural Typologies – Low rise houses vs apartments Thermophysical energy characteristics Existing construction materials Existing insulation and glazing practices Existing heating, cooling, lighting systems Energy mix Data from energy performance certification? Energy and carbon intensity Energy prices Energy and maintenance costs Comfort levels The energy poverty issue	Overview What barriers? Who are the key decision makers? What are their socio-economic circumstances? What are their attitudes? What are their investment criteria and capacities? What operational energy data is available? What energy efficiency trends/ profile? Existing design, construction, installation practices? What existing policy measures, programmes, initiatives – successes & weaknesses? What are the most promising technical measures? (What are proposed new policy measures – here, or later under Policy?) Energy poverty initiatives? Heritage building initiatives?	Important sub-sectoral segments are: • Single houses versus apartment buildings • Owner occupied versus tenanted • The heritage sub-sector • The energy poverty sub-sector
Profile of the existing building stock - Commercial	Age Size Ownership and decision makers Location – urban/rural Typologies – Single buildings versus shared	Overview What barriers? Who are the key decision makers? What are their socio-economic circumstances? What are their attitudes?	Important sub-sectoral segments are: • Single buildings versus shared buildings

Primary heading	Possible sub-headings or content elements	Questions to be addressed	Comment
	Thermophysical energy characteristics Existing construction materials Existing insulation and glazing practices Existing heating, cooling, lighting systems Energy mix Data from energy performance certification? Energy and carbon intensity Energy prices Energy and maintenance costs Comfort levels	What are their investment criteria and capacities? What operational energy data is available? What energy efficiency trends/ profile? What existing design, construction, installation practices? What existing policy measures, programmes, initiatives – successes & weaknesses? What are the most promising technical measures? (What are proposed new policy measures – here, or later under Policy) Heritage building initiatives	• Owner occupied versus tenanted/ leased • The heritage sub-sector • The most energy intensive buildings, e.g. hotels, retail, leisure
Profile of the existing building stock – Public sector	Age Size Ownership Location – urban/rural Typologies – Single buildings versus shared Thermophysical energy characteristics Existing construction materials Existing insulation and glazing practices Existing heating, cooling, lighting systems Energy mix Data from energy performance certification? Energy and carbon intensity Energy prices Energy and maintenance costs Comfort levels NEEAP targets adopted for public sector Energy efficiency procurement policies ESCO activity	Overview What barriers? Who are the key decision makers? What are their attitudes? What are their investment criteria and capacities? What operational energy data is available? What energy efficiency trends/ profile? What existing design, construction, installation practices? What existing policy measures, programmes, initiatives – successes & weaknesses? What are the most promising technical measures? Heritage building initiatives? (What are proposed new policy measures – here, or later under Policy)?	Important sub-sectoral segments are: • Central government buildings owned and occupied by the State (because of EED Article 5 obligations) • State owned versus tenanted/ leased • The heritage sub-sector • The most energy intensive buildings, e.g. hospitals, third level educational buildings
Sectoral profiles summarised	Tabular and/or diagrammatic summary of sectoral (and sub-sectoral if feasible) energy performance profiles	• What are the worst performing parts of the building stock? • What is the scale and nature of the energy poverty challenge? What is the scale and nature of the challenge with older buildings, including heritage buildings?	These profiles will link to the techno-economic modelling and assessment that now follows

Primary heading	Possible sub-headings or content elements	Questions to be addressed	Comment
Profile of key decision makers	Summary of key decision makers in each sector or sub-sector, and their priority needs to enable commitment to act		One of the outputs from the Stakeholder engagement process

4.5 Step 4: Key barriers and challenges

Primary heading	Possible sub-headings or content elements	Questions to be addressed	Comment
Key barriers and challenges	Have you identified actual and possible barriers to the upscaling of building energy renovation in your country? How do you resolve the dichotomy between societal and private investment perspectives? What are your particular challenges with older buildings? Do you have a national code of practice for building energy renovation? Do you have a national skills plan for building energy renovation? Is there a suitable support system for developing new products/services for building retrofit? Do you have a monitoring and verification system or guidelines for energy efficiency programmes? Is there a forum to co-ordinate the different ministries involved in building retrofit?		

4.6 Niche challenges

Primary heading	Possible sub-headings or content elements	Questions to be addressed	Comment
SPECIFIC DILEMMAS AND CHALLENGES			
Specific implementation issues (other than financing – below) ***[ADDRESSING CLAUSE (d) OF EED ARTICLE 4]*** *These may be embedded in other chapters rather than presented in a stand alone chapter.*	Phased approaches in each sector, prioritising clear early cost effective opportunities Influenced by value for money, skills base/ industry capacity **Staged approaches to renovation:** • Role of building energy passports • Encouraging bundled solutions (avoiding diminishing returns issue) **Prioritisation of poorest performing buildings** in each sector/ sub-sector. Possible candidates: • Older buildings • Buildings of high energy intensity • Homes in energy poverty (but see note in final column) **Split incentive issue**: • Possible role for EPCs impacting property value and rental premiums (in lieu of energy cost savings) • Possible role for voluntary agreements • Roles for regulation and incentive funds for rental sector • Applying learnings from EED and EPBD Concerted Actions and H2020 projects **Tackling energy poverty:** • Possible setting of ring-fenced targets and resources • Delivery mechanisms • Possible funding or technical support roles for EEO scheme • Applying learnings from EED and EPBD Concerted Actions and H2020 projects **The State role as an exemplar** (by implementing EED Article 5)	What are the first phase opportunities? (shallow to moderate depth of renovation) What potential role can the building energy passport concept play in relation to staged renovations? What is meant by 'poorest performing buildings'? How should they be addressed? What potential solutions might apply to the split incentive dilemma? Are there pilot initiatives that might help to inform solutions to these issues – with a view to informing future policy actions? Can an EEO scheme (EED Article 7) assist in addressing/ prioritising energy poverty?	The answers to several of these difficult questions will need to be informed by intelligence from experiences in other countries, including pilot research projects exploring potential solutions (such as new business models/ financial instruments. NOTE: Upgrading of homes to alleviate energy poverty may not save much energy but will achieve comfort/ health/ quality of life benefits) and so are in the social policy domain perhaps more than the energy policy domain

4.7 Strategic approach to assessing feasibility

Primary heading	Possible sub-headings or content elements	Questions to be addressed	Comment
STRATEGIC APPROACH			
Overview	Status review >> Technical potential >> Logistical potential >> Economic potential >> Financing needs >> Policy intervention actions >> Real market potential Two key issues: • Tackling market failure, i.e. where building owners or users are failing to act in their own self-interest on readily available EE opportunities– role for information/ promotion, incentives (?) • Resolving the dichotomy between the building owner investor micro-economic perspective (quick payback etc.) and the societal macro-economic benefit perspective (with buildings having a lifetime of over 30 years, often over 60 years) – a role for policy interventions (incentives) in resolving this dichotomy. Attention to addressing particular challenges: • Seeking to prioritise the worst performing parts of the building stock • Tackling the energy poverty challenge • Tackling the older buildings challenge Consideration of: • specific scale impact initiatives aimed at the most promising market sectors to mobilise deep or deeper EE renovation actions in the short term; • specific pilot scale initiatives to help provide evidence and confidence to stakeholders in order to tackle key points of resistance (perceived market failures); and • longer term developmental initiatives aimed at developing capacity and an active healthy building EE renovation service sector.	On the basis of the status review, for each sector and sub-sector: What is the technical potential? What is the logistical potential, allowing for constraints such as planning and aesthetics? What is the cost-effective economic potential? What attitudinal and perception barriers hamper decision to act? What capacity has the owner or investor to provide or access finance on attractive terms?	Each step in the process is a 'filter', converting from theoretical technical potential to realistic market potential.

4.8 Step 5: Techno-economic appraisal

Primary heading	Possible sub-headings or content elements	Questions to be addressed	Comment
TECHNO-ECONOMIC APPRAISAL			
Technical priorities	Upgrading the building shell – demand reduction with long lifetime (but often expensive) Upgrading the building technical systems – smart technologies (often less expensive than building shell measures but shorter lifetime) Integrating renewables where feasible Trigger points – new ownership, business identity change, general renovation required anyway	In what circumstances is upgrading the building technical systems the preferred option? In what circumstances are renewable energy technologies most feasible?	Trigger points
Menu of energy efficiency upgrade options	Building envelope: Wall insulation – internal, external, cavity sandwich Roof insulation – pitched, flat, external, internal Glazing – high performance windows, heat loss, solar control HVAC and other technical systems services: Ventilation – natural, mechanical, DCV, MVHR Heat generation – fuel and generator Cooling, air conditioning Cogeneration Renewable energy technologies – heat pumps, solar thermal, solar PV, biomass? Lighting system – LED, lamps, luminaires, controls Smart controls, building management systems etc. Other?	For each market segment: What is the shortlist of potential building envelope measures? What are their key energy performance characteristics? What is the shortlist of potential HVAC, lighting and other services measures? What are their key energy performance characteristics?	This needs to take account of the climatic balance in India's regions between winter heating and summer cooling needs.
Investment cost data, energy prices and economic assumptions	Differentiated by building sector and type: Installed costs of measures Energy prices current and projected (including carbon tax etc. if applicable) Useful lifetimes of measures Discount rate/s	What are the sources of the following information? Can we obtain realistically representative data on the capital costs (installed costs) of each measure? What are current and projected energy prices? What discount rate/s?	
Techno-economic appraisal of the potential: Technical appraisal	This is essentially a 'bottom up' analysis process based on sectoral and sub-sectoral characteristics, in order to help establish realistic targets.	How refined an energy profiling and performance model can we develop for each sub-sector, depending on the quality of available source data?	A 'forward looking perspective' involves: A life cycle assessment approach considering lifetime costs and benefits

Primary heading	Possible sub-headings or content elements	Questions to be addressed	Comment
	Based on the profiling of the different segments of the building stock above: Existing technical energy characteristics of each segment are codified in a building stock energy model (Excel workbook). Segmentation based on building function, form, thermal characteristics, usage patterns etc. This involves technical modelling of the different permutations of measures applied to each segment of the building stock Sources and assumptions on technical data Tables for each sector, presenting the main findings. These will indicate: Scale, depth and potential impact of EE measures in the short term – in terms of energy saving, cost saving, emissions saving The ultimate technical potential (real potential will be less) and currently realisable potential Comment on the feasibility of staged/ phased renovations. Comment on **potential trigger points** in each market segment.	What thermal upgrades are feasible? What building technical systems upgrades are feasible? Can we calculate the scale and potential impact (energy, cost, emissions) of short term measures? What are the limits of technical feasibility? Staged renovations? Will modest incremental measures technically/ economically lock out deep measures? What is the role of EPCs? What might be the role for energy 'passports'? What are potential 'trigger points' for EE renovation, and how can they be availed of?	A recognition that the challenge is a 'marathon' and that a phased/ staged approach is essential Hence prioritising early action on the most promising opportunities But accompanying this with pilot initiatives to test and inform future solutions. More than one zone can be assessed if required.
Techno-economic appraisal of the potential: Economic appraisal ***[THIS AND THE PRECEDING SUB-CHAPTERS ADDRESS CLAUSES (b) AND (e), PLUS PART OF (f), OF EED ARTICLE 4]***	Economic methodology – applying a life cycle (cost optimal) type perspective on investments in upgrading Sources and assumptions on cost data **Cost-effectiveness criteria** For each segment of the building stock, overall quantification of impact potential: Energy (primary energy) savings Cost savings CO_2 emissions savings Payback NPV (Investment cost ratio to lifetime emissions savings?) **Tables for each sector, presenting the most cost-effective solutions in 'league table' rank order.** The ultimate technical potential (real potential will be less) and currently realisable potential. This is for individual measures and also for selected 'bundled' measures	Have cost optimal studies been carried out? – including for renovation works - as required by the EPBD? What cost effectiveness criteria do decision makers apply to energy efficiency investments in their buildings? How is the energy poverty issue best addressed?	**A 'forward looking perspective'** involves: A life cycle assessment approach considering lifetime costs and benefits A recognition that the challenge is a 'marathon' and that a phased/ staged approach is essential Hence prioritising early action on the most promising opportunities But accompanying this with pilot initiatives to test and inform future solutions. The transparency of the foregoing methodology constitutes an **evidence-based estimate** of energy savings potential

Primary heading	Possible sub-headings or content elements	Questions to be addressed	Comment
	(including allowing for diminishing returns)?		

4.9 Step 6: Financing

Primary heading	Possible sub-headings or content elements	Questions to be addressed	Comment
FINANCING ISSUES			
The scale of investment required	From the foregoing: • Quantification of the scale of investment required over time, by sector • Indication of the primary sources of investment, by sector • Proposed programmes for efficient finance delivery	What is the scale of investment required? What is the mix of investment required? By sector? By source? Over what timescale?	
Understanding the needs of the financial community	Perspective on risk and cash flow Challenges – aggregation, standardisation, verification protocols, reliability Initiatives to assist applicants on making successful proposals	What do financial institutions require from proposers of programmes, schemes or projects? What is their attitude to investments in energy efficiency or renewable energy in buildings? Are there relevant examples of successful financing initiatives to date in the country or elsewhere?	
Sourcing of 'wholesale finance'	Potential sources: • Government exchequer funds • EU Cohesion Funds • EBRD, KfW etc. (in EU, not India) • Private finance • Energy Efficiency Fund (if applicable) • Energy Supplier Obligations (if applicable)	What national public funding is available? What is required to source 'wholesale' funds at the necessary scale – including from European financial institutions?	Review of potential sources can be part of the development process of the strategy, but options not chosen need not be part of the final document

Primary heading	Possible sub-headings or content elements	Questions to be addressed	Comment
Delivery mechanisms for access to finance and incentives	According to market segment, proposed financing mechanisms drawn from the following options: • Grant programmes • Loan programmes – soft loans • Regular commercial bank financing • Government guarantee schemes • Energy services companies (ESCOs) • Graduated incentives aligned with depth of renovation – e.g. increase in % loan and reduction in % interest rate • Revolving fund concept??	For each market segment, what type/s of financial instrument are most appropriate? How to engage and gear 'retail' finance at the necessary scale? What kind of support do financial institutions and investors need from government? How to 'stage' the level of incentive?	Drawing on examples of successful initiatives in comparable countries may be useful.

4.10 Step 7: Policy instruments

Primary heading	Possible sub-headings or content elements	Questions to be addressed	Comment
POLICY INSTRUMENTS			
General *[ADDRESSING CLAUSE (c) OF EED ARTICLE 4]*	Role in tackling and overcoming many of the barriers or constraints hampering EE renovation of buildings – addressing the dichotomy between private and societal good Including specific role in addressing gaps leading to current 'market failure' Assessment of existing suite of policies and incentives Proposed new policy initiatives to mobilise deep building energy renovation activity, build trust and confidence	How to reconcile and connect the public policy and individual investor perspectives, and bridge the gap? Have we conducted an assessment of options for new or amended policies? What policies are needed to tackle barriers in the different market segments? Information barriers? Economic barriers? Technical and skills barriers? Financing barriers?	Goal is to tackle gaps in awareness, capacity and motivation to implement energy efficiency renovation, including encouraging deep renovation.
Regulatory	Implementation of EU Directives and national regulations stimulating energy efficiency consumer and investor choices	How well are current regulations being implemented and complied with? Quantify the projected impact?	These will be differentiated and targeted by sector.
Financial	Sectorally – grants, soft loans, tax breaks, green funds, guarantees, blended instruments etc. From exchequer From donor entities From EU programmes Pilot initiatives	From where are 'wholesale' funds for energy efficiency financing best sourced? For each sector and sub-sector: What are the most appropriate trusted channels for 'retail' delivery of	These will be differentiated and targeted by sector. Channelling through retail banks or other institutions may tackle the aggregation challenge

Primary heading	Possible sub-headings or content elements	Questions to be addressed	Comment
		attractive finance to investors? What is the best design of financial instrument or incentive? Who should administer these funds?	
Developmental	Training and other capacity building initiatives Pilot and Demonstration projects Industry R&D – new products, services, technical and business models Model contracts, monitoring and verification protocols (to gain the confidence of the financial community)	What policies are in place or proposed to encourage technical and market innovation in the different market segments? (including new business models) What policies are needed to tackle skills deficits/ needs in the different market segments? What is the training capacity? Are there learnings from EU IEE and Horizon 2020 projects? – or other experiences from other countries?	These will be differentiated and targeted by sector.
Promotional	Information programmes Alliances with key industry players Confidence building initiatives e.g. monitoring and verification protocols Information programmes Registers of suitable products	What information deficits need addressing? What confidence building measures are needed? What industry partners can be most effective in disseminating information and promotional material? What modes of communication? – documents, internet, event.	These will be differentiated and targeted by sector, but some may also be cross-sectoral

4.11 Step 8: Packaging to gain market confidence

Primary heading	Possible sub-headings or content elements	Questions to be addressed	Comment
Market positioning of different sectors	Where is building energy renovation positioned in a marketing context?	Can we map the different building sectors in terms of the prevalence and maturity of energy efficiency renovation uptake?	
'Shaping the offer' to attract investment commitment from financial institutions	How can trust and confidence be built in the market? For financial institutions:	To what extent are the following needed? Aggregation to achieve scale? – what mechanisms or intermediaries? Graded packages? Smooth delivery mechanisms?	

Primary heading	Possible sub-headings or content elements	Questions to be addressed	Comment
		Technical assistance (experts)? Financial guarantees? Performance guarantees? Standardised evaluation, monitoring and verification systems?	
'Shaping the offer' to attract investment commitment to renovation by building owners	How can trust and confidence be built in the market? For building investors:	To what extent are the following needed? Project scoping and technical assistance? Incentives? Sourcing of finance? Smooth delivery mechanisms? Property valuation systems that better account for ongoing energy performance?	
'Shaping the offer' to attract investment commitment to renovation by all	How can trust and confidence be built in the market? For all: Underpinning actions:	To what extent are the following needed? Confidence in policy stability? New business models? Well designed information and marketing packages? Products and technology certification? Systems to ensure service quality? Registers of competent persons?	
'Shaping the offer' to attract investment commitment to renovation by building owners	How can these elements be created and packaged? What elements might a packaged solution contain?	Packaging and coordinating the customer offer through a "One Stop Shop" type system ? Standardised approaches attuned to the needs of that particular customer sector or subsector? Creation of a brand mark or marks? Good information (including persuasive case examples, panels of trusted products and service providers) to motivate and empower the decision maker? Finance – including incentives, guarantees, insurances Contractual/ legal provisions and safeguards Flexible package with options, packaged as a quality of life offering	

Primary heading	Possible sub-headings or content elements	Questions to be addressed	Comment
		(beyond the confines of energy)? Targeted marketing at trigger points of decision making opportunity? - points of sale/ purchase/ rental, points of planning, points of extension, points of replacement. Integrating energy renovation with other, generally larger, renovation motives and actions. Co-ordination service for project delivery	
	How can they be packaged for different building owner and investor types?	Homeowners? – and sub-sectors Business sector? – and sub-sectors Public sector? – and sub-sectors	
How can specific business models be created and assisted?	What roles can energy supply companies play? What roles can ESCOs play?	In the public sector? In the private sector? What do they require to undertake deep renovation projects? What is the appropriate assignment of risk? How can building owners be equipped to negotiate competently with ESCOS?	
How can specific business models be created and assisted?	What roles can domestic 'Pay as You Save' (or 'Save as You Pay') systems play?	How to reconcile with energy payback realities? Assignment of risk? What underpinning elements are required? Bank finance – Green Funds? Standardised verification/ certification protocols? Other? What approach to social housing where in some cases householder cannot contribute to funding capital works?	
How can specific business models be created and assisted?	What scope is there for engaging with master planning initiatives at district or neighbourhood level (e.g. local regeneration plans), and at city level?	To facilitate good co-ordination and governance? To facilitate aggregation of customers? To facilitate efficient procurement of services, reducing transaction costs? To exploit new and emerging opportunities from successful experiences of	

Primary heading	Possible sub-headings or content elements	Questions to be addressed	Comment
		innovation in the Smart Cities and Communities?	

4.12 Step 9: Targets, benefits, monitoring and review

Primary heading	Possible sub-headings or content elements	Questions to be addressed	Comment
THE TARGETS & PRIORITY MEASURES			
Short term priorities	For each set of actions, per sector, summary tables: Description of measure/task Responsible entity Projected level of energy savings Start and finish date	Including financial, regulatory, developmental and promotional initiatives by policy makers to unlock barriers	
Intermediate and long-term goals	For each set of actions, per sector, summary tables: Quantitative targets Initiatives for further upscaling and deepening of renovation	Including financial, regulatory, developmental and promotional initiatives by policy makers to unlock barriers	
Tabulation of actions	Similar to NEEAP format: • differentiated between sectoral measures and cross-sectoral measures • Existing/ continuing measures • New measures • (Discontinued actions)	And their assessed or projected energy saving impacts	
THE BENEFITS			
Energy and climate benefits	Lifetime energy savings, emissions savings Contribution to NEEAP targets	Can we summarise these arising from the foregoing techno-economic appraisals?	
Economic benefits	Cost savings for homes, businesses, public bodies Insulating against future energy price rises	Can we summarise these arising from the foregoing techno-economic appraisals?	
Co-benefits	Quality of life – comfort, health, productivity, property asset values, competitiveness, local jobs, fuel import dependency ……	Can we articulate and provide any quantitative indication regarding these benefits? Can we ensure that these non-energy benefits are factored into policy dialogue with authorities and stakeholders?	
PROGRESS REVIEW PROCESS			
Annual review	Led by steering group Reporting to government	What systems are in place to plan, monitor and evaluate policy effectiveness?	A sustained commitment

Primary heading	Possible sub-headings or content elements	Questions to be addressed	Comment
Three yearly review	Government reporting to EC Updating and strengthening of the strategy		Ongoing obligation. Will need progressive strengthening through each review and revision cycle.

5 STAKEHOLDER CONSULTATION AND PROCESS

In relation to Step 2 above, an active consultation process is to secure the understanding, co-operation and participation of key decision makers, contributors and influencers in the property sector.

5.1 The importance of an active role for stakeholders

The success of the strategy depends heavily on a co-ordinated commitment by a wide body of stakeholders responsible for its delivery, extending well beyond the traditional energy community. To ensure that these stakeholders make the necessary commitment, it is important that they gain an early shared understanding of their own roles and opportunities, and are actively engaged by the national authorities in the formulation of the strategy. Those roles include direct delivery on elements of the strategy, or can be indirect in enabling (or not disabling) others to deliver. While this engagement and consensus building takes time, it is a key determinant on the quality and effectiveness of the strategy in delivering the transformative change required in the marketplace.

In so doing, it may also be useful to consider or check that approach with regard to the following principles:

- Inclusiveness – with participation from government, industry, construction, suppliers, academia etc
- Collaborative – in using the collective expertise from all parties to define objectives and methods
- Consensus building – seeking shared understanding and consensus on strategy and commitment to work to its implementation
- Forward looking – towards ongoing partnership and networking of stakeholders.

5.2 Indicative stakeholder list

Below is an indicative list of stakeholder groups that need to be consulted as part of the strategy development and subsequently targeted as part of an information/ awareness campaign in due course. These are grouped into three potential categories:

Public sector:

- Local authorities as key local influencers and regulators – (likely to be the bodies responsible for building control enforcement functions insofar as these apply to renovation)
- Public sector bodies responsible for public estate (schools, universities and institutes, healthcare, public works Ministries etc.) – with renovation obligations under EED Article 5
- Energy specialists including Local Energy Agencies, specialist service providers (e.g. software tools)

- Standards, certification and accreditation bodies (e.g. relevant to the mitigation of thermophysical risks).

Building industry and professional service bodies:

- Representative bodies in the construction industry (builders and suppliers)
- Representative bodies among building professionals (architects, engineers, surveyors)
- Educational, training and research bodies (upgrading skills, new solutions etc) – which could include professional institutions.

Consumers and resource providers:

- Energy user and consumer groups – for both the residential and non-residential sectors
- Property owners and facilities management organisations
- Financial Institutions (wholesale and retail) – very important
- Energy service utilities and representative bodies (possible role in relation to data and in relation to finance with regard to Energy Supplier Obligations (EED Article 7) if applicable).

6 OTHER GOOD PRACTICE ELEMENTS

Apart from the requirement of stakeholder engagement throughout the process, most of the good practice recommendations in the guidance documents referenced earlier represent the development of solutions to tackling the barriers identified in Figure 6-1.

The market arena consists of the stock of existing buildings in need of energy renovation, and the chains and networks of people and organisations who make the decisions that determine whether that investment in energy renovation takes place. It is hugely diverse. The purpose of Step 3 (**analysis of the building stock**) is to gain a sufficiently clear and realistic understanding and quantification of the status and latent energy renovation potential of the national building stock, differentiated by sector and subsector.

Barriers that need to be addressed include: high capital costs; imperfect information; lack of awareness and confidence by both the demand and supply side of the market; and various forms of uncertainty (technical, regulatory, policy, etc.). Decision makers faced with significant uncertainty are likely to delay investment decisions or opt for choices where uncertainty appears low, quantifiable and manageable. The streams of decision makers across all sectors need to be offered a sufficiently attractive and compelling case to commit to the level of sustained investment that is needed.

Figure 6-1 Barriers to energy efficiency renovation of buildings

6.1 Techno-economic evaluation

(Step 5): The perspective, scope and definition applied towards 'cost-effectiveness' is critical. It is vital that the perspectives, scopes and definitions on 'costs' and 'benefits' should be clear and appropriately differentiated for each sector or sub-sector of the building stock. There are several different approaches. The most fundamental distinction is between the micro-economic, often relatively short term and narrowly bounded, approach by individual building owners and investors and a more macro-economic, forward looking and inclusive or societal

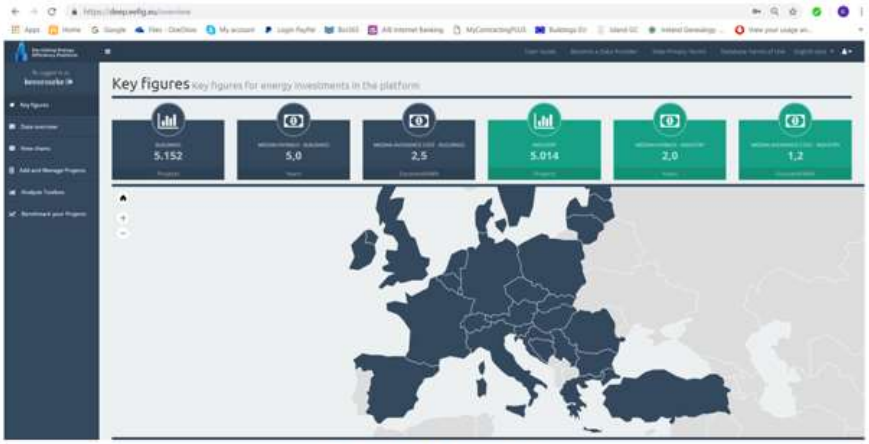
approach appropriate to public policy making. Given that building owners are the prime actors and decision makers in the 'real world' market, the gap between these two perspectives will need to be bridged by appropriate policy interventions.

In both the micro and macro perspectives the drivers and benefits of renovation extend beyond energy savings, so it is important that the full array of motives and co-benefits is factored into the business case. At individual investor and project level another fundamental aspect is therefore the proper attribution of costs and benefits, so that the energy dimension to the investment costs is not overstated – and that the additional non-energy benefits are not understated. Thus, in a high proportion of renovations the energy element needs to be viewed as a marginal or incremental cost in the context of a package of upgrade measures to the overall building quality. A dramatic or 'deep' (rather than a modest) improvement in energy performance can thus be viewed as an opportunistic value adding dimension to the overall renovation project.

6.2 Finance

(Step 6): Without the right amounts and forms of finance directed to the right places at the right time, renovation will lack the necessary scale and pace required by the goals of the strategy. To facilitate and develop the necessary co-ordination and commitment requires alignment between previous analysis and findings regarding opportunities, barriers and need on the demand side of the market (building owners/ investors) and the operating needs, risk perceptions and policies of the financial community on the supply side. With such alignment, suitable delivery mechanisms can be put in place to tackle key barriers and mobilise investment activity. Financing also needs to be coordinated with accompanying underpinning measures to tackle perceived risks of various kinds and build confidence in the market. An example of a confidence building resource is the 'Derisking Energy Efficiency Platform' (DEEP) (Figure 6-2) which is a database including over 600 case examples of energy efficiency projects covering the full spectrum of scale and payback.

Figure 6-2 The DEEP platform



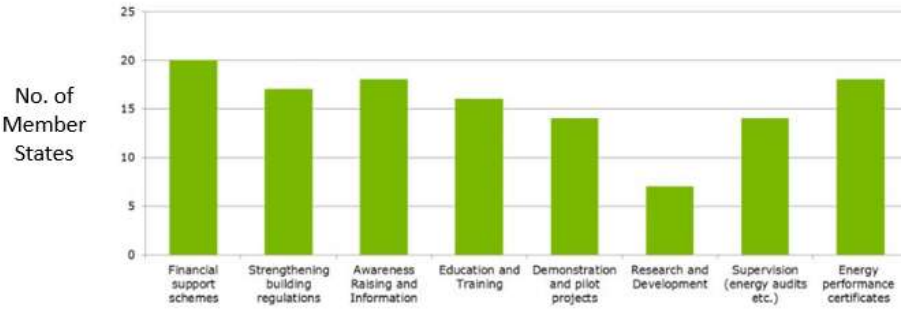
https://deep.eefig.eu

Wholesale finance sources include public finances, EU central funds, institutional and private finance, and need to be of sufficient scale and form to excite and accelerate the market, build a critical mass and create a momentum that can be sustained into the long term. To maximise leverage and effectiveness they may be combined and geared in many ways and enable the development and delivery of a suite of financing mechanisms and 'products' to incentivise or otherwise stimulate investment action, suitably attuned to the different market segments. This topic is addressed further in Position Paper 11.

6.3 Policies

(Step 7): Having identified the (market) barriers and needs from previous Steps, a particular policy role for the State to signal, orchestrate and co-ordinate, to stimulate and to regulate, in order to develop and deliver effective responses to those barriers and needs. Strong **policy co-ordination** is required to overcome the limited planning horizon of many consumers and industry players given the long-term nature of the transition for the buildings sector which needs to be co-ordinated over many years in an environment of regulatory stability. **The policy mix** can take a number of different roles and forms. A policy may be directed at tackling market, financial, technical, skills or other barriers; at direct market delivery or at facilitating healthy market development; it may be macro or fiscal in leverage, or may be focussed on a specific sector or issue. It may take the form of **regulation, incentive, development** or **promotion**, or a combination of these. A profile of the mix of policies across EU Member States in support energy efficient renovation is given in Figure 6-3.

Figure 6-3 Mix of policy supports across EU Member States for energy efficient renovation



A number of analyses indicate a typical lifetime benefit to cost ratio of 5:1 for government investment in building energy renovation, when not only energy benefits, but jobs and enterprise benefits, as well as social co-benefits, are taken into account. These can be strong drivers in securing broad based political and societal support and commitment, expressed through policy measures.

Building a healthy, more self-sustaining, market needs to address both demand and supply issues – to stimulate and build demand appetite and commitment, and to stimulate and build the supply capacity and ensure it is regulated appropriately. Several possible roles for the State are important: as an exemplar, as a guarantor, and in establishing the support structure to enable efficient standardised administrative and organisational procedures (e.g. technical

assistance to the financial community, registers of certified products and skilled service providers) to overcome other barriers.

6.4 Packaging solutions

(Step 9): Restrictions on the availability of finance (whether self-finance, loan finance or 'free' finance incentives) may not always be the main barrier to action. To get the market moving at an accelerated pace, the main commencement barriers can be summarised as lack of both market appetite (demand) and capacity (supply).

There needs to be a focus on transforming what is currently an ignored or not sufficiently interesting, attractive or easy proposition to most building owners and investors, into a compelling proposition. A packaged response to the array of barriers and challenges, which from the investment decision maker's perspective constitute RISK, can help to stimulate and establish over time a culture of CONFIDENCE and reputation for deep energy renovation. This requires an integrated approach building trust in all elements: cost-benefit, other benefits, technical, skills and service, finance, convenience and project coordination – for example through 'One Stop Shops' (Figure 6-4). Without such standardised approaches, it is difficult to envisage a significant acceleration in the scaling up or in the depth of building energy renovation activity. Such an integrated approach will involve a complementarity of actions between commercial and professional interests in the construction and property market, and public policy makers and institutions.

Figure 6-4 Exciting the market – 'one stop shops'

7 BPIE REVIEW OF MEMBER STATE STRATEGIES

The following are primary indications from a review of a selection of 10 Member State strategies carried out by the Building Performance Institute Europe (BPIE), entitled 'Renovation strategies of selected EU countries', and available at http://bpie.eu/publication/renovation-strategies-of-selected-eu-countries/ .

The review assessed the strength of each strategy, on a scale from zero (absent) to 5 (full compliance) for each of the five conditions set in the Energy Efficiency Directive Article 4 (now transferred to the EPBD). Its findings are summarised as scores assigned to each of the 10 strategies in Figure 7-1.

Figure 7-1 Scores in BPIE assessment of ten building energy renovation strategies

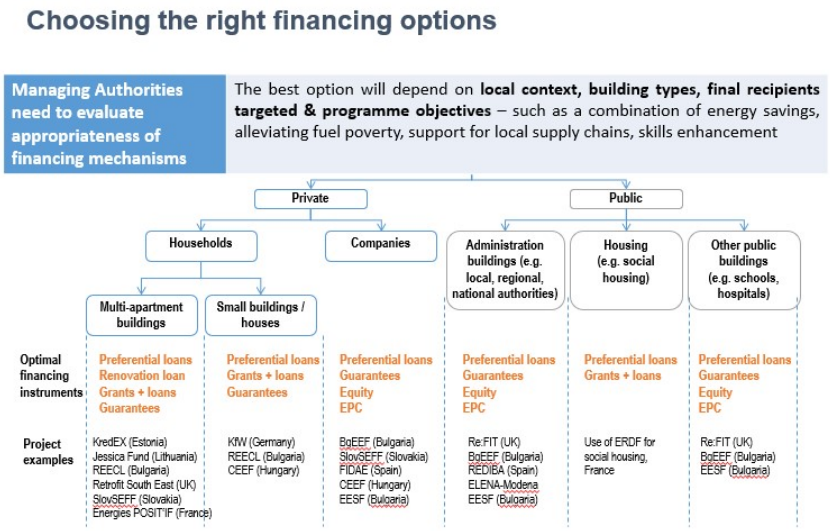
COMPLIANCE WITH EED ARTICLE 4 REQUIREMENTS						
COUNTRY	Overview of building stock	Identification of cost-effective approaches to renovation	Policies to stimulate cost-effective renovation	Forward-looking perspective to guide investment decisions	Estimate of expected energy savings and wider benefits	OVERALL level of compliance with Article 4
Austria	3	2	1	0	1	28%
Brussels Capital Region	5	5	3	2	2	68%
Czech Republic	3	3	4	4	4	72%
Denmark	2	1	4	0	1	32%
France	4	4	4	2	2	64%
Germany	4	2	3	2	3	56%
The Netherlands	3	0	3	1	3	40%
Romania	3	3	4	4	4	72%
Spain	4	4	3	4	3	72%
The UK	5	4	3	3	3	72%
AVERAGE	3.6	2.8	3.2	2.2	2.6	58%

The strongest section of most strategies was the characterisation of the building stock, and indeed this scored the highest average rating of 3.6. The only other sector scoring an average of over 3 was the policy description. However, only a few strategies included the comprehensive policy mix that needs to be put in place to transform the market for building renovation.

Generally, Member States struggled most with the forward-looking perspective, which scored an average of just 2.2 out of 5. Given that these strategies are meant to provide confidence to building owners to invest in building renovation, and to the market to invest in the supply chain, this remains a significant challenge. While the forward perspective should cover more than simply the financing of measures, the Commission's technical guidance on financing the energy renovation of buildings (https://ec.europa.eu/energy/sites/ener/files/documents/2014_guidance_energy_renovation_buildings.pdf) contains very useful guidance for EU Member State authorities on how to approach the effective planning and deployment of EU funds to sustainable energy investments in buildings in their jurisdictions. It provides a range of funding models combining different funding sources delivered through a wide variety of 'retail' delivery mechanisms – typically through banks, local authorities and special purpose programmes. It presents a variety of good practice approaches, aimed at attracting greater levels of private

sector investment, attuned to the needs of different building sectors, together with a number of illustrated case studies. An example of its guidance on choosing appropriate financing models is given in Figure 7-2.

Figure 7-2 Example of guidance on establishing appropriate funding schemes



The following are its observations on the stronger of these strategies:

Czech Republic - The particular strengths of this strategy lie in the technical analysis of energy saving opportunities, modelling of renovation scenarios, as well as the holistic approach to identifying policies and measures to stimulate the market.

Romania - A unique feature of this strategy is in its seeking to quantify the wider benefits of building renovation. Another positive aspect is the comprehensive appraisal of policy options that need to work together to address the underlying barriers. The strategy recognises that the benefits of renovation are felt different Ministries, including for example Health, since poor quality housing has a cost to the nation in terms of lost working days and impact on health services. The policies section of the strategy recognises the importance of engaging across the political spectrum in support of the strategy for deep renovation of the building stock, including for example establishing an objective to eradicate fuel poverty through enhancing energy performance of the housing stock.

Spain – The Spanish strategy includes a good technical appraisal of the building stock and energy saving opportunities. It notes the strategic importance of building renovation and identifies the need to provide information and advice, adequate finance, and a suitably trained workforce. Specific actions that reduce bureaucratic hurdles, and help the financing of renovation measures, have been identified. Building renovation is seen as a key component of improving the economic conditions in Spain, reviving the construction sector and revitalising urban areas. Multiple benefits are identified, including the improved quality of life that flows from reduced expenditure on energy and improved indoor comfort conditions for occupants.

United Kingdom – The UK renovation strategy includes a very detailed description of the building stock, and presents a useful insight into the cost-effective renovation packages that might typically be adopted in different building types. The existing policy framework is clearly set out, while the forward plan is placed in the context of the 5-yearly carbon budgets which have been specified through to 2027. Energy saving potentials and existing funding sources are identified.

France - One of the key strengths of this strategy is the Presidential-level commitment to some ambitious goals in the building sector, such as the deep renovation of 500,000 dwellings a year and the desire to introduce a mandatory renovation requirement for the non-residential sector. The three-pronged approach of supporting households, facilitating finance and increasing professionalism, points to a coordinated effort, supported by a significant number of initiatives.

The Netherlands - The Dutch strategy is based around three key principles: informing and raising awareness; facilitating; and financial incentives. The aim is to help residents and businesses to help themselves and realise the benefits that energy renovation can bring, not only in cutting energy bills but also in terms of improved living conditions and increased property values. To stimulate this improvement in the quality of life for its citizens, the Government has identified a number of approaches that are quite innovative and with the potential to stimulate significant improvements in building energy performance. The fact that a wider Energy Agreement has been secured with a number of stakeholder bodies is encouraging.

8 CONCLUSION

To achieve EU policy goals a priority has been set for all Member States to establish long term deep energy renovation strategies applied across the majority of their existing building stocks. This requires a major upscaling in the pace, volume and depth of energy efficiency renovation activity, in order to modernise Europe's building stock to be fit for purpose for the remainder of this 21st century.

This Position Paper has outlined a good practice approach to developing long term strategies for energy efficiency renovations of buildings, based on guidelines developed in a number of support documents and on review of a pool of such strategies developed and at least partly implemented by EU Member States to date. The core of the paper is a series of nine steps, with each step containing a checklist of indicative issues/ questions to be considered when developing such a strategy.

The paper also includes links to significant sources of reference material (including guidance documents containing relevant local policies, programmes, projects and case studies) which may help to address the issues/ questions posed. While it cannot identify or answer all the issues that need to be addressed, it is intended as a useful starting point for relevant authorities by way of posing a series of possible questions to be addressed in partnership with stakeholders, in a sequentially logical manner, and providing signposts to possible useful approaches to tackling particular challenges, including examples of relevant actions and experiences. The fundamental structured approach and the ingredients required for developing and implementing a successful strategy are expected to be similarly applicable to India's circumstances.

National strategies need to include a twin approach, which stimulates a major upscaling in the volume of demand by building owners for energy efficiency renovation works, and builds a matching delivery capacity across the building industry supply chain, including finance supply.

The essence of a successful ongoing renovation strategy is strong, consistent policy leadership and co-ordination with stakeholders to tackle barriers and risks, including addressing the dichotomy between longer term societal vs shorter term investor cost/ benefit.

All EU Member States have prepared long term renovation strategies. A number of good practice features in these strategies have been highlighted in the paper.

9 REFERENCES

The following are sources of analysis consulted and referenced in the course of preparing this paper. Also listed is a selection of websites from which useful information can be obtained on EPBD implementation.

Website title and address	Description
Joint Working Group of Concerted Actions: https://www.epbd-ca.eu/outcomes/EED-Article4-composite-document-final.pdf	Assistance Documents for EU Member States in developing long term strategies for mobilising investment in building energy renovation
Building Performance Institute Europe (BPIE) www.bpie.eu BPIE guide: http://bpie.eu/publication/a-guide-to-developing-strategies-for-building-energy-renovation/ http://bpie.eu/publication/renovation-strategies-of-selected-eu-countries/	A European 'think tank' providing policy research and advice on energy in buildings, with publications and monitoring of progress with EPBD implementation A Guide to Developing Strategies For Building Energy Renovation Review of a selection of 10 Member State strategies
Build Up www.buildup.eu	EU portal for energy efficiency in buildings. Extensive library of documents, webinars etc. relating to EPBD and related implementation
EU Commission – energy efficiency in buildings https://ec.europa.eu/energy/en/topics/energy-efficiency/buildings	Covering EPBD and allied Directives, independent reports, national reports, events
EPBD Concerted Action www.epbd-ca.eu	Public website for collaborative forum of Member States to assist EPBD implementation
EU Build Up Skills initiative http://www.buildup.eu/en/skills	Strategic initiative to boost continuing or further education and training of craftsmen and other on-site construction workers and systems installers in the building sector

Renovation Roadmaps for Buildings, Policy Partners (for Eurima), 2013, available at https://www.eurima.org/uploads/ModuleXtender/Publications/96/Renovation_Roadmaps_for_Buildings_PP_FINAL_Report_20_02_2013.pdf

Guidance on financing the energy renovation of buildings (https://ec.europa.eu/energy/sites/ener/files/documents/2014_guidance_energy_renovation_buildings.pdf)

Derisking Energy Efficiency Platform (DEEP), https://deep.eefig.eu