

## JRC SCIENCE FOR POLICY REPORT

# Synthesis Report on the assessment of Member States' building renovation strategies

Luca Castellazzi  
Paolo Zangheri  
Daniele Paci

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#### Contact information

Luca Castellazzi  
Joint Research Centre, Via E. Fermi 2749. Ispra 21027. Italy.  
E-mail: luca.castellazzi@ec.europa.eu  
Tel.: +390332 78 9977

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#### Abstract

*The European building stock consumes approximately 40% of primary energy and it is responsible for 36% of the EU greenhouse emissions. A significant reduction of building energy demand is a requisite to meet Europe's GHG emissions reduction targets. The Article 4 of the Energy Efficiency Directive requires Member States "to establish a long-term strategy beyond 2020 for mobilising investment in the renovation of residential and commercial buildings with a view to improving the energy performance of the building stock. In order to transpose the Directive and to increase the rates and depth of building renovation, the Member States were asked to develop their first renovation strategies and provide them with their third NEEAPs, due by 30th April 2014.*

*The JRC undertook an assessment of 31 national/regional building renovation strategies submitted by the Member States. The present report summarises the assessment performed by JRC on the received strategies. The analysis assessed and evaluated the compliance with all the items of Article 4 and checked if they were adequately addressed in each national renovation strategy.*

## Table of contents

Acknowledgements.....	3
Executive summary .....	4
1. Introduction.....	8
2. Methodology .....	10
3. Assessment of the compliance to EED Article 4 mandatory elements.....	12
3.1 Overall state of compliance with Article 4.....	12
<i>Non-compliant strategies</i> .....	15
<i>Non fully compliant strategies</i> .....	16
<i>Almost fully compliant strategies (OR Acceptable strategies)</i> .....	16
<i>Fully compliant strategies and Best practices</i> .....	16
4. Information on the National building stock – Article 4(a) .....	18
5. Cost-effectiveness approaches of renovation - Article 4(b).....	22
6. Policies and measures to stimulate cost-effective deep renovations - Article 4(c).....	25
6.1 Innovative approaches .....	32
7. Forward-looking perspective to guide investment decisions - Article 4(d).....	36
8. Evidence-based estimate of expected energy savings and wider benefits – Art.4(e) .	38
9. Conclusion and steps forward.....	42
References .....	44
Annex A – Summary of the detailed assessment of 31 renovation strategies .....	45
AUSTRIA .....	45
BELGIUM – BRUSSELS CAPITAL REGION .....	47
BELGIUM – FLANDERS .....	49
BELGIUM – WALLONIE .....	51
BULGARIA .....	53
CROATIA.....	55
CYPRUS .....	57
CZECH REPUBLIC .....	59
DENMARK .....	61
ESTONIA .....	63
FINLAND .....	65
FRANCE .....	67
GERMANY.....	69
GIBRALTAR .....	71
GREECE .....	73
HUNGARY.....	75

IRELAND .....	77
ITALY .....	79
LATVIA .....	81
LITHUANIA .....	83
LUXEMBURG .....	85
MALTA .....	87
NETHERLANDS .....	89
POLAND .....	91
PORTUGAL .....	93
ROMANIA .....	95
SLOVAKIA .....	97
SLOVENIA .....	99
SPAIN .....	101
SWEDEN .....	103
UNITED KINGDOM .....	105
ANNEX B – Official Commission's guidance for NEEAPs .....	107
ANNEX C – Article 4 notifications' evaluation template .....	111
Assessment Synthesis & Overview .....	111
Article 4(a) – Overview of the National building stock .....	112
Article 4(b) – Cost-effective approaches to renovation .....	114
Article 4(c) – Policies and measures to stimulate cost-effective deep renovations .....	116
Article 4(d) – Forward-looking perspective to guide investment decisions .....	117
Article 4(e)-Evidence-based estimate of expected energy savings and wider benefits .....	118
List of abbreviations and definitions .....	119
List of figures .....	120
List of tables .....	121

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## Executive summary

The European building stock consumes approximately 40% of primary energy and it is responsible for 36% of the EU greenhouse emissions<sup>1</sup>. A significant reduction of building energy demand is a requisite to meet Europe's GHG emissions reduction targets<sup>2</sup>. Buildings are a strategic sector for energy policy: it is among Juncker's Commission priorities and it is a pillar of the Energy Union as set by the 2015 Communication<sup>3</sup>. The Energy Performance of Buildings Directive (EPBD) Directive together with the Energy Efficiency Directive (EED) and the Renewable Energy Directive (RED), defined a framework that creates the conditions for long term improvements in the energy performance of Europe's building stock.

In particular the Article 4 of EED requires Member States *"to establish a long-term strategy beyond 2020 for mobilising investment in the renovation of residential and commercial buildings with a view to improving the energy performance of the building stock. That strategy should address cost-effective deep renovations which lead to a refurbishment that reduces both the delivered and the final energy consumption of a building by a significant percentage compared with the pre-renovation levels<sup>4</sup> leading to a very high energy performance"*.

In order to transpose the Directive and to increase the rates and depth of building renovation, the Member States were asked to develop their first renovation strategies and provide them with their third NEEAPs, due by 30th April 2014. One year after this deadline 31 strategies have been submitted to the European Commission (28 from MSs, 3 strategies from Belgium, and one from Gibraltar).

The present report summarises the assessment performed by JRC on the received strategies. The JRC undertook an assessment of 31 national/regional building renovation strategies submitted by the Member States (Deliverable D.2.1 Reports on assessment of each individual Member States' strategy). The analysis assessed and evaluated the compliance with all the items of Article 4 and checked if they were adequately addressed in each national renovation strategy.

The analysis provided an overview of the characteristics of Member States' national building stock (e.g. inventory, energy performance, etc.), highlighting data gaps and availability, and assessed the ambition levels of renovations determined and appropriateness of policies and measures (distinguishing between measures that have already been implemented and measures to be implemented) as well as energy savings expected. The summary of the individual assessments of the 31 renovation strategies submitted by Member States (Belgium communicated three regional strategies), including scores and targeted recommendations can be found in Annex A.

The aim of this report is to summarise the efforts undertaken by Member States in order to meet the requirements of EED Article 4, to provide an overview of the policies and measures chosen and of the overall strengths and weakness, and to identify best practices.

The assessment of the national building renovation strategies has highlighted that, in total, twenty-three out of the thirty-one submitted strategies (74.2%) satisfactorily addressed the main elements of EED Article 4. Ten strategies are fully compliant, with

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<sup>1</sup> <https://ec.europa.eu/energy/en/topics/energy-efficiency/buildings>

<sup>2</sup> COM/2014/015 final

<sup>3</sup> COM/2015/080 final

<sup>4</sup> In the SWD (2013)143 final, the Commission services have indicated that Member States should aim to encourage deep renovations of buildings leading to significant (typically more than 60%) efficiency improvements.

exemplary coverage of regulation requirements. Only six strategies were found to be not compliant.

In addition, it is worth mentioning that some of the non-compliant strategies were found for Member States traditionally strong in terms of energy efficiency measures and achievements, leading to considering the possibility that reporting failed to correctly depict the status of the building energy renovation in those countries (i.e. Austria, Germany and Sweden ) and their future plans.

### ***Non-compliant strategies***

According to our analysis, only six building renovation strategies out of thirty-one, do not meet the basic requirements of EED Article 4. This means that at least two requirements of Article 4 have been evaluated to be insufficiently covered in these strategies. This is the case of the strategies provided by the following Member States: Austria, Belgium Flanders, Belgium Wallonia, Bulgaria, Poland, and Portugal.

### ***Non fully compliant strategies***

The strategies from Germany and Sweden are deemed to be not fully compliant with Article 4; it means that they have been evaluated as not compliant in only one requirement of Article 4 (i.e. The German strategy for Article 4(b), the Swedish one for Article 4(d) only).

### ***Almost fully compliant strategies (OR Acceptable strategies)***

Thirteen strategies have been evaluated as "almost fully compliant"; it means that they have been assessed to be partially compliant (i.e. score=2) for maximum two requirements: Brussels Capital Region, Croatia, Cyprus, Denmark, Estonia, Finland, Gibraltar, Italy, Latvia, Luxemburg, Malta, Netherlands and Slovakia.

### ***Fully compliant strategies and Best practices***

Ten strategies resulted to be fully compliant to requirements of Article 4: Czech Republic, France, Greece, Hungary, Ireland, Lithuania, Romania, Slovenia, Spain and the United Kingdom.

The result of the appraisal exercise is considered especially positive as these were the first renovation strategy documents submitted by Member States and it is expected that their quality, and their actual implementation, will improve in future. Strategies will be revised in 2017, and every 3 years thereafter.

Nevertheless, the assessment shows that a number of Member States did not followed strictly the guidelines and missed some important part/concepts which would require improvements:

- With the exceptions of Finland and Belgium Flanders, no Member States reported plans following the "staged deep renovation" concept. More information and explanation on the idea and more references on the efficacy and examples of successful implementation could help Member States in the development of this renovation approach.
- In most of the cases Member States simply reported a reference to the cost-optimal methodologies, as required by the EPBD. It is recommended that key

results of the cost-optimal analysis for the existing buildings would be properly integrated within the strategies.

- In terms of policy measures, only a few Member States reported "planned" measures for energy efficiency in buildings, while the vast majority reported only existing policies. As the strategies aim at having a "long-term" vision, Member States should be asked an effort to go beyond a simple inventory of the existing measures, providing, a vision/roadmap on the evolution of future policies and measures. Further guidance and support could be given on this point.  
Furthermore, as a suggestion for the preparation of the next round of strategies, Member States could be explicitly asked to provide views on specific measures / policies: for instance, on refurbishment obligations, or incentives to demolition-reconstruction.
- A very few Member States provided a scenario analysis on the intervention options. It would be necessary to have alternative scenarios for building stock and to evaluate cost-effectiveness of different options under each scenario. This should in turn offer a tool to decide the most appropriate (cost-effective) level of intervention. In doing this exercise, it is important that the main assumptions are made explicit and discussed. Sensitivity analysis of the main parameters of the study should also be performed, while this was not done in any of the strategy.
- Not all Member States have provided a clear indication of their renovation targets. A description of potential energy savings and other benefits associated to the targets, when defined, is usually missing.
- The section related to forward-looking perspective to guide investment received the lowest average rating in the assessment exercise. In a number of cases information was not provided or was not in line with art 4 requirements and guideline indications. Additional guidance on this issue should be provided.
- Member States seem to neglect or undervalue the importance of R&D in the building sector: Only two strategies included this dimension (i.e. the United Kingdom and Germany).
- The majority of the renovation strategies failed to report and discuss issues beyond energy efficiency, for instance: indoor comfort/air quality, impact on construction sector, externalities.
- Non-residential building stock is not well covered and described. This is true for all the sections of the strategies. Member States should be asked additional effort in the collection of data and analysis of this specific segment of the building stock.
- Evaluation of the policies implemented should also be a section in the future strategies. Member States should prove to have monitored at least the most important measures and to share the outcomes in view of a policy evaluation exercise.

As a general remark, Member States seem to have developed each section of the long-term renovation strategy as a separate, stand-alone topic. A more correct view should have considered each section as related to the others in a conceptual flow.



Considering the linkages between the different sections (which reflect the different requirements of Article 4), should make Member States able to have a more systemic view and develop more coherent and complete strategies.

## 1. Introduction

The European building stock consumes approximately 40% of primary energy and it is responsible for 36% of the EU greenhouse emissions<sup>5</sup>. A significant reduction of building energy demand is a requisite to meet Europe's GHG emissions reduction targets<sup>6</sup>. Buildings are a strategic sector for energy policy: it is among Juncker's Commission priorities and it is a pillar of the Energy Union as set by the 2015 Communication<sup>7</sup>. The Energy Performance of Buildings Directive (EPBD) Directive together with the Energy Efficiency Directive (EED) and the Renewable Energy Directive (RED), defined a framework that creates the conditions for long term improvements in the energy performance of Europe's building stock.

In particular the Article 4 of EED requires Member States *"to establish a long-term strategy beyond 2020 for mobilising investment in the renovation of residential and commercial buildings with a view to improving the energy performance of the building stock. That strategy should address cost-effective deep renovations which lead to a refurbishment that reduces both the delivered and the final energy consumption of a building by a significant percentage compared with the pre-renovation levels<sup>8</sup> leading to a very high energy performance"*.

In order to transpose the Directive and to increase the rates and depth of building renovation, the Member States were asked to develop their first renovation strategies and provide them with their third NEEAPs, due by 30th April 2014. One year after this deadline 31 strategies have been submitted to the European Commission (28 from MSs, 3 strategies from Belgium, and one from Gibraltar).

The present report summarises the assessment performed by JRC on the received strategies. The JRC undertook an assessment of 31 national/regional building renovation strategies submitted by the Member States (Deliverable D.2.1 Reports on assessment of each individual Member States' strategy). The analysis assessed and evaluated the compliance with all the items of Article 4 and checked if they were adequately addressed in each national renovation strategy (see the evaluation template in annex C).

The analysis provided an overview of the characteristics of Member States' national building stock (e.g. inventory, energy performance, etc.), highlighting data gaps and availability, and assessed the ambition levels of renovations determined and appropriateness of policies and measures (distinguishing between measures that have already been implemented and measures to be implemented) as well as energy savings expected. The summary of the individual assessments of the 31 renovation strategies submitted by Member States (Belgium communicated three regional strategies), including scores and targeted recommendations can be found in Annex A.

The aim of this report is to summarise the efforts undertaken by Member States in order to meet the requirements of EED Article 4, to provide an overview of the policies and measures chosen and of the overall strengths and weakness, and to identify best practices.

The structure of the Report is as follows. Chapter 1 presents the methodology followed for the evaluation of the 31 Member States renovation strategies. The results of the general assessment of the 31 renovation strategies are presented in Chapter 2. In Chapters 3 to 7 the compliance of the strategies against the five requirements of Article 4 are analysed in detail. In Chapter 8 conclusions and recommendations are provided.

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<sup>5</sup> <https://ec.europa.eu/energy/en/topics/energy-efficiency/buildings>

<sup>6</sup> COM/2014/015 final

<sup>7</sup> COM/2015/080 final

<sup>8</sup> In the SWD (2013)143 final, the Commission services have indicated that Member States should aim to encourage deep renovations of buildings leading to significant (typically more than 60%) efficiency improvements.

The Annexes appended to the Report present the summaries of the 31 renovation strategy evaluations, the official Commission guidance for NEEAPs and the Renovation strategies evaluation template.

## 2. Methodology

The evaluation of Member States renovation strategies followed the structure suggested in the Commission's guidance for national energy efficiency action plans (NEEAPs)<sup>9</sup>. In particular, Annex B of the guidance specifies the areas that Member States are requested to address under each of the five sub-paragraphs in Article 4.

An evaluation template has been developed following the sections set out in the guideline document. These are summarized in Annex B of the present report.

In some sections of the review template, numerical information (e.g. on the building stock) is collected and showed, while other sections report more qualitative information gathered in the review of the national strategies. For some sections, information on the presence/absence of a specific element in the strategy is recorded (with comments, when necessary).

The template used for the individual Member States' strategy review is included as Annex C to the present report.

This report presents the result of the evaluation of Member States' "Article 4 notifications" only and not an assessment of Member States' building renovation policies.

Only the information provided by Member States in their submitted renovation strategy documents, complemented, when necessary by information retrieved in the National Energy Efficiency Action Plans (NEEAP), has been reviewed and evaluated and is presented in this synthesis report: third party information, as well as information retrieved from other official and unofficial sources has not been taken into account unless explicitly indicated by Member States.

For the evaluation of the policy measures' section (Article 4(c)), a more detailed distinction of the measures has been elaborated as described in chapter 5 (see Table 7 - Categorisation of policy measures).

The evaluation assessed compliance of each strategy to EED Article 4 provisions in the five relevant areas (Article 4 sub-paragraphs). The level of details and accuracy of the information provided in each section was evaluated.

In order to be consistent with previous studies (BPIE, 2014), in the appraisal of the strategies each section was scored on a 0-5 scale, where:

- 0 = MISSING – the item is not covered at all, or only described in another source;
- 1 = UNSATISFACTORY – only the most cursory coverage of the item;
- 2 = INADEQUATE or PARTIALLY COMPLIANT– item addressed poorly, with insufficient detail, or with important aspects missing;
- 3 = ADEQUATE – meets the basic minimum requirements;
- 4 = GOOD – topic is described in some detail;
- 5 = EXCELLENT – exemplary coverage of the topic.

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<sup>9</sup> SWD(2013)180 final

([http://ec.europa.eu/energy/sites/ener/files/documents/20131106\\_swd\\_guidance\\_neeaps.pdf](http://ec.europa.eu/energy/sites/ener/files/documents/20131106_swd_guidance_neeaps.pdf)).

Other guidance documents have been published, for example by BPIE (BPIE 2014) and by the EED Concerted Action working group (<http://www.esd-ca.eu/reports/art-4-guidance-document>).

In addition to compliance with the requirements of Article 4 of the EED and level of detail, the assessment considered other criteria:

- Level of ambition: ambitions of the renovation targets and goals of the strategy
- Appropriateness: to what extent are the measures indicated contribute to the objectives of the strategy? Are they sufficient / appropriate to reach them?
- Comprehensiveness of policy packages covering all key sectors/actors?

The assessment exercise also identified strengths and weaknesses of each strategy and formulates recommendations. A specific focus is placed on best practices and innovative approaches, when based on the assessment, some new, original, and promising measures or policies have been implemented or planned.

The overall compliance of the strategies, four categories, has been determined based on the following criteria:

**NON-COMPLIANT:** two requirements or more of Article 4 are either MISSING or UNSATISFACTORY covered (i.e. scores 0 or 1)

**NOT FULLY COMPLIANT:** if the strategy is not compliant with **only one** requirement of Article 4 failed (i.e. 0 or 1), OR at least three requirements assessed to be INADEQUATE/PARTIALLY COMPLIANT (i.e. score = 2)

**ALMOST FULLY COMPLIANT:** if it has been assessed to be INADEQUATE/PARTIALLY COMPLIANT (i.e. score = 2) for maximum two requirements;

**FULLY COMPLIANT;** if the strategy meets all the basic requirements (all the scores  $\geq$  3) for all the requirements.

This classification is different from the BPIE one, which is based on a percentage of the total potential score. We opted to this different approach to take into account the completeness of the strategy, and for instance to avoid the case of evaluating as compliant a strategy with one or two missing or unsatisfactory covered requirements.

### 3. Assessment of the compliance to EED Article 4 mandatory elements

#### 3.1 Overall state of compliance with Article 4

According to the methodology and the scoring system described in Chapter 1, each strategy has been evaluated against the five requirements of Article 4, namely:

- (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; and
- (e) An evidence-based estimate of expected energy savings and wider benefits.

Table 1 presents the results of the evaluation of each long-term renovation strategy against the five requirements of the Energy Efficiency Directive, Article 4. The scores reflect the **compliance** aspects of the renovation strategies. It is worth mentioning that a "fully compliant" does not necessarily mean that the strategy is considered "effective" or likely to deliver the required transformation towards deep renovation of the national building stock.

The colour coding reflects the assessment as follows:

**RED** = Non-compliant strategy; two requirements or more of Article 4 are either MISSING or UNSATISFACTORY covered (i.e. scores 0 or 1)

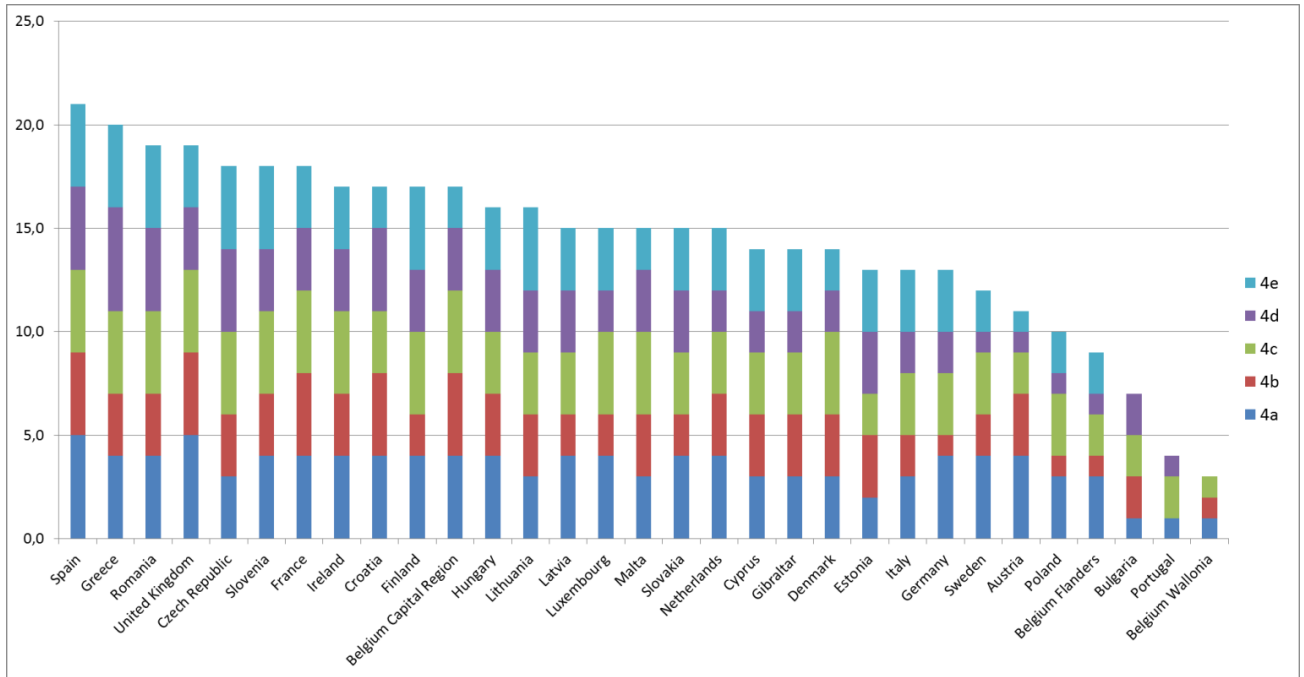
**YELLOW** = Strategy not fully compliant; the strategy is not compliant with only one requirement of Article 4 failed (i.e. 0 or 1), OR at least three requirements assessed to be INADEQUATE/PARTIALLY COMPLIANT (i.e. score = 2)

**LIGHT GREEN** = Strategy almost fully compliant; it has been assessed to be INADEQUATE/PARTIALLY COMPLIANT (i.e. score = 2) for maximum two requirements;

**GREEN** = Strategy fully compliant; the strategy meets all the basic requirements (all the scores  $\geq 3$ ) for all the requirements.

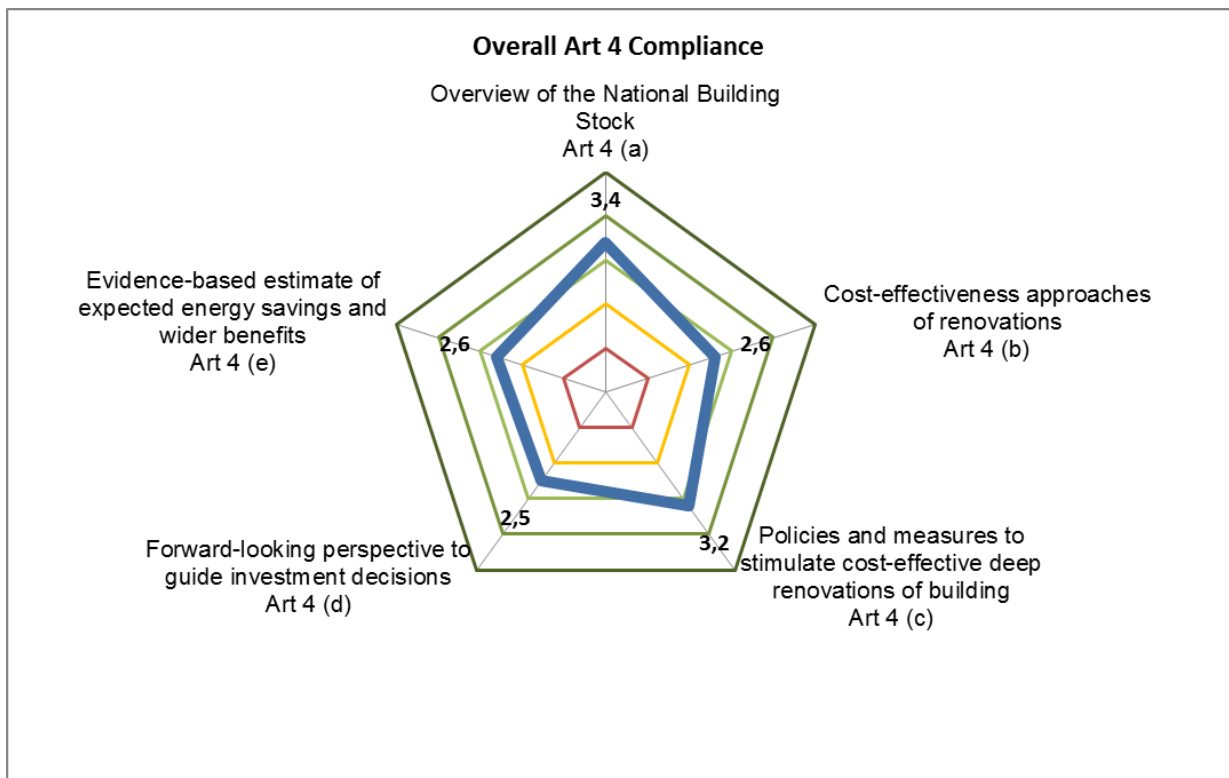
**Table 1: Compliance with EED Article 4 requirements**

<b>Member State</b>	<b>Overview of building stock - 4(a)</b>	<b>Identification of cost-effective approach to renovation - 4(b)</b>	<b>Policies to stimulate cost-effective renovation - 4(c)</b>	<b>Forward-looking perspective to guide investment decisions - 4(d)</b>	<b>Estimate of expected energy savings and wider benefits - 4(e)</b>
<b>Austria</b>	4	3	2	1	1
<b>Belgium BCR</b>	4	4	4	3	2
<b>Belgium Flanders</b>	3	1	2	1	2
<b>Belgium Wallonia</b>	1	1	1	0	0
<b>Bulgaria</b>	1	2	2	2	0
<b>Croatia</b>	4	4	3	4	2
<b>Cyprus</b>	3	3	3	2	3
<b>Czech Republic</b>	3	3	4	4	4
<b>Denmark</b>	3	3	4	2	2
<b>Estonia</b>	2	3	2	3	3
<b>Finland</b>	4	2	4	3	4
<b>France</b>	4	4	4	3	3
<b>Germany</b>	4	1	3	2	3
<b>Gibraltar</b>	3	3	3	2	3
<b>Greece</b>	4	3	4	5	4
<b>Hungary</b>	4	3	3	3	3
<b>Ireland</b>	4	3	4	3	3
<b>Italy</b>	3	2	3	2	3
<b>Latvia</b>	4	2	3	3	3
<b>Lithuania</b>	3	3	3	3	4
<b>Luxembourg</b>	4	2	4	2	3
<b>Malta</b>	3	3	4	3	2
<b>Netherlands</b>	4	3	3	2	3
<b>Poland</b>	3	1	3	1	2
<b>Portugal</b>	1	0	2	1	0
<b>Romania</b>	4	3	4	4	4
<b>Slovakia</b>	4	2	3	3	3
<b>Slovenia</b>	4	3	4	3	4
<b>Spain</b>	5	4	4	4	4
<b>Sweden</b>	4	2	3	1	2
<b>United Kingdom</b>	5	4	4	3	3



**Figure 1: Comparison of the scores of the 31 evaluations of Member States notifications**

Overall, the highest-scored renovation strategies as regards compliance are the one from Spain (21/25 – 84% of total possible points), Greece (20/25 – 80%), United Kingdom and Romania (19/25 – 76%), Czech Republic, Slovenia and France (18/25 – 72%). Figure 1 presents a comparison of the scores of the 31 evaluations, against each of the five requirements of EED Article 4.



**Figure 2: Average scores of the 31 renovation strategy evaluations**



On average, the strategies provided by Member States cover better Article 4(a) and Article 4(c) sub-paragraphs (average rating 3.4 and 3.2 respectively), while the other requirements are not addressed at the same level of detail (see Figure 2). In particular, the "forward-looking perspective" (Article 4(d)) is the one that caused most difficulties to Member States and, overall, resulted to be the weakest section of the analysed strategies (see Figure 2). In fact, only few Member States (i.e. Greece, Spain, Czech Republic and Romania) interpreted correctly this requirement, providing different scenarios of renovation options and a clear roadmap for their implementation.

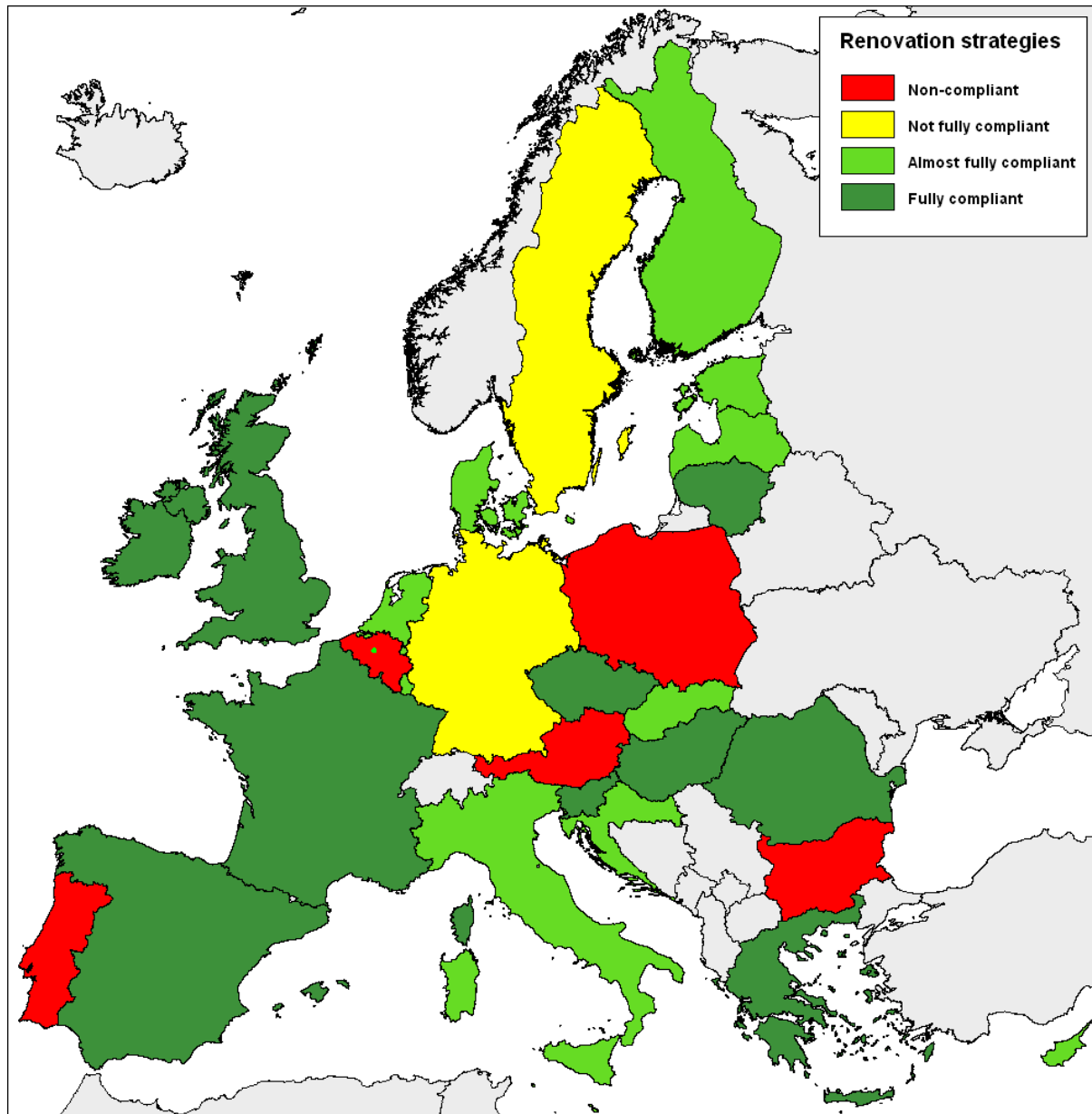


Figure 3: Map illustrating the result of the evaluation of the renovation strategies

### ***Non-compliant strategies***

According to our analysis, only six building renovation strategies out of thirty-one, do not meet the basic requirements of EED Article 4. This means that at least two requirements of Article 4 have been evaluated to be insufficiently covered in these

strategies. This is the case of the strategies provided by the following Member States: Austria, Belgium Flanders, Belgium Wallonia, Bulgaria, Poland, and Portugal.

***Non fully compliant strategies***

The strategies from Germany and Sweden are deemed to be not fully compliant with Article 4; it means that they have been evaluated as not compliant in only one requirement of Article 4 (i.e. The German strategy for Article 4(b), the Swedish one for Article 4(d) only).

***Almost fully compliant strategies (OR Acceptable strategies)***

Thirteen strategies have been evaluated as "almost fully compliant"; it means that they have been assessed to be partially compliant (i.e. score=2) for maximum two requirements: Brussels Capital Region, Croatia, Cyprus, Denmark, Estonia, Finland, Gibraltar, Italy, Latvia, Luxemburg, Malta, Netherlands and Slovakia.

***Fully compliant strategies and Best practices***

Ten strategies resulted to be fully compliant to requirements of Article 4: Czech Republic, France, Greece, Hungary, Ireland, Lithuania, Romania, Slovenia, Spain and the United Kingdom.

**Table 2: Summary of strategies compliance with EED Article 4 requirements**

<p><b>Non-compliant strategies</b></p> <p>Austria, Belgium Flanders, Belgium Wallonia, Bulgaria, Poland, Portugal</p>
<p><b>Non fully compliant strategies</b></p> <p>Germany, Sweden</p>
<p><b>Almost compliant strategies</b></p> <p>Brussels Capital Region, Croatia, Cyprus, Denmark, Estonia, Finland, Gibraltar, Italy, Luxemburg, Latvia, Malta, Netherlands and Slovakia</p>
<p><b>Fully compliant strategies and Best practices</b></p> <p>Czech Republic, France, Greece, Hungary, Ireland, Lithuania, Romania, Slovenia, Spain, the United Kingdom</p>

Concerning the coverage of each of the requirements of Article 4, the following five strategies have been selected as best examples for each section, to combine a "Best of" building renovation strategy (Table 3).

**Table 3: A "Best Of" building renovation strategy**

<b>Section</b>	<b>Best practice example</b>
Overview of building stock - 4(a)	The United Kingdom
Identification of cost-effective approach to renovation - 4(b)	Brussels Capital Region
Policies to stimulate cost-effective renovation - 4(c)	Denmark
Forward-looking perspective to guide investment decisions - 4(d)	Spain and Greece
Estimate of expected energy savings and wider benefits - 4(e)	Romania

## 4. Information on the National building stock – Article 4(a)

As already mentioned, the Directive requires Member States, to provide, in their renovation strategies, an overview of the national building stock. A good knowledge of the existing building stock is a prerequisite for the development of an effective building renovation strategy. This has been well understood and implemented by Member States that, on average, provided a reasonably detailed description of their building stock. This section has the highest average score (3.4 out of 5).

With reference to Article 4(a), 27 strategies resulted to be fully compliant (score  $\geq 3$ ), 1 inadequate/partly compliant (score = 2) and only 3 non-compliant (score 0 or 1) .

In the following tables, the information on the building stock provided by each renovation strategy for the residential (Table 4) and the non-residential sector (Table 5) is shown, following the indications of the "Commission's guidance" document (see Annex B – point 1).

The following aspects have been considered for the evaluation of the requirement of Article 4(a):

- A. Identification of main building categories,
- B. Identification of age bands having a material bearing on building energy performance,
- C. Distribution of Energy Performance Certificate ratings by building sector/type,
- D. Information on climatic zones which have a material bearing on building energy performance,
- E. Information on ownership (i.e. public, private or mixed),
- F. Information on tenure (i.e. Owner occupied, rented or mixed),
- G. Identification of energy use and performance characteristics of each building combination.

In the next Tables (Tables 4, 5, 6, 8, 10, 11) the following colour code has been used to report the level of detail of the information provided in the renovation strategies:

**GREY** = information non provided

**LIGHT BLUE** = information provided with a medium level of detail

**BLUE** = information provided with a good level of detail

**Table 4: Information provided on the residential building stock**

<b>Member State/Item</b>	<b>A</b>	<b>B</b>	<b>C</b>	<b>D</b>	<b>E</b>	<b>F</b>	<b>G</b>
<b>Austria</b>							
<b>Brussels Capital Region</b>							
<b>Belgium Flanders</b>							
<b>Belgium Wallonia</b>							
<b>Bulgaria</b>							
<b>Croatia</b>							
<b>Cyprus</b>							
<b>Czech Republic</b>							
<b>Denmark</b>							
<b>Estonia</b>							
<b>Finland</b>							
<b>France</b>							
<b>Germany</b>							
<b>Gibraltar</b>							
<b>Greece</b>							
<b>Hungary</b>							
<b>Ireland</b>							
<b>Italy</b>							
<b>Latvia</b>							
<b>Lithuania</b>							
<b>Luxembourg</b>							
<b>Malta</b>							
<b>Netherlands</b>							
<b>Poland</b>							
<b>Portugal</b>							
<b>Romania</b>							
<b>Slovakia</b>							
<b>Slovenia</b>							
<b>Spain</b>							
<b>Sweden</b>							
<b>United Kingdom</b>							

**Table 5: Information on the non-residential building stock**

Member state/Item	A	B	C	D	E	F	G
<b>Austria</b>							
<b>Brussels Capital Region</b>							
<b>Belgium Flanders</b>							
<b>Belgium Wallonia</b>							
<b>Bulgaria</b>							
<b>Croatia</b>							
<b>Cyprus</b>							
<b>Czech Republic</b>							
<b>Denmark</b>							
<b>Estonia</b>							
<b>Finland</b>							
<b>France</b>							
<b>Germany</b>							
<b>Gibraltar</b>							
<b>Greece</b>							
<b>Hungary</b>							
<b>Ireland</b>							
<b>Italy</b>							
<b>Latvia</b>							
<b>Lithuania</b>							
<b>Luxembourg</b>							
<b>Malta</b>							
<b>Netherlands</b>							
<b>Poland</b>							
<b>Portugal</b>							
<b>Romania</b>							
<b>Slovakia</b>							
<b>Slovenia</b>							
<b>Spain</b>							
<b>Sweden</b>							
<b>United Kingdom</b>							

As expected, Member States reported more detailed information on the residential building stock than on the non-residential building stock.

In general, the building stock has been well described by the different building categories and age bands, while the information on the energy classes and climatic zones is missing in the majority of the cases. Overall, the strategies including more detailed information on their building stocks are the one provided by Brussels Capital Region, Croatia, Ireland, Latvia, Romania, Spain and the United Kingdom. Among these, the one from the United Kingdom has been evaluated as best practice.

The United Kingdom provided a comprehensive and very detailed statistical overview of the building stock. This includes a detailed analysis of building types, ages, tenure status, energy performances, energy demand and energy supply both for residential and non-residential buildings. The overview is based on recent data from different sources (i.e. the DECC "UK housing energy fact file 2013", the ONS "UK census 2011") and it can be considered as an example for other Member States.

## 5. Cost-effectiveness approaches of renovation - Article 4(b)

The second sub-paragraph of Article 4 requires the identification of a cost-effective approach to renovations relevant to the building type and climatic zone. The "Commission's guidance for NEEAP" translates this point in the following key questions:

- A. What technical opportunities for retrofit of energy efficiency measures for each building category have been identified? What technical opportunities for retrofit of renewable energy measures have been identified? Has the opportunity to connect to a district heating system been considered?
- B. What packages of measures that can achieve at significant energy saving, at least up to the prevailing energy performance requirements for new buildings of the same category, have been identified?
- C. Has it been determined whether deep renovations should be undertaken as a single package, or staged over a period of time?
- D. Has the cost effectiveness of the different packages of measures been determined using cost optimality methodology?
- E. From the above cost appraisal, have you determined a prioritised set of renovation packages for each building category, and a timeline for implementation?
- F. Have you considered the exemplary role of the public sector (at all tiers of government, as well as public services such as public housing, defence, health and education) in leading the drive towards deep renovation, and in exerting influence of citizens and businesses?
- G. Have you considered the appropriateness of targeting the least energy efficient building stock as a priority?
- H. Have you considered different scenarios as to the rate of change of key parameters?

In agreement with this formulation, the following table (Table 6) provides an evaluation of the information included in this sub-chapter of the renovation strategies.

In a large number of cases Member States referred to the cost-optimal analysis already developed to transpose the EPBD requirements, but this point resulted in a non-exhaustive summary of those calculations, not fully integrated with the rest of the renovation strategy. Some Member States did not submit at all a cost-effective approach to renovations and some others provided very generic considerations not supported by reliable assessments.

Overall, 19 strategies resulted to be compliant with Article 4(b), 7 partly compliant and 5 non-compliant. The issues less covered by Member States are those related to the staged deep renovations (item C), the timeline for implementation (item E) and different scenarios on key parameters (item H).

No one has fully implemented the official guidance, but the following Member States presented (for different reasons) a very satisfactory approach: Brussels Capital Region, Croatia, France, Spain and the United Kingdom. From these best approaches, the following general lessons can be derived:

- Insulation of roof and external walls, replacement of single-glazed windows, improvement of the envelope air-tightness and upgrade of boilers are considered generally cost-effective.



- Installation of mechanical ventilation systems (including heat recovery), ground source heat pumps, improvement of lightning and cooling systems (especially in non-residential buildings) and behavioural measures (i.e. smart meter/control systems) are often taken into account for deep grade renovation options.
- The solar renewable energy options are favourably assessed, but rarely included in the renovation packages.
- The energy saving potential of the residential sector is judged greater than that one of the non-residential stock, for which less information is also available.
- Identifying cost-effective approaches to energy improvement work is considered a difficult exercise, as it depends on many input data and boundary conditions. The results achieved are partial and further analyses are needed.

**Table 6: Information provided on Cost-effectiveness approaches of renovation**

Member state / Item	A	B	C	D	E	F	G	H
<b>Austria</b>								
<b>Brussels Capital Region</b>								
<b>Belgium Flanders</b>								
<b>Belgium Wallonia</b>								
<b>Bulgaria</b>								
<b>Croatia</b>								
<b>Cyprus</b>								
<b>Czech Republic</b>								
<b>Denmark</b>								
<b>Estonia</b>								
<b>Finland</b>								
<b>France</b>								
<b>Germany</b>								
<b>Gibraltar</b>								
<b>Greece</b>								
<b>Hungary</b>								
<b>Ireland</b>								
<b>Italy</b>								
<b>Latvia</b>								
<b>Lithuania</b>								
<b>Luxembourg</b>								
<b>Malta</b>								
<b>Netherlands</b>								
<b>Poland</b>								
<b>Portugal</b>								
<b>Romania</b>								
<b>Slovakia</b>								
<b>Slovenia</b>								
<b>Spain</b>								
<b>Sweden</b>								
<b>United Kingdom</b>								

## 6. Policies and measures to stimulate cost-effective deep renovations of buildings - Article 4(c)

This section was the core of the majority of the renovation strategies and, together with the one on the description of the building stock, got the highest marks in the evaluation with an average score of 3.2 out of 5 (see Figure 2).

According to the Guidance, Member States were requested to provide an overview of the policies measures to stimulate cost effective deep renovations of buildings, including staged deep renovations and in particular to:

- A. Give an appraisal of existing measures/policies in the Member States;
- B. Provide an analysis of existing barriers to deep building renovation;
- C. Give an appraisal of relevance of policies used in other territories;
- D. Provide a design of new policy landscape that addresses barriers and enables the delivery of the required ramp up in deep renovation activity, with a particular focus on those measures which need to be introduced within the next 3 years.

Table 8 presents the results of the evaluation on the information provided by Member States in this section.

Moreover, according to the "Commission's guidance for NEEAPs" (see Annex B, point 3) for the evaluation of the strategies, the policy measures were divided in the following categories: Regulatory, Financial and fiscal, Information campaigns, Labelling, Voluntary agreements, and Other measures. Table 7 provides a detailed breakdown of the types of policy measures considered.

**Table 7: Categorisation of policy measures**

<b>Regulatory</b>	Building codes; Minimum Energy Performance Standards (MEPS) for new and existing buildings; refurbishment obligations
<b>Financial and fiscal</b>	Grants; Subsidies; Preferential loans; Tax incentives; Energy taxation, Energy Efficiency Obligation Schemes (EEOSs)
<b>Information campaigns</b>	Awareness raising and information campaigns
<b>Labelling</b>	Energy Performance certification, energy labelling schemes
<b>Voluntary Agreements</b>	Voluntary certification and labelling programs; Voluntary and negotiated agreements;
<b>Others</b>	Energy audits, skills development and capacity building programme, Demonstration programmes, Research and Innovation programmes, Quality standards, Smart meter roll-out;

Overall, Member States addressed quite exhaustively Article 4(c) requirements, providing a comprehensive set of policy designed to address the identified barriers, with 25 strategies that resulted to be fully compliant (score  $\geq 3$ ), 5 inadequate/partly compliant (score = 2) and only 1 non-compliant (i.e. Belgium Wallonia).

**Table 8: Information provided on measures and policies for building renovation**

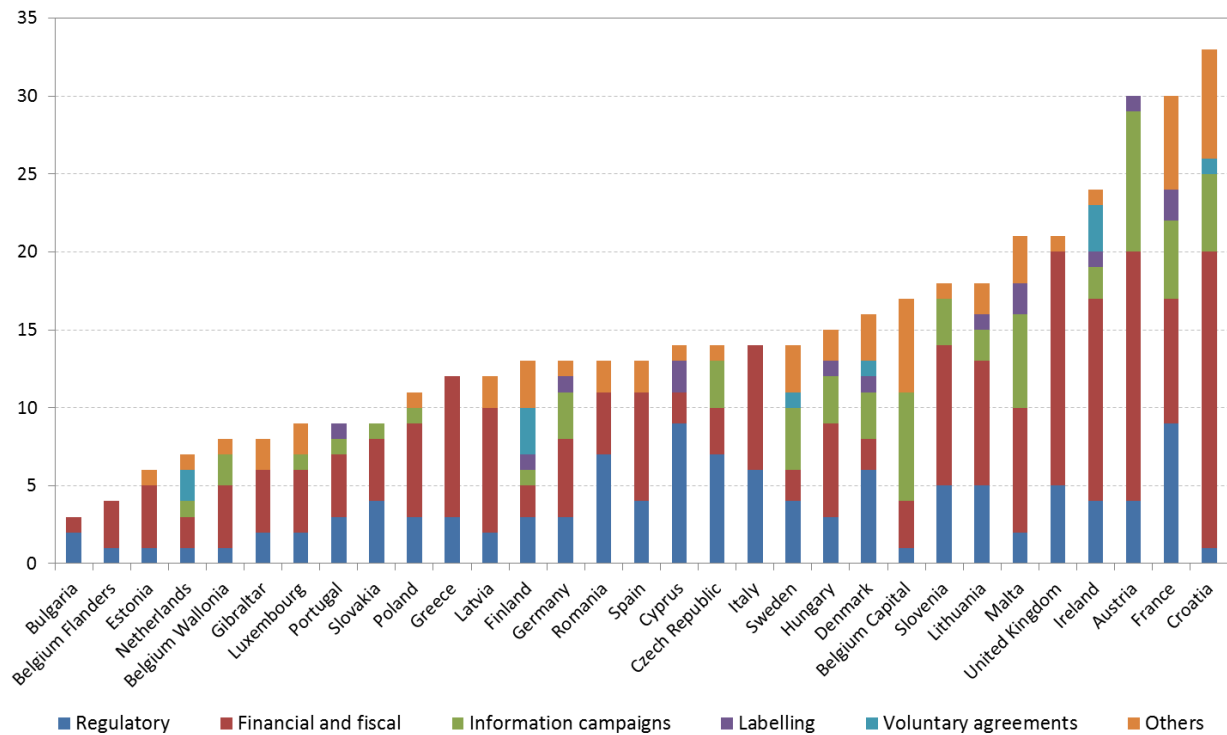
Member state / Item	A	B	C	D
<b>Austria</b>				
<b>Brussels Capital Region</b>				
<b>Belgium Flanders</b>				
<b>Belgium Wallonia</b>				
<b>Bulgaria</b>				
<b>Croatia</b>				
<b>Cyprus</b>				
<b>Czech Republic</b>				
<b>Denmark</b>				
<b>Estonia</b>				
<b>Finland</b>				
<b>France</b>				
<b>Germany</b>				
<b>Gibraltar</b>				
<b>Greece</b>				
<b>Hungary</b>				
<b>Ireland</b>				
<b>Italy</b>				
<b>Latvia</b>				
<b>Lithuania</b>				
<b>Luxembourg</b>				
<b>Malta</b>				
<b>Netherlands</b>				
<b>Poland</b>				
<b>Portugal</b>				
<b>Romania</b>				
<b>Slovakia</b>				
<b>Slovenia</b>				
<b>Spain</b>				
<b>Sweden</b>				
<b>United Kingdom</b>				

Table 9 presents the number of measures targeting building renovation included in the 31 analysed strategies, divided by country, type and status of the implementation (i.e. implemented/planned).

**Table 9: Measures included in the strategies by country and type**

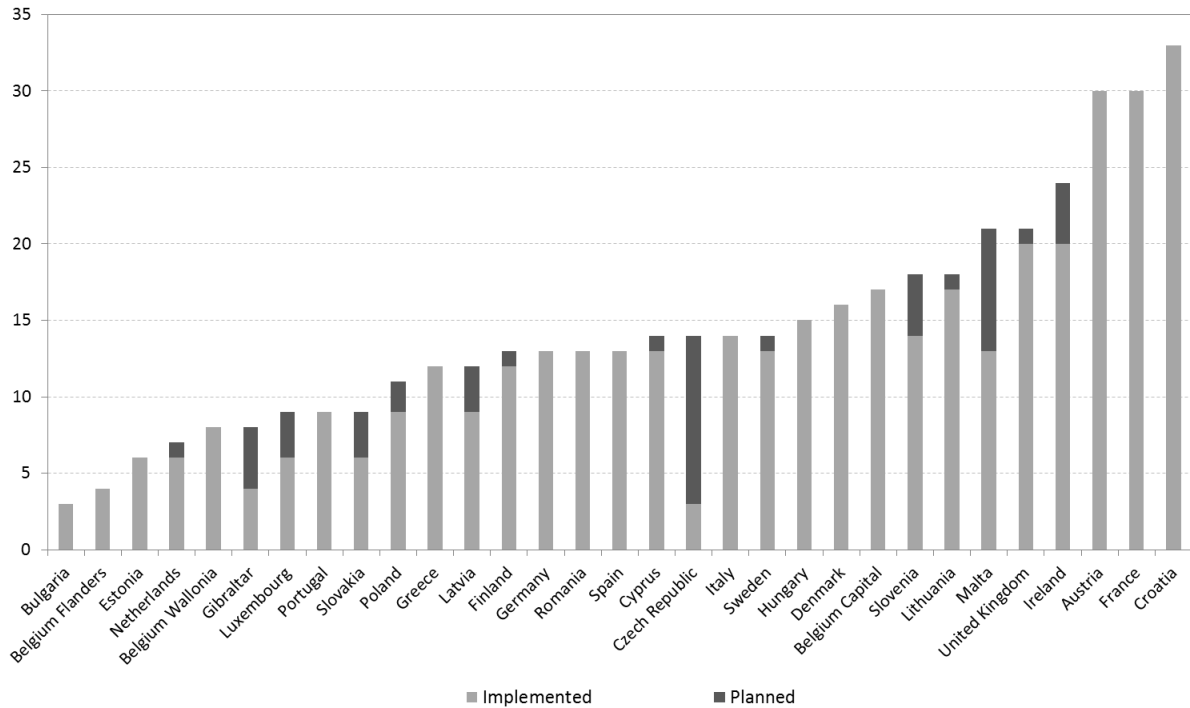
Country	Regulatory		Financial and fiscal		Information campaigns		Labelling		Voluntary agreements		Others		TOTAL	
	Impl	Plan.	Impl	Plan.	Impl	Plan.	Impl	Plan	Impl	Plan.	Imp.	Plan.	Impl	Plan.
Austria	4		16		9		1						30	0
Belgium BCR	1		3		7						6		17	0
Belgium Flanders	1		3										4	0
Belgium Wallonia	1		4		2						1		8	0
Bulgaria	2		1										3	0
Croatia	1		19		5				1		7		33	0
Cyprus	9		1	1			2				1		13	1
Czech Republic	1	6	1	2		3					1		3	11
Denmark	6		2		3		1		1		3		16	0
Estonia	1		4								1		6	0
Finland	3		2			1	1		3		3		12	1
France	9		8		5		2				6		30	0
Germany	3		5		3		1				1		13	0
Gibraltar	1	1	2	2							1	1	4	4
Greece	3		9										12	0
Hungary	3		6		3		1				2		15	0
Ireland	3	1	11	2	2		1		3			1	20	4
Italy	6		8										14	0
Latvia	1	1	6	2							2		9	3
Lithuania	5		7	1	2		1				2		17	1
Luxembourg	2		1	3	1						2		6	3
Malta	1	1	8		2	4	1	1			1	2	13	8
Netherlands	1		2			1			2		1		6	1
Poland	2	1	5	1	1						1		9	2
Portugal	3		4		1		1						9	0
Romania	7		4								2		13	0
Slovakia	4		2	2		1							6	3
Slovenia	4	1	6	3	3						1		14	4
Spain	4		7								2		13	0
Sweden	3	1	2		4				1		3		13	1
United Kingdom	5		15									1	20	1
<b>TOTAL</b>	<b>96</b>	<b>12</b>	<b>162</b>	<b>16</b>	<b>50</b>	<b>10</b>	<b>13</b>	<b>1</b>	<b>11</b>	<b>0</b>	<b>49</b>	<b>5</b>	<b>381</b>	<b>44</b>

There is a great heterogeneity of policy packages in different Member States, both in terms of absolute number and in terms of policy type, with a predominance of Financial & Fiscal and regulatory measures.



**Figure 4: Number of all the measures in the building sector (implemented and planned) by country and type**

In general, while in most of the strategies the existing policy framework is clearly described, the vast majority of Member States reported only existing policies and only a few Member States (e.g. Czech Republic, Malta and Ireland) reported "planned" measures for energy efficiency in buildings (see Figure 5). As the strategies aim at having a "long-term" vision, Member States should make an effort to go beyond a simple inventory of the existing measures, providing, a clear roadmap on the evolution of future policies and measures.



**Figure 5: Number of implemented vs planned measures by country**

Thirteen strategies scored 4 out of 5 (i.e. Belgium Brussels Capital, Czech Republic, Denmark, Finland, France, Greece, Ireland, Luxembourg, Malta, Romania, Slovakia, Slovenia and the United Kingdom). Among these the Danish description section has been pointed out as best practice.

The Danish strategy reports an articulated, wide, complete and ambitious set of policy measures. Most of them are already implemented and the new ones are intended to be an upgrade of the existing measures (such as energy performance requirements). The document describes the policy measures in details, providing a background and a rationale for each line of intervention. Existing and new measures are clearly identified and a sufficiently precise timeline for their implementation is provided. The strategy outlines initiatives across 4 sectors: Initiatives aimed at all construction segments; Initiatives targeted at single family dwellings; Initiatives targeting multi-family buildings, commercial buildings and public buildings; and Initiatives targeted at strengthening the skills and innovation to promote energy renovation.

The main measures and policies presented in the strategies are presented and discussed below.

Regulatory measures were mostly composed of requirements related to the EPBD and more specifically on minimum energy performance requirements for new and existing buildings. Nearly all Member states included information on building regulations for new and existing buildings in their strategies. A few Member States referred to further improvements in their building codes, strengthening the energy standards to be met during building construction and renovation. Examples include Denmark reporting various upgrades in the energy requirements for new buildings and specific requirements for building envelope, windows and installations and Austria which stated that on-going adjustments are made in building regulations. France has last updated its thermal building codes in 2012, tightening primary energy consumption requirements for new buildings to an annual threshold of 50 kWh<sub>ep</sub>/m<sup>2</sup> for heating, domestic hot water, lighting, cooling and auxiliary systems. In Flanders, both energy performance and indoor climate requirements for buildings, together with insulation standards are set. Other

examples of countries with measures tightening of energy performance standards include Ireland and the Netherlands. Other building regulations mentioned in the strategies include inspections of water boilers and air conditioning systems (e.g. Bulgaria, Cyprus, Italy, Croatia and France).

Germany has the Renewable Thermal Energy Act (EEWärmeG) and Renewable Energy Act (EEG) which promote the use of renewable energies in various sectors including residential buildings. The Renewable Energies Heat Act, entered into force in 2009, stipulates that owners of new buildings must cover part of their heat supply with renewable energies. The Renewable Energy Act, last updated in 2014, promotes the generation of electricity using renewable energy sources through long-term regularly adjusted feed-in tariffs.

France indicated that a target of renovating 500,000 old dwellings per year by 2017 has been set. In Brussels Region of Belgium, the programme PLAGE – related to a local plan for energy management. "Plan Local d'Action pour la Gestion Énergétique" – targets real estate owners or occupants covering overall more than 100,000 m<sup>2</sup> and obliges them to reduce their energy consumption by implementing energy management measures. These measures include the establishment of an energy cadastre concerning all buildings owned or occupied, the identification of priority buildings in this cadastre, the definition of an energy accounting system for these buildings, the definition of an action plan to improve their energy performances. This policy started in 2005 and energy management plans are now being made mandatory in the private and tertiary sector. This threshold has been lowered to 50,000 m<sup>2</sup> to define obliged actors in the public sector. Energy efficiency targets corresponding to a 10% reduction of the annual energy consumption are being set for these actors by a decree currently under implementation and targets will have to be achieved in four years.

Specific regulatory measures for the services sector include the Luxembourgish scheme on improvement of lighting in non-residential buildings, which introduces specific energy efficiency requirements for lighting in new non-residential buildings. The Netherlands has an Environmental Management Act for non-residential buildings which places a legal obligation to take energy-saving measures with a payback time of less than 5 years. The obligation applies for large or medium-sized companies with an energy consumption of more than 50 000 kWh and 25 000 m<sup>3</sup> gas per year and also for non-residential buildings including offices, healthcare institutions and schools.

All Member States have reported financial and fiscal measures supporting energy efficiency improvements in the residential and non-residential sectors. These are typically offered in the form of grants and subsidies. For example, Austria has had long experience with federal subsidies for energy efficiency measures for existing and new residential buildings (since 1982) and has gone through continuous tightening of requirements. In addition, the Austrian Federal Government's renovation drive has become as an important and successful tool for private individuals to reduce their energy consumption through subsidies which are provided in the form of one-off, non-reimbursable grants. Bulgaria offers financing through EE fund for renovation of residential buildings as well as grants for multi-family residential buildings under the Operational Programme "Regional Development" and Energy Efficiency credit line for households. The Netherlands has a new € 400 million subsidy programme for the period 2014-2017 offering investment support to landlords in the social rental sector. The subsidy is a measure supporting the parties involved in the Energy Saving Agreement for the Rental Sector which committed to the objectives of an average label B (corporations) and a minimum label C (private landlords) for 80% of homes in 2020. In Italy, an incentive scheme for the promotion of renewable thermal energy and energy efficient heating (also known as "Conto Termico") is expected to generate 1.47 Mtoe of final energy savings in the residential and tertiary sector in 2020. In Lithuania, grants targeting households are offered within the "Programme on renovating multi-apartment buildings for the period 2005-2020. These grants are financed by EU Structural Funds, private, state and municipal budgets.



Tax relief on energy efficiency upgrades for households are available in Greece, France, Germany, Denmark, Finland, Italy, the Netherlands and Portugal. In Italy, the tax credit scheme for building renovations constitutes a very important measure in terms of expected energy savings in 2020. This incentive instrument is closely related to the Energy Certificate one: in order to gain access to the tax credit, it is compulsory to provide an energy certificate that demonstrates the energy efficiency improvement. In the Netherlands, Reduced VAT rate on labour costs for fitting insulation and glass and for maintenance and renovation of residential buildings are available to housing corporations and home owners since 2009.

Loan programmes are offered by a few Member States (France, Greece, Germany, the Netherlands and Portugal). Germany has had a long successful tradition with grants and loans through its KfW scheme, which provide support for renovations achieving various "KfW Efficiency House" levels; the most ambitious one being the KfW Efficiency House 55 representing 55% of the maximum primary energy requirement set for a new building. The Federal CO<sub>2</sub> building renovation programme, along with the KfW programmes for energy-efficient building and renovation, which provides loans and grants in the residential area, is the highest-volume funding instrument in Germany. Within this framework, the KfW initiated investments running to just under EUR 162 billion on behalf of the Government between 2006 and the end of March 2014. These funds were used to renovate more than 3.5 million homes or to build particularly energy-efficient new homes and to renovate over 1 940 buildings for municipal or social bodies. France offers interest-free loans through its Eco-PTZ programme which allows to finance up to EUR 30 000 in works for the improvement of the energy efficiency of privately owned or rented dwellings. Social housing eco-loans (Eco-PLS) are also available in France since 2009. In the Netherlands, a revolving fund supporting energy saving measures in existing houses has been operational since beginning of 2014 for owner-occupiers and is also expected to support landlords and the fund for owners' associations<sup>10</sup>.

For financial measures, specific measures for services include the Greek financial incentive scheme for energy upgrading of commercial buildings. Ireland ran a grant scheme for exemplar projects in the public and business sectors, offering support for sustainable energy upgrades to buildings, services, facilities and processes. Ireland also provides on-going advice, mentoring and training in energy management to participating SMEs in the commercial sector since 2008. The Energy Investment Allowance enables companies to deduct energy efficiency investments from their taxable profit. In Sweden, aid is provided to small and medium-sized enterprises in the form of energy audit checks. This aid may be granted to enterprises with energy consumption in excess of 500 MWh per annum.

Market-based instruments in the residential and non-residential sectors are mainly in the form of Energy Efficiency Obligation Schemes. Austria, Flanders region of Belgium, Bulgaria, Denmark, France, Italy, Ireland, Latvia, Luxembourg, Malta and the United Kingdom have energy efficiency obligation schemes which target these sectors. In the United Kingdom, the Green Deal is the only on-bill financing scheme, which makes a link between loan repayment and energy savings.

Various measures on information and awareness-raising have been mentioned for residential and service sectors. In Austria, the main information and awareness raising measure is the Klimaaktive programme which is an umbrella measure by the Austrian Climate Initiative, consisting of a large number of programmes with the aim to promote the topics of climate protection, energy efficiency and renewable energy sources, in the

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<sup>10</sup> This was stated to be operational sometime in 2014

personal, commercial and public spheres, by means of information, advice, education, training, quality standards and networking. In France, 450 Renovation Information Service Points (PRIS) have been set in the country with the aim to help owners make decisions through the implementation of a national one-stop approach and a local network for the energy renovation of private dwellings. This is a genuine local public service, which provides independent technical, financial, fiscal and regulatory information and gives advice, free of charge and objectively, to the enquiring homeowner on the design of the energy renovation project. In Denmark, a new information campaign (BedreBolig, Better Homes) was introduced in 2014, offering comprehensive, expert advice throughout the energy renovation process. In connection with the launch of BedreBolig, DKK 15 million has been allocated to the launch of a special information campaign. The campaign inter-alia focuses on developing cooperation and dialogue between home owners, banks, mortgage institutions and energy advisers. In Malta a study shall be conducted with the help of the Institute for Sustainable Energy, the Malta Intelligent Energy Management Agency and the National Statistics Office, whereby a pilot project will be carried out on a stratified sample of about 10,000 households to model consumer behaviour and their response to initiative. Other information and awareness-raising measures included the large-scale Latvian information campaign "Dzīvo siltāk!" ("Living warmer!"), encouraging apartment owners to participate in the management of common property and upgrading of the energy performance of buildings and the demonstration project for large-scale energy saving measures in existing residential buildings in the Netherlands.

## 6.1 Innovative approaches

Renovating the EU building stock is a challenging task for policy makers. Thus Member States are called to integrate in their strategies also innovative measures to overcome the existing barriers. In this view in our evaluation we identified innovative approaches.

Beyond the novelty of the measures we consider the following aspects in the selection of these approaches:

- integrated innovative financing schemes;
- policies that create links between the national and local level of renovation;
- measures that consider district aspects;
- synergies with research and innovation programmes.

Hereunder, the main identified policies are listed by type.

### **Regulatory**

#### *The United Kingdom's mandatory minimum energy efficiency standard for rented properties*

Current measures<sup>11</sup> are unlikely to be sufficient to drive the necessary behavioural changes among landlords and tenants to lead to major efficiency improvements, especially in the current period of constrained supply of rental properties. In time this may change as a greater supply of rental properties promotes more competition among landlords that, combined with a growing awareness of the benefits of efficiency, leads to improvements in the building stock offered for rent. In order to accelerate the phasing

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<sup>11</sup> It is mandatory for all rental properties to have a Building Energy Rating that must be displayed on any advertisement of a property offered for rent.

out of inefficient buildings, in the United Kingdom there will be a *minimum energy efficiency standard for privately rented housing and non-domestic property*, with the first domestic and non-domestic energy efficiency regulations coming into force by 1 April 2018.

Moreover, on the same issue, other regulatory measures have been implemented: domestic private landlords will not be able to unreasonably refuse requests for consent to energy efficiency improvements from their tenants, where financial support is available, such as Green Deal finance or ECO, with the first tenants' energy efficiency improvements regulations coming into force by 1 April 2016.

## **Financial and fiscal**

### France Innovative renovation financing scheme: Energies Positif

Local authority actions aimed at encouraging energy efficiency improvements via third-party financing go beyond simply implementing a system of grants or assistance for energy improvements and involve creating a real service for users in the building renovation sector. The Ile-de-France region has set up a truly public service, acting as a One-stop shop, backed by SEM Energies Positif, aimed at advising, supporting and helping fund a private individual's home energy improvements.

Energies POSIT'IF is a public private company (Société d'Economie Mixte) used by French local authorities to manage urban development projects particularly energy related projects. It was set up in 2013 with the support of the Ile-de-France region, Caisse des Dépôts et Consignations, Caisse d'Épargne.

Energies POSIT'IF aims to increase the number of energy retrofits in the Ile-de-France region by providing comprehensive technical services (energy advice, retrofits and energy performance guarantees) and third party financing to thermally upgrade multi-unit buildings. Projects will be financed through equity, low interest debt from financial institutes and the sale of energy savings certificates achieving a low energy building performance target<sup>12</sup>.

### Dutch "Energiesprong" (Energy Leap)

Energiesprong<sup>13</sup> is a non-for-profit market development programme that, through an agreement between construction companies and housing associations, created deal to refurbish 111,000 houses to Net Zero Energy levels by 2020 in The Netherland. The program is targeted at relatively poor tenants of homes with high energy bills: the savings on energy bills will be used to finance the building renovation.

The programme is derived from the Energy in the Built Environment Innovation Agenda (IAGO, approved by the Ministerial Council on February 9, 2009). Knowledge institutions, market players and government worked together to lay the foundations for this, from the Energy Transition Built Environment Platform (PeGo). The thinking behind it is that small steps taken by individual actors will never lead to the achievement of high ambitions. The success of this transition will not only deliver CO<sub>2</sub> reductions. An accelerated and broadened approach to the built environment will also create great

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<sup>12</sup> Intelligent Energy Europe funding from Mobilising Local Energy Investments (MLEI PDA) was used for the initial project development phase. It funded capacity building amongst stakeholders—managers, financial institutions, construction partners, architect, etc.—to up skill and improve knowledge of energy efficiency, thermal retrofits and energy performance contracting. MLEI also supported technical and socio-economic assessments of multi-unit buildings to ensure their suitability for the energy performance contracting model. More details at:

<http://www.energiespositif.fr/>.

<sup>13</sup> More details at: <http://energiesprong.nl>

potential for employment in the construction sector. But intelligent, innovative renovation and new-build systems must be developed and delivered, in order to give the Dutch construction industry a chance to regenerate itself and to position itself as an international leader.

The programme aims to make a substantial contribution to the conditions under which the energy transition can be achieved effectively.

### Italian "Conto Termico" (Thermal Account)

As one of the most ambitious measures on the energy supply side (even if not limited to this), an incentive scheme for the promotion of renewable thermal energy and energy efficient heating also known as "Conto Termico" was introduced in Italy. Started in 2013, the scheme, which works as a feed-in tariff mechanism for heating energy, is addressed to public authorities and to private parties i.e. individuals, condominiums, businesses and farms. These beneficiaries may implement the actions via an ESCO, by means of a third-party financing contract, an energy service contract or an energy performance contract. The National Authority for Electricity and Gas prepares the model contract between the Governing Institution for Energy Services (GSE) and private households to access the incentive for the installation or substitution of heating plants with higher efficient ones or fuelled by renewable sources<sup>14</sup>. Public administration can get incentives also for other energy efficiency interventions, such as the improvement of the building shell.

### **Information campaigns**

#### Latvian "Let's live warmer!" information campaign

The large-scale Latvian information campaign "Dzīvo siltāk!" ("Living warmer!") encourages apartment owners to participate in the management of common property. It stimulates upgrading of the energy performance of buildings also through demonstration projects for large-scale energy saving measures in existing residential buildings in Latvia.

An extensive and active presence on modern social media, using different communication channels (in addition to its official website, the campaign has a strong presence on all main social networking sites, from Facebook and Twitter to YouTube and Vimeo)<sup>15</sup> and a strong branding strategy are among the innovative aspects of the measure and contributed to its success. Over 186 informative events of different type had been organised, attracting more than 8,500 participants, (a number of these broadcast live online). In addition, an annual competition to find 'The Best Energy Efficient Building' assures adequate coverage in mainstream and specialist print.

In 2013 the Latvian campaign "Let's Live Warmer" received the EU Sustainable Energy Week Winner Award in the category "Communicating".

### **Other measures: Research and Innovation**

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<sup>14</sup> Examples of interventions include: replacement of heat generators with electrical and gas heat pumps, including heat pumps for the production of sanitary hot water; replacement of heat generators with biomass-fed heat generators, heating fireplaces and stoves; and installation of solar thermal collectors and solar cooling systems.

<sup>15</sup> A collection of this material can be found at: <http://www.youtube.com/siltinam>; <http://www.slideshare.net/siltinam>, [www.vimeo.com/dzivosiltak](http://www.vimeo.com/dzivosiltak); <http://www.twitter.com/siltinam>, and <http://www.facebook.com/dzivosiltak>

Stimulating innovation is not among the measures traditionally listed in the national strategies for energy efficiency building renovation. However, technological change is key in shaping the diffusion of renovation of the EU building stock by offering new, improved and cost-effective possibilities. The German strategy and the United Kingdom strategies integrate the R&D and Innovation dimension in their national building renovation strategies.

#### Research programmes in the United Kingdom

In the United Kingdom DECC has launched an Energy Entrepreneurs Fund (EEF) to support the development and demonstration of innovative technologies and processes in energy efficiency and building technologies, and in power generation and energy storage. £16 million has been awarded to entrepreneurs since the first phase launch in autumn 2012 and a further £19 million is available until 31 March 2015 to help bring a range of new and innovative low carbon products to market. Moreover, the Energy Technologies Institute's (ETI) £100 million, 5 year Smart Systems and Heat Programme is investigating what drives heat demand and the potential for technical innovations to meet this demand more efficiently.

#### German Research and innovation programmes

In Germany, the Federal Government supports the research, development and demonstration projects designed to integrate efficiency technologies and renewable energies in buildings and cities as part of their own energy research programme and model projects carried out in the framework of the construction research and other promotional programmes in the building policy and urban planning context. In addition to the technology aspects, lifecycle costs and cost-efficiency analyses also play an important role.

In particular, the "Research for Energy Optimised Building" focuses on buildings that have minimum energy requirements and offer a high level of comfort to their occupants while requiring only moderate investment and much reduced running costs. Key aspect of the research are: (a) identification and testing of new building concepts and innovative efficiency technologies; (b) scientific evaluation of energy-optimised model buildings. Initial pilot applications have already been evaluated.

These activities are supplemented by research on modern energy supply technologies and planning instruments. The link to a neighbourhood and urban planning context fosters a systemic and integrated approach to energy relevant research topics in the building sector.

Another interesting measure is the "Research for energy-efficient towns and cities" [EnEff:Stadt] initiative. It aims at developing combinations of measures, optimised in both energy and economic terms, for defined neighbourhoods that will be implemented as pilot projects. The initiative takes a dual approach by looking at comprehensive urban development concepts as well as efficiency measures for individual buildings. The use of an 'integral planning' approach opens up a variety of ways in which to increase energy efficiency in urban settlement areas. This potential is to be tapped by the intelligent use and networking of innovative technologies in settlement projects as well as in local and district heating systems. The 'EnEff:Stadt' research initiative will be qualitatively monitored and it supports the establishment of evaluation criteria, concepts and planning tools for communities, the housing sector and public utility companies.

## **7. Forward-looking perspective to guide investment decisions - Article 4(d)**

In this section Member States are asked to indicate their projections, including a solid methodology to simulate the development of the national building stock up to the 2050 horizon. It is essential to provide key actors with sufficient time and certainty to prepare and plan for changes in a sustainable way. In this context, policies should be designed to provide appropriate long-term signals to the market, and communicated in a way that consumers and all stakeholders understand the overall objective and plan their investment strategies with confidence. A roadmap with key dates, targets, milestones for the introduction of legislation and support mechanisms should be considered an essential requirement of future renovation strategies.

Based on the building stock segmentation data and consumption data, and after having defined the investment costs needed to reduce the energy consumption at building level (by the cost-effective analysis), this section should evaluate different intervention scenarios which corresponds to different impacts of the strategy. The assumptions should be well discussed and the final results properly presented.

This section is the one that caused most difficulties to Member States and resulted to be the weakest one of the analysed strategies. In fact, only few Member States (i.e. Croatia, Czech Republic, Greece, Romania and Spain) interpreted correctly this requirement, providing different scenarios of renovation options and a clear roadmap for the implementation.

In agreement with Commission's guidance, the following aspects have been considered for the evaluation of Article 4(d):

- A. Methodology applied: have been different scenarios considered?
- B. Quantification of the total annual investment requirements, mapped out over the period to 2050, in order to deliver the identified renovation opportunities;
- C. Identification of existing sources of funding for building energy renovation: i) owners' private equity; ii) public purse (including EU Structural and Innovation Funds); iii) banks and other sources of private investment (e.g. pension funds);
- D. Analysis of barriers to investment;
- E. Identification of possible funding sources and mechanisms to meet the identified investment profile.

Table 10 presents how all these aspects have been addressed by Member States in their strategies.

Even if this point has great potential for improvement for all Member States strategies, we point out the Greek, Spanish and Czech forward-looking perspectives sections as the current best practices:

- Greece developed an analysis per scenarios, combining different types and paces of renovation: 5 scenarios have been defined for residential buildings and 2 scenarios for non-residential ones. The forward-looking perspective is oriented to the progressive and coordinated upgrading of the building stock (at least 80% of the existing buildings will be renovated by 2050). Three phases have been recognised up to 2050 (initial, acceleration and stabilisation) and for each of them several actions are proposed, covering all main areas of intervention;
- Spain identified and described five scenarios up to 2020, three for the residential sector and two for the non-residential one and a baseline for each group have been provided. Moreover this strategy includes a detailed description of the results of the scenario analysis expressed in terms of number of properties

- renovated, investment (including public subsidy level), energy savings, carbon emission reduction and jobs created;
- Czech Republic defined five scenarios, but with a wider horizon (up to 2050): from a "business as usual" case up to an "ideal hypothetical" potential if deep renovation of 3% per year of the building stock were to begin with immediate effect. For residential buildings, the scenarios were modelled with good detail. For the non-residential stock, because good-quality and detailed statistics were not available, only rough estimate were established.

**Table 10: Information provided in the strategies on Article 4(d) prescriptions**

Member state / Item	A	B	C	D	E
<b>Austria</b>					
<b>Brussels Capital Region</b>					
<b>Belgium Flanders</b>					
<b>Belgium Wallonia</b>					
<b>Bulgaria</b>					
<b>Croatia</b>					
<b>Cyprus</b>					
<b>Czech Republic</b>					
<b>Denmark</b>					
<b>Estonia</b>					
<b>Finland</b>					
<b>France</b>					
<b>Germany</b>					
<b>Gibraltar</b>					
<b>Greece</b>					
<b>Hungary</b>					
<b>Ireland</b>					
<b>Italy</b>					
<b>Latvia</b>					
<b>Lithuania</b>					
<b>Luxembourg</b>					
<b>Malta</b>					
<b>Netherlands</b>					
<b>Poland</b>					
<b>Portugal</b>					
<b>Romania</b>					
<b>Slovakia</b>					
<b>Slovenia</b>					
<b>Spain</b>					
<b>Sweden</b>					
<b>United Kingdom</b>					

## 8. Evidence-based estimate of expected energy savings and wider benefits – Article 4(e)

The last sub-clause of Article 4 requires providing an evidence-based estimate of expected energy savings and wider benefits. According to the Commission's guidelines, the strategies have to address the following questions:

- A. Has the attractiveness to building owners of their direct benefits been identified?
- B. Have the societal benefits arising from deep renovation been identified?
- C. Have ways in which externalities (e.g. societal benefits from reduced CO<sub>2</sub> emissions, increased energy security, etc.) can be internalised for the benefit of the investor been identified?

In addition to these aspects, it has been assessed whether the benefits (e.g. Energy savings, Employment, CO<sub>2</sub> reduction, Social/Health, Energy security) have been clearly quantified in the strategy (see column D of Table 11).

Table 11 provides an evaluation of the level of detail of the information included in the strategies on EED Article 4(e) requirements.

The issues less covered by Member States are those related to the "internalisation of externalities" (i.e. societal benefits translated into benefits for the investor) and the numerical quantification of the benefits. In the majority of the strategies this aspect has not been properly considered.

Overall, the strategies performed quite well on this Article 4 notification sub-chapter (i.e. 20 strategies assessed as fully compliant with scores  $\geq 3$ , 7 inadequate/partly compliant with score = 2 and only 4 non-compliant), with the ones provided by Czech Republic, Finland, Greece, Lithuania, Romania, Slovenia and Spain that scored the best marks. Among these, the Romanian strategy has been evaluated as best practice.

The strategy from Romania provides a very detailed estimation of the benefits arising from building renovation activities. In the provided Article 4 notification four renovation scenarios (i.e. baseline, modest, intermediate and ambitious) have been analysed in terms of energy savings, employment generated and carbon emission reduction at 2050. Individual and societal benefits have been identified as well. Moreover, the Romanian strategy is the only one that attempted to assign an economic value to wider benefits (i.e. Economic stimulus, societal health, environmental and energy system benefits) and to assess the overall social benefits associated to building renovation, that resulted to be almost five times the value of the energy cost saved alone (multiplication value 4.6).



**Table 11: Information provided in the strategies on Article 4(e) sub-paragraph**

<b>Member state / Item</b>	<b>A</b>	<b>B</b>	<b>C</b>	<b>D</b>
<b>Austria</b>				
<b>Brussels Capital Region</b>				
<b>Belgium Flanders</b>				
<b>Belgium Wallonia</b>				
<b>Bulgaria</b>				
<b>Croatia</b>				
<b>Cyprus</b>				
<b>Czech Republic</b>				
<b>Denmark</b>				
<b>Estonia</b>				
<b>Finland</b>				
<b>France</b>				
<b>Germany</b>				
<b>Gibraltar</b>				
<b>Greece</b>				
<b>Hungary</b>				
<b>Ireland</b>				
<b>Italy</b>				
<b>Latvia</b>				
<b>Lithuania</b>				
<b>Luxembourg</b>				
<b>Malta</b>				
<b>Netherlands</b>				
<b>Poland</b>				
<b>Portugal</b>				
<b>Romania</b>				
<b>Slovakia</b>				
<b>Slovenia</b>				
<b>Spain</b>				
<b>Sweden</b>				
<b>United Kingdom</b>				

One of the key elements of an effective building renovation roadmap is to set clear and ambitious targets including intermediated milestones.

This is not always the case of the assessed building renovation strategies, where a clear renovation target, with intermediate milestones, is often not provided. Table 12 presents the building renovations targets and, where a clear target was not provided, the expected energy savings indicated in the analysed strategies.

It can be noted that these targets are not uniform among different strategies, both in term of temporal horizon (e.g. 2016, 2020, 2050), type of target (e.g.

annual/cumulative energy savings, number of buildings to be renovated, etc.) and metrics (e.g. final or primary energy).

**Table 12: Strategies Building renovation targets and/or expected energy savings**

Member state	Building renovation strategies energy saving targets and expected energy savings
Austria	3% estimated building sector energy use reduction in the in 2020, compared to 2013
Belgium BCR	n/a
Belgium Wallonia	n/a
Belgium Flanders	Energy savings by 2020: 4288 GWh of final energy and 4581 GWh for primary energy
Bulgaria	n/a
Croatia	Target for long-term plan of integral renovation of national building stock by 2050: reduction of GHG emissions in buildings for 80%.
Cyprus	n/a
Czech Republic	The potential saving of energy for heating in residential buildings is calculated as 77 PJ. This represents a 45% reduction compared to current consumption.
Denmark	The expected benefits from the strategy are 35% reduction in net energy consumption for heating and hot water in the building stock by 2050 compared to 2011.
Estonia	For the building sector, energy savings of up to 3.5 PJ/y to be achieved by 2016
Finland	Estimated impact of renovation on energy consumption: -8% by 2020, -37% by 2050 (-8115GWh by 2020, -36889 GWh by 2050)
France	Energy consumption of existing buildings should be reduced by 38% by 2020 and that 400.000 dwellings should be energy renovated every year starting from 2013 <sup>16</sup> .
Germany	337 PJ/year for period 2008-2020 <sup>17</sup>
Gibraltar	Energy saving potential of 6.7 GWh of primary energy by 2020 and 88.8 GWh by 2050
Greece	Renovation of at least 80% of the existing building stock by 2050
Hungary	Primary energy saving target for the building sector: 49PJ/y at 2020.
Ireland	Target to deliver a near-zero emissions building sector by 2050; Additional target to reduce energy usage in the public sector by 33% by 2020 <sup>18</sup>
Italy	Building sector energy saving target: 4.9 Mtoe/y final energy savings by 2020 (3.67 Mtoe/y in the residential sector, 1.23 Mtoe/y in service sector); A reduction of 24% primary energy consumption is foreseen in comparison with the business as usual scenario.
Latvia	By 2030 the average consumption of thermal energy for heating will be reduced by 50 % against the current indicator <sup>19</sup> . Latvia committed to renovate 3% of State owned and used building areas each year, so that energy savings of 186 GWh over the 2014–2020 period will be achieved.

<sup>16</sup> French Grenelle law (2009) - article 5. In 2013 an Energy Renovation Plan for Housing was adopted; the aim is to have, by 2017, 500.000 dwellings renovated each year. The plan includes all the policies and measures adopted by the government to reach its 38% reduction of energy consumption of existing buildings by 2020.

<sup>17</sup> This estimate savings from building related measures set in the second NEEAP; The most of the energy savings in buildings should be resulted from implementation of EE Ordinance for residential and non-residential buildings. The rest should be resulted from different KfW programmes for buildings including 70PJ/year from the KfW EE renovation programme.

<sup>18</sup> Modelling undertaken by SEAI predicts that current efficiency measures will lead to a decrease in overall residential energy demand of 16% by 2020.

<sup>19</sup> , which is approximately 200 kWh/m<sup>2</sup>/year with climate correction (in 2009 – 202 kWh/m<sup>2</sup>)

<b>Member state</b>	<b>Building renovation strategies energy saving targets and expected energy savings</b>
Lithuania	by 2020 at least 500 GWh of thermal energy to be saved (i.e. for space heating).
Luxembourg	n/a
Malta	n/a
Netherlands	The Dutch Energy Agreement <sup>20</sup> set the following goals for existing buildings: 300,000 existing buildings per year to improve by at least two energy label steps; Average social rental property to achieve label B, while 80% of private rental to achieve minimum label C in 2020; At least an average energy label A for buildings in 2030.
Poland	n/a
Portugal	n/a
Romania	n/a
Slovakia	The projected National energy savings are 6928.6 GWh up to 2030
Slovenia	Final e energy consumption in building decreased by at least 16% by 2020 and by 30% by 2030 (compared to 2005); almost carbon-free energy use in the building sector, by 2050
Spain	While a robust scenario analysis has been provided (i.e. 3 scenarios for residential sector, 2 for non-residential sector), the strategy does not indicate which of the scenario is the target one.
Sweden	According to "reference option" scenario provided in the strategy, the final energy consumption for heating and DHW in buildings should be reduced by 12-25% <sup>21</sup> .
United Kingdom	While the United Kingdom set a very clear and ambitious overall sectors legally binding target (i.e. cutting carbon emissions by 80% by 2050), specific targets for the building sector are not clearly indicated, except for new buildings (i.e. the introduction of zero carbon homes standards for new homes in England by 2016).

<sup>20</sup> The Dutch building renovation strategy is developed in the framework of the Energy Agreement for Sustainable Growth, published in September 2013, aimed at achieving 80-95% reduction in CO<sub>2</sub> emissions by 2050, and at least a 40% CO<sub>2</sub> reduction in 2030.

<sup>21</sup> The strategy is developed in a framework of existing instruments and measures which have been found to have contributed to a reduction in average energy consumption of 11% between 1995 and 2011.

## 9. Conclusion and steps forward

The assessment of the national building renovation strategies has highlighted that, in total, twenty-three out of the thirty-one submitted strategies (74.2%) satisfactorily addressed the main elements of EED Article 4. Ten strategies are fully compliant, with exemplary coverage of regulation requirements. Only six strategies were found to be not compliant.

In addition, it is worth mentioning that some of the non-compliant strategies were found for Member States traditionally strong in terms of energy efficiency measures and achievements, leading to considering the possibility that reporting failed to correctly depict the status of the building energy renovation in those countries (i.e. Austria, Germany and Sweden ) and their future plans.

The result of the appraisal exercise is considered especially positive as these were the first renovation strategy documents submitted by Member States and it is expected that their quality, and their actual implementation, will improve in future. Strategies will be revised in 2017, and every 3 years thereafter.

Nevertheless, the assessment shows that a number of Member States did not followed strictly the guidelines and missed some important part/concepts which would require improvements:

- With the exceptions of Finland and Belgium Flanders, no Member States reported plans following the "staged deep renovation" concept. More information and explanation on the idea and more references on the efficacy and examples of successful implementation could help Member States in the development of this renovation approach.
- In most of the cases Member States simply reported a reference to the cost-optimal methodologies, as required by the EPBD. It is recommended that key results of the cost-optimal analysis for the existing buildings would be properly integrated within the strategies.
- In terms of policy measures, only a few Member States reported "planned" measures for energy efficiency in buildings, while the vast majority reported only existing policies. As the strategies aim at having a "long-term" vision, Member States should be asked an effort to go beyond a simple inventory of the existing measures, providing, a vision/roadmap on the evolution of future policies and measures. Further guidance and support could be given on this point.  
Furthermore, as a suggestion for the preparation of the next round of strategies, Member States could be explicitly asked to provide views on specific measures / policies: for instance, on refurbishment obligations, or incentives to demolition-reconstruction.
- A very few Member States provided a scenario analysis on the intervention options. It would be necessary to have alternative scenarios for building stock and to evaluate cost-effectiveness of different options under each scenario. This should in turn offer a tool to decide the most appropriate (cost-effective) level of intervention. In doing this exercise, it is important that the main assumptions are made explicit and discussed. Sensitivity analysis of the main parameters of the study should also be performed, while this was not done in any of the strategy.

- Not all Member States have provided a clear indication of their renovation targets. A description of potential energy savings and other benefits associated to the targets, when defined, is usually missing.
- The section related to forward-looking perspective to guide investment received the lowest average rating in the assessment exercise. In a number of cases information was not provided or was not in line with art 4 requirements and guideline indications. Additional guidance on this issue should be provided.
- Member States seem to neglect or undervalue the importance of R&D in the building sector: Only two strategies included this dimension (i.e. the United Kingdom and Germany).
- The majority of the renovation strategies failed to report and discuss issues beyond energy efficiency, for instance: indoor comfort/air quality, impact on construction sector, externalities.
- Non-residential building stock is not well covered and described. This is true for all the sections of the strategies. Member States should be asked additional effort in the collection of data and analysis of this specific segment of the building stock.
- Evaluation of the policies implemented should also be a section in the future strategies. Member States should prove to have monitored at least the most important measures and to share the outcomes in view of a policy evaluation exercise.

In addition to best practices, also unsuccessful examples could be highlighted in order to have the possibility to learn from failures and to better understand the barriers in place for building renovation.

As a general concluding remark, Member States seem to have developed each section of the long-term renovation strategy as a separate, stand-alone topic. A more correct view should have considered each section as related to the others in a conceptual flow.

Considering the linkages between the different sections (which reflect the different requirements of Article 4), should make Member States able to have a more systemic view and develop more coherent and complete strategies.

## References

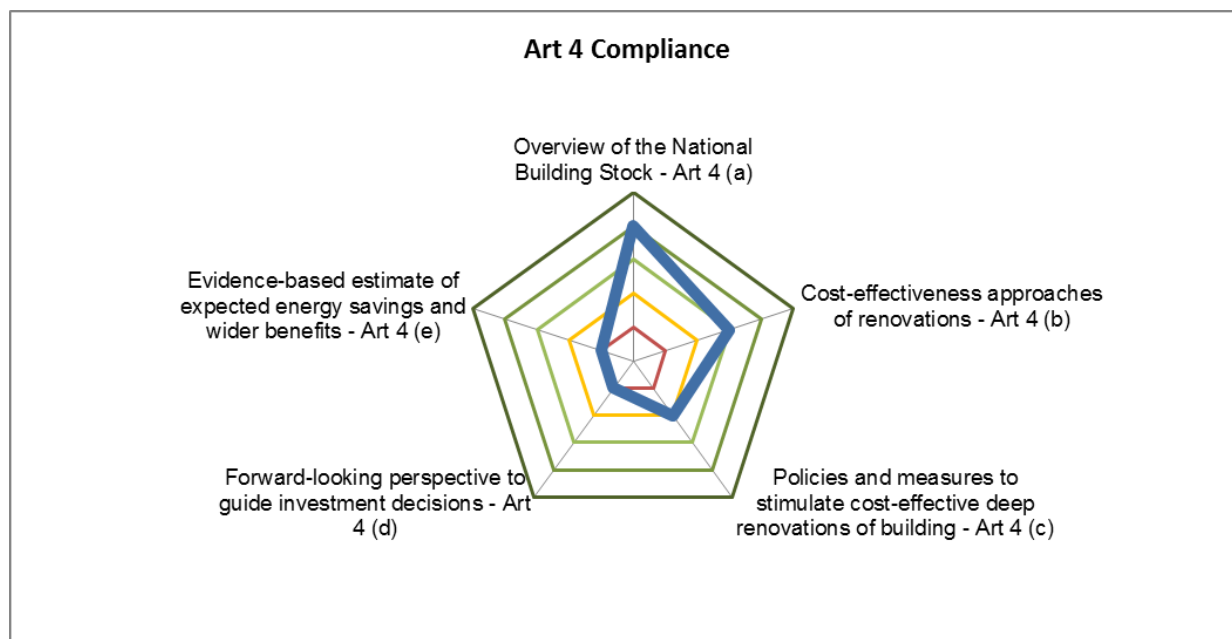
- [1] EU, Directive 2012/27/EU. European Parliament and of the Council of 25 October 2012 on energy efficiency, amending Directives 2009/125/EC and 2010/30/EU and repealing Directives 2004/8/EC and 2006/32/EC.
- [2] Buildings Performance Institute Europe (BPIE), "Renovation strategies of selected EU countries – a status report on compliance with article 4 of the energy efficiency directive", November 2014.
- [3] ADDEDNDUM - Buildings Performance Institute Europe (BPIE), "Renovation strategies of selected EU countries – a status report on compliance with article 4 of the energy efficiency directive", January 2015.
- [4] Commission's guidance for national energy efficiency action plans (NEEAPs) – C(2013) 2882 final; See [http://ec.europa.eu/energy/sites/ener/files/documents/20131106\\_swd\\_guidance\\_neeaps.pdf](http://ec.europa.eu/energy/sites/ener/files/documents/20131106_swd_guidance_neeaps.pdf)
- [5] EEFIG, 2015 - Energy efficiency, the first fuel for the EU economy, hot to drive new finance for energy efficiency investments.
- [6] JRC 2015 – Energy Renovation: The Trump Card for the New Start for Europe.

## Annex A – Summary of the detailed assessment of 31 national/regional renovation strategies

### AUSTRIA

Country	AUSTRIA		
Document Information	The Austrian renovation strategy is provided as an annex (Annex B) of the NEEAP. The document is available in English.		
National Building Renovation Strategy (Art 4 EED) Introduction	The strategy includes the following items: the development of provisions in building law for major renovation as a policy measure, new financial models, changes in the energy mix, rebound effects and changing rates of increase in the use of solar thermal systems and heat pumps in the building stock. For residential buildings the Austrian renovation strategy is based on the national building and housing stock from 2011. For the EED Article 4b provisions, the strategy refers to the cost optimality report (OIB Guidelines 6), submitted pursuant to Article 4(2) of the EPDB 2010/31/EU.		
Overview of the National Building Stock - Art 4 (a)	yes	The Austrian building stock is provided for number of units and sqm for each building type, each construction period and energy carrier used for heating. Similar data for tenure status, ownership, climatic zones, energy classes were not provided while they seem to exist in Austria based on the data sources listed in the narrative. As stated in the Austrian Building Energy Code, the calculations are made only for heating demand. The overall consumption of each building category is therefore unknown. The data on useful floor space was obtained from Statistics Austria, Building and Housing Census 2001 and updated with data from the micro-census 2011/12. The heating demand values for residential buildings correspond to average values that were determined from the ZEUS energy performance certificate database.	4
Cost-effectiveness approaches of renovations - Art 4 (b)	yes	In the section "Evidence-based estimate based on the national building stock" of the Austrian Art 4 notification it is mentioned that "The heating demand (HD in kWh/m <sup>2</sup> GFAa) for thermally renovated buildings after 2013 was calculated in accordance with OIB Guideline 6 and the selected building typologies", but further information is not provided. The OIB Guideline 6 ("Document for the detection of Cost optimality") is very detailed, but the results achieved are not summarised. So it is not trivial to understand what heating demands have been considered for renovated buildings for the Austrian evidence-based estimation. From the results presented it looks like different renovation options were considered in the Austrian renovation strategy. However, no details were provided on each package considered for the renovation. The only solutions that we can understand from the presented results are the connection to district heating systems and use of the RES.	3
Policies and measures to stimulate cost-effective deep renovations of building - Art 4 (c)	Partly	Policies and measures are provided by region. Based on the information provided some regions have a more comprehensive policy package than others. In all regions, financial schemes exist to encourage renovation. The main target in Austria is to reduce heating demand and consumption. Subsidies are also provided for the installation of renewable energy systems. The impact of the policies and measures implemented is not provided in the report. A clear strategic assessment of the policy needs to renovate the housing stock is missing	2
Forward-looking perspective to guide investment decisions - Art 4 (d)	no	The strategy provides an estimation of the energy saving potential related to the Austrian building stock, that should be complemented with a financial assessment, in order to properly quantify the overall economic effort and the contribution of the policy package.	1
Evidence-based estimate of expected energy savings and wider benefits - Art 4 (e)	no	Annual energy savings to 2020 are contained in the Excel screenshots, but it is not clear how they were calculated. Wider benefits are not identified.	1

<b>Summary</b>	The Austrian renovation strategy is mainly guided by reducing the heating demand and consumption as well as the decarbonisation of the supply side. This may explain the existence of different financing schemes for the installations of RE systems. A clear strategic assessment of the policy needs to renovate the housing stock is missing
<b>Level of details</b>	The level of details provided in the Austrian renovation strategy is low, except in the building stock section. All other requirements are either not provided or treated superficially.
<b>Level of ambitions</b>	It is difficult to assess the level of ambition of the Austrian renovation strategy: it is confusing to include measures for new buildings when the strategy is about the renovation of existing ones
<b>Appropriateness</b>	Policies and measures exist in each region of Austria. However due to lack of information, it is difficult to assess the appropriateness of the strategies developed locally.
<b>Comprehensiveness</b>	Some Austrian regions seem to have a comprehensive policy package that includes regulations, financing schemes and information tools. However more details should be reported in the national renovation strategy document.
<b>Strengths</b>	The Austrian renovation strategy is developed by region which means it takes more into account the local circumstances. Some of the strategies are likely to have been developed following a bottom-up approach.
<b>Weaknesses</b>	Not enough details were provided to fully assess the impact of the Austrian renovation strategy. No concrete timeline for interventions provided
<b>Innovative approach</b>	The one-stop shop in Austria to address a large audience, including owners, tenants but also developers and industry. It is also interesting that databases of EPC and construction products are made publicly available in some regions
<b>Recommendations</b>	The Austrian renovation strategy needs to be revised to include more details (e.g. on policies) and the missing sections (estimated benefits and investments).

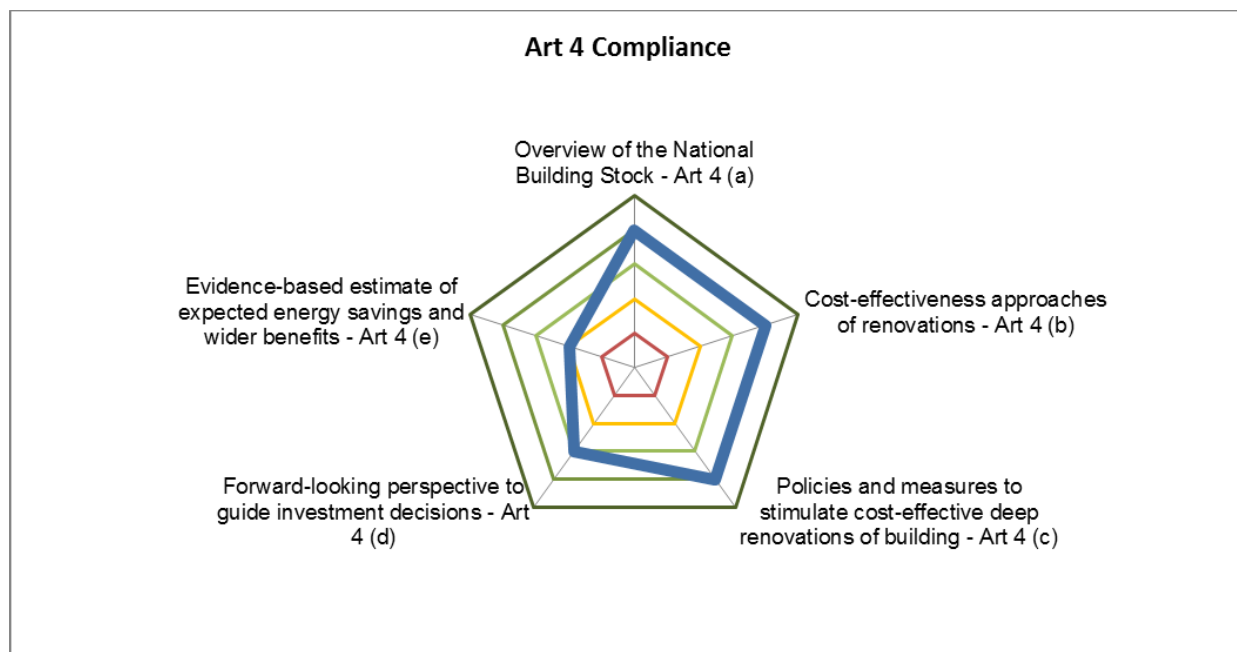




## BELGIUM – BRUSSELS CAPITAL REGION

Country	BELGIUM - Brussels Capital		
Document Information	The Brussels Capital Region renovation strategy was provided as an annex (Annex B) of the NEEAP. The document is available in English.		
National Building Renovation Strategy (Art 4 EED) Introduction	The Brussels Capital Region strategy is the result of matching different set of data including the energy balance, the energy monitoring of districts, national statistics, energy consumption survey for Belgian households, the cost-optimum study and the economic data.		
Overview of the National Building Stock - Art 4 (a)	yes	The strategy includes a comprehensive and detailed analysis of buildings by age, type, floor area and energy performances, as well as consumptions by energy carriers and end-use. Different sources of datasets were matched. This includes data from energy balance, the energy monitoring of districts, national statistics, energy consumption survey for Belgian households, the cost-optimum study, economic data and cadastre data. Other data (i.e. energy classes) are not included in the renovation strategy. For the non-residential building stock the breakdown per building type is limited to two categories, while the energy carrier used are provided for 8 categories.	4
Cost-effectiveness approaches of renovations - Art 4 (b)	yes	The cost-effective approaches described in the renovation strategy is a summary of what is provided in the cost-optimality study (according to the Commission's guidelines related to the EPBD Directive). This section provides a detailed discussion of the method (based on 6 reference building types) and general conclusions about the applicability of certain renovation measures (architectural/structural and technical). The methodology appears reliable and the identified cost-optimal levels are quite ambitious.	4
Policies and measures to stimulate cost-effective deep renovations of building - Art 4 (c)	yes	A comprehensive set of policies and measures have been adopted and already implemented in BCR. The package includes regulatory instruments through the update of the building energy code to the passive house requirements, several financial instruments, information tools as well as support to the industry through capacity building and demonstration projects. The policy package includes also modification in the legal framework for the rental market with the aim to remove the split incentive barrier as well as the modification of land use rules to allow for external renovation of the facades.	4
Forward-looking perspective to guide investment decisions - Art 4 (d)	yes	The BCR renovation strategy includes an estimate for the annual investment needs as well as the investment needs over the period 2014-2030. Two options are proposed, one considering only energy renovation and the second one considering more broader environmental renovation. On the other hand, detailed information on timing and sources of funding should be provided.	3
Evidence-based estimate of expected energy savings and wider benefits - Art 4 (e)	partly	The impact of energy renovation is not quantified in terms of energy cost savings for the owners and the tenant, or in terms of jobs, health and environmental impacts. However, the strategy mentions that energy renovation will have societal benefits	2

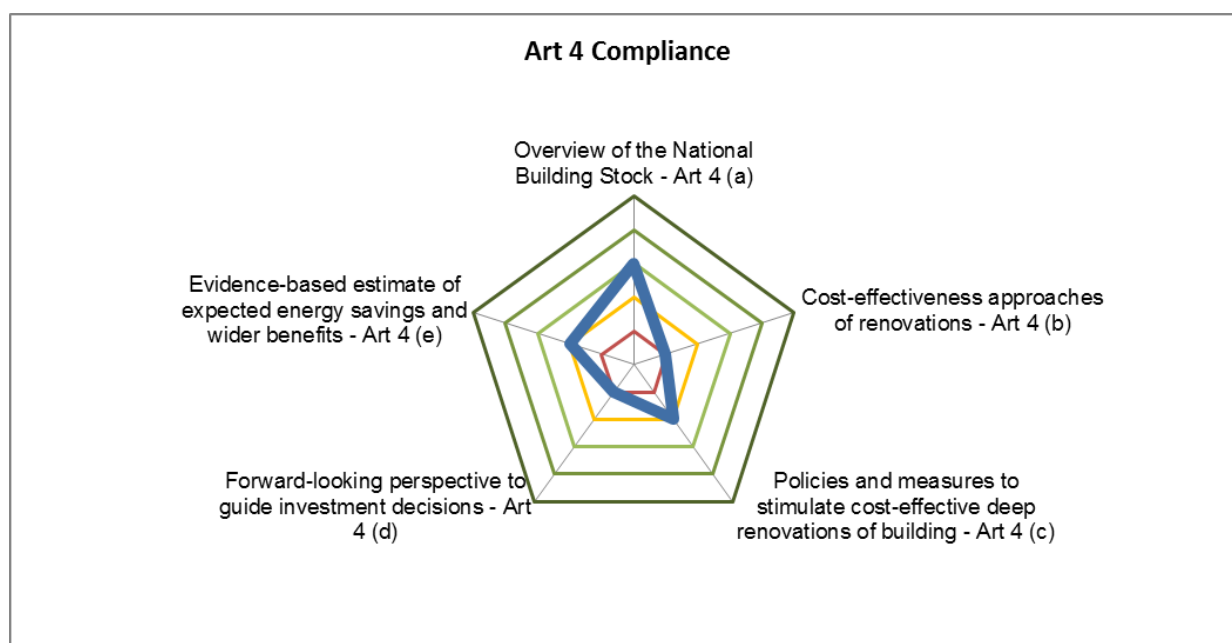
<b>Summary</b>	The BCR renovation strategy provides a comprehensive overview of the building stock, the renovation options for different types of buildings. It also includes a package of policies and measure ranging from regulatory instruments to financial schemes, information tools targeting owners but also professionals. The strategy also considers demonstration projects and trainings to build capacity. The overall strategy will benefit from further analysis of additional impacts (i.e. job creation) of the renovation.
<b>Level of details</b>	The building stock is well detailed. The cost-effective approaches refer to the cost optimum study for more details . Policies and measures are more detailed in the NEEAP than in the strategy itself. Overall, the level of details provided in the different sections of the strategy is satisfactory.
<b>Level of ambitions</b>	Considering passive house requirements for energy renovation of existing buildings is quite ambitious
<b>Appropriateness</b>	The measures and policies designed for the strategy are appropriate. However, it is difficult to assess if the capacity building programme will allow for an effective implementation of the passive house requirements.
<b>Comprehensiveness</b>	The BCR renovation strategy is comprehensive from a policy point of view. It includes all the known policy instruments used for EEB.
<b>Strengths</b>	The adoption of the passive house requirements in 2013 is an important signal for market actors.
<b>Weaknesses</b>	No concrete timeline for interventions provided.
<b>Innovative approach</b>	Matching different sources of datasets including energy, land use and economic data to design the strategy
<b>Recommendations</b>	Consider including cost-benefits analysis in terms of jobs, energy cost savings, health and emission reduction



## BELGIUM – FLANDERS

Country	BELGIUM - Flemish Region		
Document Information	The Flemish renovation strategy is provided as an annex (Annex B) of the NEEAP. The document is available in English.		
National Building Renovation Strategy (Art 4 EED) Introduction	The Flemish renovation strategy is based on the 2020 Energy Renovation Programme. Quantitative data are based on EPC database for residential buildings and the land register for non-residential buildings. Renovation options are based on the analysis conducted to determine the cost-optimum level.		
Overview of the National Building Stock - Art 4 (a)	yes	The description of the residential Flemish building stock is based on extrapolations from the 2013 Energy Performance Certificates database. The one relate to the non-residential buildings is based on land register. The provided overview includes 2 type of residential buildings and 5 non-residential categories, as well as age bands and reference energy consumption by carrier. The level of detail is sufficient. As specified in the strategy, for both sub-sectors, further data are needed to better adjust the renovation plan.	3
Cost-effectiveness approaches of renovations - Art 4 (b)	no	The cost-optimum level will be introduced in 2016. It is based on the study conducted to define different renovation options for each building type per construction period and climatic zone. However, no details on the calculations, the assumptions and on the results were provided in the renovation strategy.	1
Policies and measures to stimulate cost-effective deep renovations of building - Art 4 (c)	Partly	The set of measures described in the renovation strategy are mainly financial ones. The only regulatory measure mentioned is the energy performance standard that renovated buildings have to meet in case of major renovation. A more comprehensive policy package will be needed to achieve the 2020 Energy Renovation target.	2
Forward-looking perspective to guide investment decisions - Art 4 (d)	no	The strategy does not provide sufficient information on future investment amounts toward 2050. Some indications on planned investment (2012-2019) are provided in measure section.	1
Evidence-based estimate of expected energy savings and wider benefits - Art 4 (e)	partly	Impact of energy renovation is provided in the NEEAP document but only in terms of energy savings for the overall strategy and for each single measure. Assumptions used for the calculations were not included in the Renovation annex or in the NEEAP	2

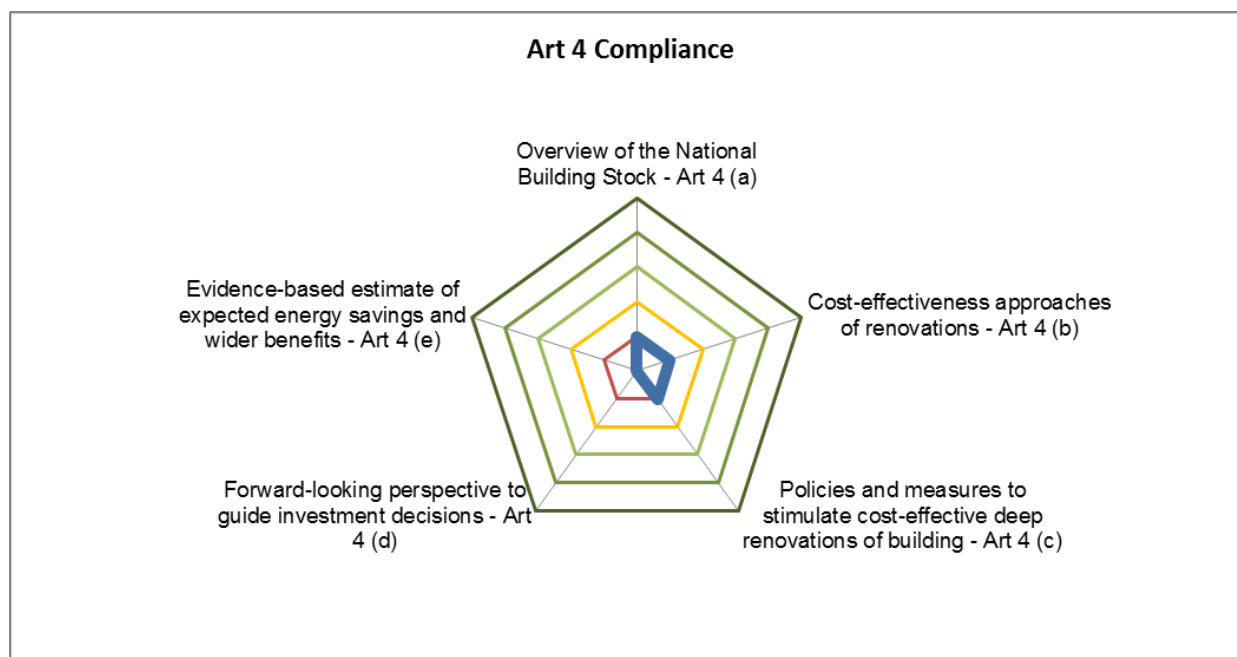
<b>Summary</b>	The Flemish Government ambition, in its 2020 Energy Renovation Programme, is that every citizen will have an efficient home by 2020. The strategy considers two options a) basic strategy where roofs, windows and heating systems are replaced and b) pioneer strategy targeting nZEB renovation level. The Flemish strategy considers that deep renovation should be conducted to avoid the lock-in-effect. While the document is generally poor on details, especially on the assumptions, calculations and results for the estimated impacts, it provides a sufficient overview of the overall strategy for building renovation and specify an ambitious target for 2020.
<b>Level of details</b>	The Flemish renovation strategy is based on several studies. However a very few details are provided in the document and original sources of information are not always available or accessible.
<b>Level of ambitions</b>	The level of ambition is quite high, as the Flemish strategy targets to provide each person in the region with a comfortable, energy efficient home by 2020.
<b>Appropriateness</b>	Difficult to assess the appropriateness of the policies and measures included in the renovation strategy, and their actual impact in the achievement of the target, as no sufficient details are provided.
<b>Comprehensiveness</b>	The Flemish renovation strategy has a clear target and time line, different financing schemes and programme for demonstration projects. However, it lacks a more comprehensive policy package that should include more regulatory measures, information tools, and R&D.
<b>Strengths</b>	The main strength of the Flemish renovation strategy is the fact a target has been set with a clear timeline for its achievement.
<b>Weaknesses</b>	Lack of information instruments, R&D programme and other policy instruments that would speed-up the phase-out of inefficient buildings
<b>Innovative approach</b>	Housing renovation pilot project (5 years) that will lead to knowledge platform on deep renovation and inventorisation of deep renovation projects in Europe.
<b>Recommendations</b>	The strategy needs to be further developed to include soft instruments to ensure a better preparation of market actors to the transformation of the Flemish building stock. Details on the assumptions, calculations and results would allow for a better assessment of the Flemish efforts towards nZEB by 2050.



## BELGIUM – WALLONIE

Country	BELGIUM - Wallonia Region		
Document Information	The Wallonian renovation strategy was provided as an annex (Annex B) of the NEEAP. The document is in French only		
National Building Renovation Strategy (Art 4 EED) Introduction	The Wallonia renovation strategy is based on the cost-optimum study (COZEB), which includes a database for investment costs.		
Overview of the National Building Stock - Art 4 (a)	no	The Wallonian strategy doesn't include any data on the building stock. However, in continuation of the COZEB study, a model of the Walloon buildings stock is currently under development.	1
Cost-effectiveness approaches of renovations - Art 4 (b)	no	The cost-effective approach is not described in the renovation strategy. It might be included in the cost-optimal study mentioned in the strategy, but it is not clear if calculations have been carried out also for the existing building stock.	1
Policies and measures to stimulate cost-effective deep renovations of building Art 4 (c)	no	Policies and measures are described in the NEEAP and not in the building renovation strategy. Either not all existing policies and measures are described or not enough policies and measures exist in the Wallonian region.	1
Forward-looking perspective to guide investment decisions - Art 4 (d)	no	No information have been provided.	0
Evidence-based estimate of expected energy savings and wider benefits - Art 4 (e)	no	No information are provided about the benefits of the strategy.	0

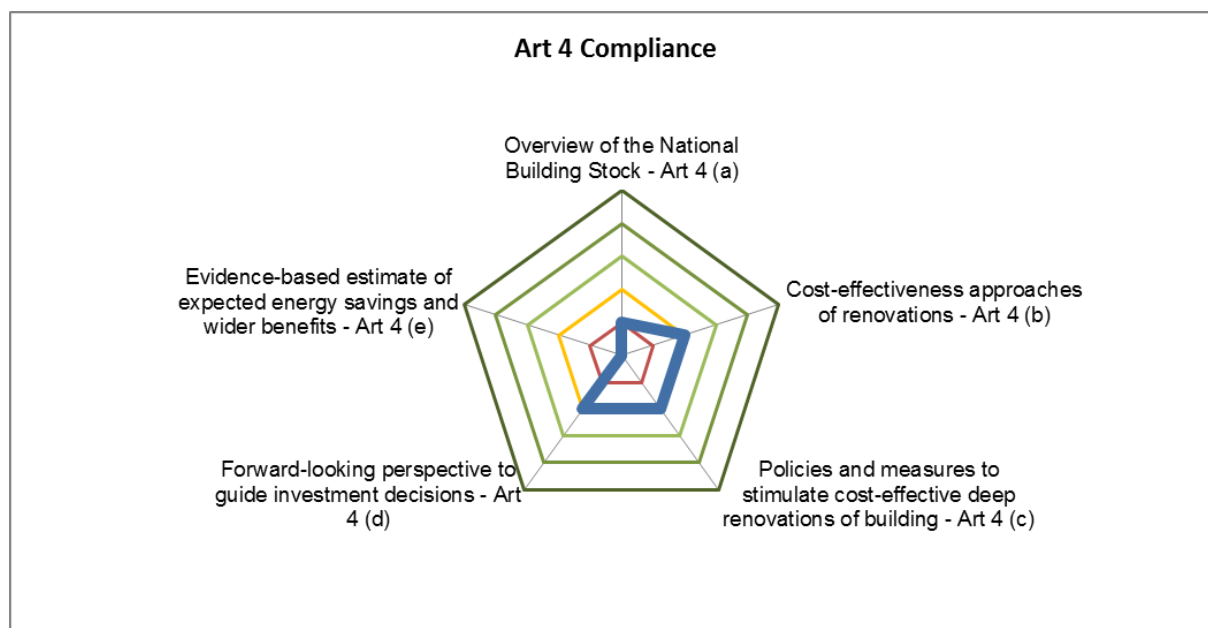
<b>Summary</b>	The Wallonian renovation strategy missed almost all the basic requirements of Art 4. It appears as a wish list of what is needed to be done to achieve the 2050 nZEB target, but no specific information is provided, nor a timeline or calculations of impacts. Policy measures are not listed in the document, but in the NEEAP: as such the building renovation strategy cannot be considered as a stand-alone, specific document.
<b>Level of details</b>	No details provided
<b>Level of ambitions</b>	The Wallonian renovation strategy targets to have all buildings (new and existing???) at nZEB level by 2050
<b>Appropriateness</b>	Impossible to assess as information is not provided
<b>Comprehensiveness</b>	Impossible to assess as information is not provided
<b>Strengths</b>	The identification of a clear, ambitious, nZEB target for 2050
<b>Weaknesses</b>	The Wallonian strategy lacks fundamental sections and information. It cannot be considered as a fully developed document, but rather a draft still in stakeholders' consultation process.
<b>Innovative approach</b>	POLLEC: a campaign that helps municipalities to design and implement a SEAP (Covenant of Mayors Initiative)
<b>Recommendations</b>	Develop and improve all sections of the renovation strategy.



## BULGARIA

Country	BULGARIA		
Document Information	The Bulgarian renovation strategy was provided in the NEEAP 2014 as Annex II: "Overview of the National Long Term Programme for the Mobilisation of Investments in the Implementation Measures to Improve the Energy Performance of Buildings". The document is available in English.		
National Building Renovation Strategy (Art 4 EED) Introduction	The Bulgarian strategy includes: i) overview of the building stock; ii) formulation of economically approaches to improving the energy performance of buildings, taking into account the building types and the climate zones in Bulgaria; iii) the state policy and regulation for EE in buildings and iv) creation a financial framework for guiding investment.		
Overview of the National Building Stock - Art 4 (a)	no	Annex II of Bulgarian NEEAP provides a general overview of the national building stock, but it does not include a detailed dataset, as requested by the EC guidance.	1
Cost-effectiveness approaches of renovations - Art 4 (b)	partly	A general overview of the cost-optimal analysis is provided, but many elements are missing and the results are not discussed in detail. It should be explained if calculations were specifically made for the Bulgarian existing buildings.	2
Policies and measures to stimulate cost-effective deep renovations of building - Art 4 (c)	partly	The regulatory measures (transposing EPBD) have a direct effect on the new building, but they affect marginally the existing stock. To push the renovation of the existing buildings it should necessary to implement additional policies, able to overcome the existing economic barriers and stimulate the market. Staged deep renovations are not taken into account and a clear perspective is not provided in the Annex II of BG NEEAP. The project 'Energy renovation of Bulgarian homes' is reported, but it is not clear how it is supporting the renovation measures (e.g. by incentives, grants, loan).	2
Forward-looking perspective to guide investment decisions - Art 4 (d)	partly	The financial framework is not well defined. 11 financial initiatives are listed, but it is not clear how they are supporting and will support the renovation of the national building stock: there is not a specific quantification of the future investment levels, nor the next timing of different initiatives. Being these measures focused on several topics (e.g. industry, transports, transmission/distribution, RES, district heating and public lighting plants, etc.), the results achieved in the building sector should be specified.	2
Evidence-based estimate of expected energy savings and wider benefits Art 4 (e)	no	No information are provided about the benefits of the strategy.	0

<b>Summary</b>	The Bulgarian strategy is flawed and it does not provide a clear forward-looking perspective. The results already achieved on the existing building stock are not clearly provided and the next targets are not discussed. For these main reasons it is not completely compliant with Art. 4 of EED. Moreover the cost-optimal methodology as well the state of technical regulations is summarised but their implications for the renovation strategy are not clearly discussed.
<b>Level of details</b>	The level of details is very low in all sections of the Bulgarian strategy.
<b>Level of ambitions</b>	The general ambition of the strategy appears poor
<b>Appropriateness</b>	The implemented measures can have a positive effect on the building stock, but an evidence-based estimate of expected energy savings is not provided.
<b>Comprehensiveness</b>	Additional efforts on the refurbishment of building envelopes should be undertaken.
<b>Strengths</b>	The project 'Energy renovation of Bulgarian homes' (but it should be better described)
<b>Weaknesses</b>	Lack of a comprehensive forward-looking perspective; targets not defined; modest analysis of the barriers; insufficient measures focused on the building envelopes
<b>Innovative approach</b>	n/a
<b>Recommendations</b>	All points of the strategy should be more detailed and an evidence-based estimate of expected energy savings should be included. The good initiatives undertaken should be strengthened on the field of the building renovations, within a well defined framework (outlined by context, barriers, objectives, available resources, risks, etc.)

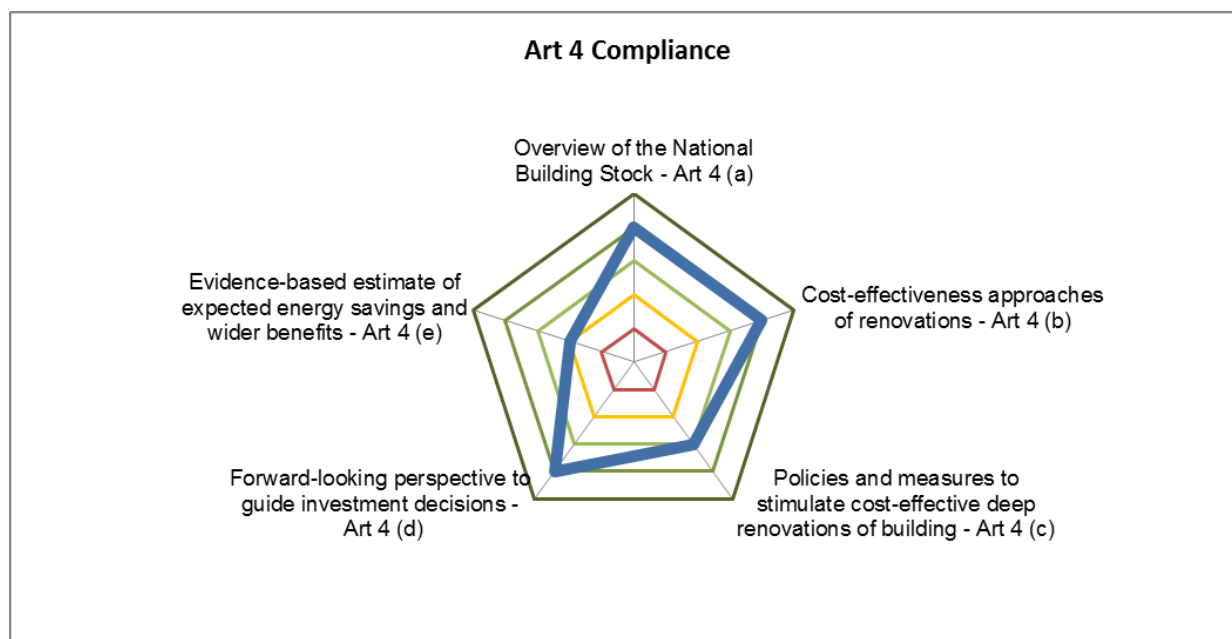




## CROATIA

Country	CROATIA		
<b>Document Information</b>	The Croatian national strategy was not included in the NEEAP, but published in April 2014 as a separate document. The strategy is available in Croatian only.		
<b>National Building Renovation Strategy (Art 4 EED) Introduction</b>	The strategy is part of an ambitious project of building renovation, which includes also a Plan for increasing of the number of nZEBs (in particular nearly zero family houses). Each programme is described as an individual measure in the building sector with information provided on saving targets, financial sources, responsible implementation bodies, and methodology and system for monitoring and verification of the savings.		
<b>Overview of the National Building Stock - Art 4 (a)</b>	yes	The Croatian overview of national building stock is based on the data provided by the Ministry of Construction and Physical Planning and Croatian Bureau of Statistics. The building stock is described with an high level of detail, covering almost all the requirements of the Commission guidance: the data on energy consumption are missing and there is no analysis of energy classes.	4
<b>Cost-effectiveness approaches of renovations - Art 4 (b)</b>	yes	The comprehensive Croatian analysis includes 14 renovation packages. It was made well from the perspective of insulation and other mostly architectural elements. Several thermal system options (including the ground source heat pumps and the opportunity to connect to a district heating system) have been considered, as well the retrofit of lighting systems. Energy audits and establishing of sustainable energy management is considered in all categories of building variants and some renewable energy measures are included. 19 building types have been studied and the results are ambitious. Moreover a sensitivity analysis has been carried out on the calculation period.	4
<b>Policies and measures to stimulate cost-effective deep renovations of building - Art 4 (c)</b>	yes	Despite, according to information gathered from other sources (i.e. NEEAP) a comprehensive set of measures, addressing both residential and non-residential buildings, is in place in Croatia, in the provided building renovation strategy the existing measures and policies are just listed and not described in detail. The analysis of barriers, appraisal of relevance of policies used in other territories and design of new policy landscape has decent quality.	3
<b>Forward-looking perspective to guide investment decisions - Art 4 (d)</b>	yes	The projection of the renovation budget was provided for the period from 2014 to 2049 on annual basis. A analysis of possible funding sources is provided, but a clear indication of investment roadmap with key dates, targets, milestones, is not included.	4
<b>Evidence-based estimate of expected energy savings and wider benefits - Art 4 (e)</b>	partly	The analysis of history data and current situation in the sector of construction was analysed in details. Regarding the benefits of the implementation of the building renovation strategy, the expected influence on employment and GDP was considered in more details and quantified based on three levels of multiplication factors, while the other expected influences were described in a qualitative way. Expected energy savings were provided at building level, but no quantification of expected total energy savings for proposed scenarios was provided.	2

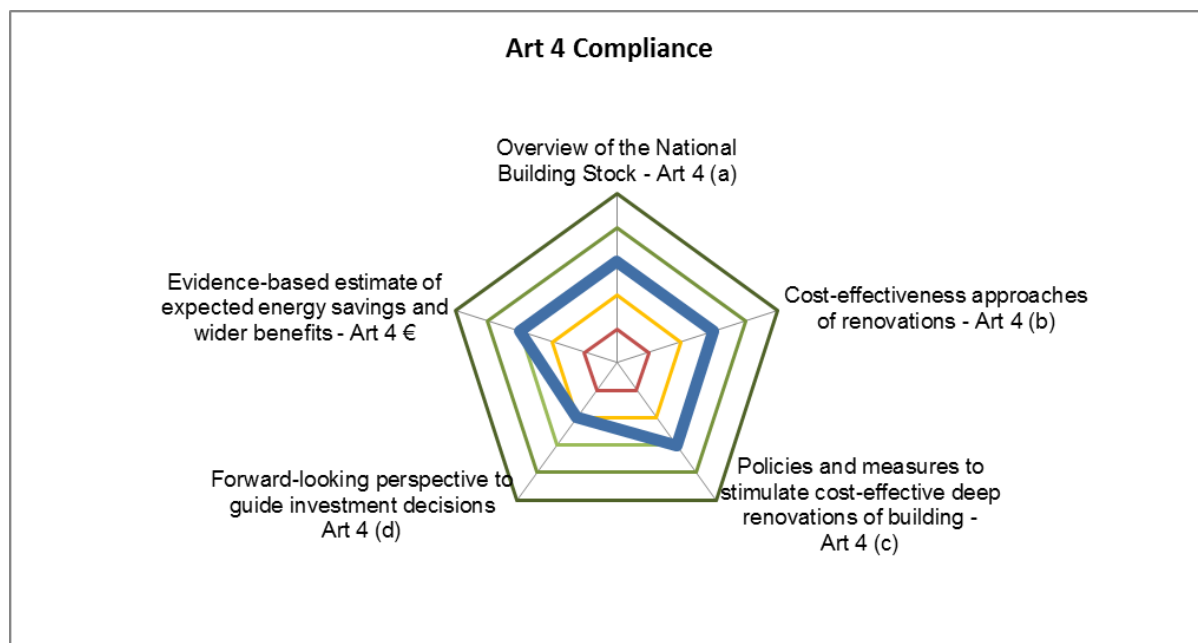
<b>Summary</b>	The Strategy is prepared with a lot of details related to the current situation and possible and planned actions, but it is not clear how is the strategy expected to be implemented (timeline for interventions) and which are expected impacts in terms of energy savings and larger benefits (jobs, environmental; etc.).
<b>Level of details</b>	The level of detail is good, especially in the building stock overview section.
<b>Level of ambitions</b>	The strategy seems ambitious as the Best Available Technologies have been taken into account.
<b>Appropriateness</b>	Financing support is appropriate, but the focus is mainly on public financial tools, while private ones are not so much addressed.
<b>Comprehensiveness</b>	A comprehensive set of measures, addressing both residential and non-residential buildings, is in place in Croatia.
<b>Strengths</b>	The detailed description of the national building stock, and public financial schemes
<b>Weaknesses</b>	Private financial schemes are not adequately addressed. Identification of priority sectors and a clear timeline for intervention is also missing. As well as a quantification of the expected energy savings in each scenario.
<b>Innovative approach</b>	n/a
<b>Recommendations</b>	Priority sectors should be identified in order to focus financial means with more effect. Private financial sector should be also considered in the strategy. Quantification of expected energy savings should be provided.



## CYPRUS

Country	CYPRUS		
<b>Document Information</b>	The Cypriot strategy has been provided as ANNEX F of the 3rd National Energy Efficiency Action Plan of Cyprus. The Annex "Strategy for encouraging investments in building renovation" is available in English.		
<b>National Building Renovation Strategy (Art 4 EED) Introduction</b>	The strategy for encouraging investments in the sector of building renovation has been developed following extensive consultation with stakeholders. Consultation was carried out through the Advisory Committee for Monitoring the Implementation of the Laws Regulating the Energy Efficiency of Buildings, through a special sub-committee thereof, which was established specifically for this purpose. A number of stakeholders provided input to the strategy: the Cyprus Scientific and Technical Chamber (ETEK), the Cyprus Chamber of Commerce and Industry (KEBE), the Cyprus Employers and Industrialists Federation (OEB), the Cyprus Energy Agency, universities, financial institutions, professional associations of engineers, architects and contractors, consumer associations and departments of the public sector involved in the building sector.		
<b>Overview of the National Building Stock - Art 4 (a)</b>	yes	The overview developed by the Statistical Service of Cyprus on the 2011 data gives description of building types and their status of occupancy. Dwellings data for year of construction are provided. Tenure's data are given in percentage. Examples of energy consumption and costs are provided for 6 different type of building, 4 residential and 2 non-residential. Consumptions are distinguished per electricity (kWh) and oil litres (for heating). Partial information of non-residential building is provided (in particular for the public sector), and therefore additional information should be included.	3
<b>Cost-effectiveness approaches of renovations - Art 4 (b)</b>	yes	The strategy identified different type of measures for different typology of buildings. For 5 typologies (3 residential and 2 offices), energy saving measures (insulation, window type, heating/cooling system, PV) are provided. The costs of the renovation packages are presented but it is not clear if the measure have been selected considering a cost-optimal methodology. In addition 25 pilot projects on the installation of smart meters are presented: the energy savings achieved are of 30-40%.	3
<b>Policies and measures to stimulate cost-effective deep renovations of building - Art 4 (c)</b>	yes	In the Cypriot strategy a comprehensive set of measures is described. Three types of policy measures are listed as measures expected to stimulate renovations: (1) legislative measures policy measures (mainly EPBD-related measures such as EPCs, min EP levels, air-conditioning/heating system inspections) (2) financial incentives such as grant schemes for RES and EE as mentioned in the introduction and (3) training measures, e.g. for energy auditors and EPC experts. Most of these measures have been in place before the EED adoption. A preliminary analysis of renovation existing barriers is provided, but can be improved.	3
<b>Forward-looking perspective to guide investment decisions Art 4 (d)</b>	partly	The strategy provides only a qualitative assessment of the main financial barriers to investments. The different funding source options (i.e. buildings owners, companies active in the building and energy sector, financial institution, public institution) are not discussed in detail. A clear indication on investments requirement is missing.	2
<b>Evidence-based estimate of expected energy savings and wider benefits - Art 4 e</b>	yes	The impact of the energy upgrading of existing building stock on the development of Cyprus economy has not been assessed yet. However, estimation on its positive impacts has been made. Cost for energy upgrading of the building stock are provided and relevant scenarios forecasted. Benefits for energy efficiency improvement in building are very well supported. Deeper analysis can be conducted on social benefits translated into benefits for the investors.	3

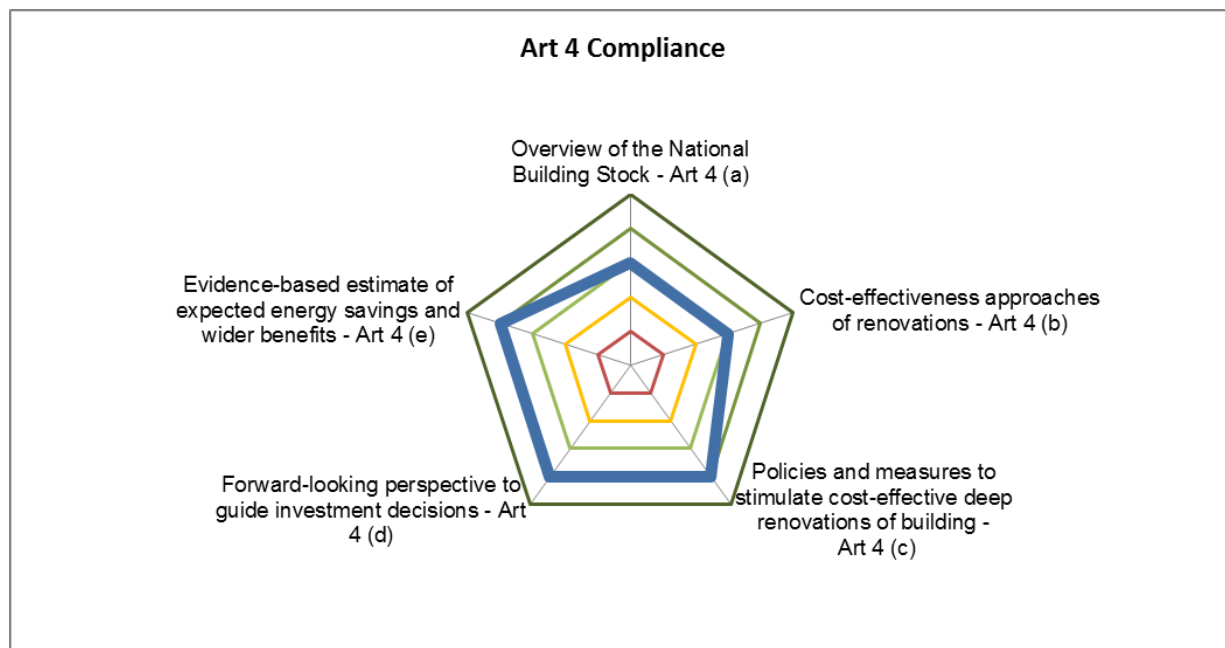
<b>Summary</b>	The overall Cypriot strategy provides a good appraisal of the building stock and energy saving opportunities. It recognises the strategic importance of building renovation; financial, social and environmental benefits are specified. The documents provides a springboard for further analysis and discussions on the results and the barriers faced by each sector involved in the field of the energy upgrading of buildings.
<b>Level of details</b>	The strategy offers a good level of details in the analysis and description of the building stock. Policies and expected benefits are included, but with a lower level of detail. The different funding sources should be more deeply analysed.
<b>Level of ambitions</b>	The targets of the strategy should be better defined, however the identified renovation packages result coherent with the Cypriot context and they should lead to a significant improvement of the existing building stock.
<b>Appropriateness</b>	The measures and policies designed for the strategy appears appropriate, but the appraisal is difficult due to little specific details provided.
<b>Comprehensiveness</b>	Cyprus has in place a quite comprehensive set of measures for the building sector, however it should clarify the future timing of the implemented policies.
<b>Strengths</b>	Good analysis of the building stock. Building stock analysed per typology to implement renovation measures.
<b>Weaknesses</b>	No concrete timeline for interventions provided. Information on policies and expected benefits is not at an adequate level.
<b>Innovative approach</b>	n/a
<b>Recommendations</b>	More details on actual timeline for implementation should be provided. More information on policies and expected benefits would be needed.



## CZECH REPUBLIC

Country	CZECH REPUBLIC		
Document Information	The Czech strategy has been provided in Annex 6 ("Building renovation") of NEEAP 2014. The document is available in English.		
National Building Renovation Strategy (Art 4 EED) Introduction	The document examines the building stock and opportunities for energy savings therein. It studies various scenarios for the renovation of the building stock, the costs and benefits thereof, and proposes policy, legislative and economic instruments to implement them. It focuses in detail on residential buildings. To determine the potential energy savings, the analysis refers to several scenarios of future consumption carried out by Czech, European and global studies (e.g. World Energy Outlook 2012 of IEA, EU energy trends to 2030 by DG Energy, Outline of scenarios for the development of the Czech economy's energy demands by SEVEN, Study of potential energy savings in habitable buildings and tertiary sector up to 2050 by Porsenna).		
Overview of the National Building Stock - Art 4 (a)	yes	The Czech overview is based on the 2011 Population and Housing Census. The building stock is described in terms of type, number and surfaces, with more details (e.g. age of building) for the residential sector. About the non-residential sector, the considered categories don't allow a clear characterisation of the building types commonly described in the reference literature (e.g. offices, schools, etc.). The 72 building categories used for the scenario modelling are not described in detail and information about the climatic aspect are missing.	3
Cost-effectiveness approaches of renovations - Art 4 (b)	yes	Starting from the results of the TABULA project, 3 refurbishment levels have been defined. The retrofit packages include envelope technologies and system improvements to reduce the final energy consumption for heating, DHW and lighting. The energy savings related to space heating of the residential sector are clearly provided and the evaluation of investments is based on unit costs. For some non-residential types a very rough estimate was done and the industrial sector is not considered. As explicitly reported, technologies of local renewable sources have not been discussed in the document.	3
Policies and measures to stimulate cost-effective deep renovations of building - Art 4 (c)	yes	Czech Republic provided a comprehensive overview of the implemented measures. 17 national policy measures are identified and summarily described. They are proposed to overcome specific barriers, related to different sectors: strategic, economic and financial, legislative and administrative, educational and professional. Additional indications about the future implementation of the measures (timing and expected impact) should be better explained.	4
Forward-looking perspective to guide investment decisions - Art 4 (d)	yes	5 scenarios have been defined (by BPIE). The modelling indicates that the best solution would be to implement at least scenario 4 (i.e. "fast and deep" : 2-3% p.a. renovation rate, with mainly deep renovation) which would contribute savings of 18.6 PJ in the residential sector (25.4 PJ including other buildings outside industry). Total costs are estimated at EUR 6.5 billion for residential buildings and EUR 8.9 billion for all buildings. It does not take into account the potential for renewable technologies.	4
Evidence-based estimate of expected energy savings and wider benefits - Art 4 (e)	yes	The potential savings of energy for heating in residential buildings is calculated in reliable way. For the non-residential sector (services and agriculture), it has been roughly estimated. The selected scenario (4: fast and deep) would contribute savings of 18.6 PJ in the residential sector (25.4 PJ including other buildings outside industry). On the basis of a total investment in building renovation reaching CZK 35-40 bn (€125-145M) per year as a result of implementing the renovation strategy, 35 000 new jobs will be created and GDP increased by 1%.	4

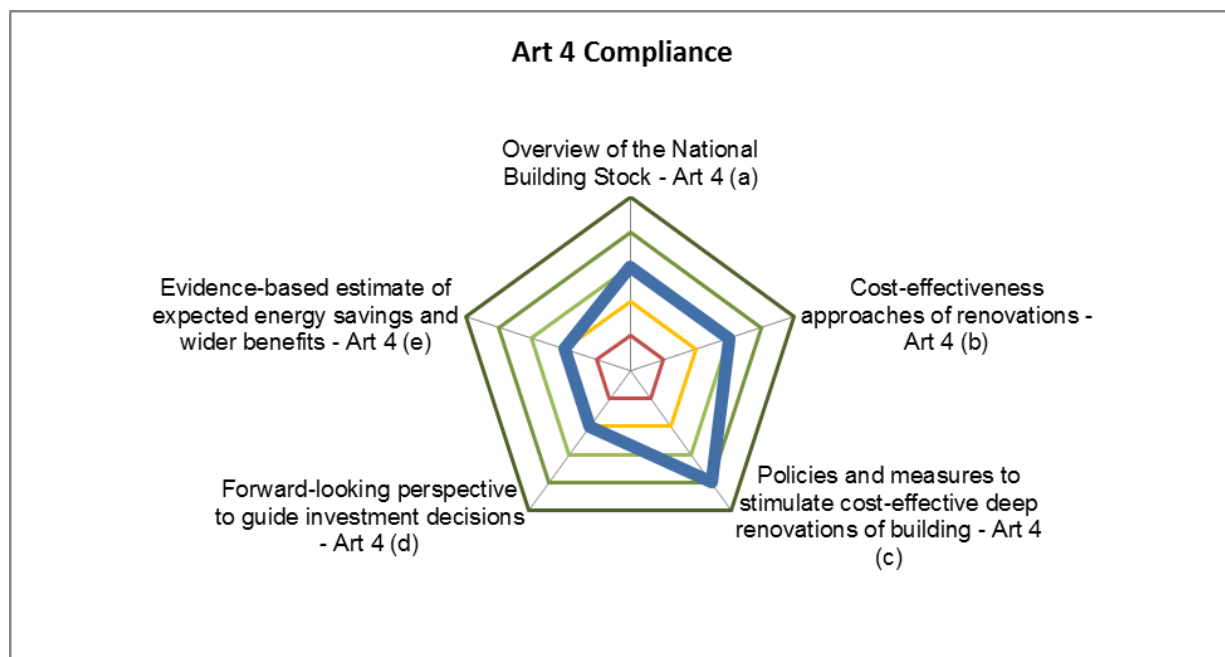
<b>Summary</b>	Czech Republic provided a renovation strategy that covers all aspects of Article 4, and can be considered as compliant with Art. 4 requirements. The principles of the strategy are in line with those of the EED and, if properly and quickly applied, the measures planned can lead to the target, satisfactorily identified.
<b>Level of details</b>	The general level of detail of the study is good. But the building categories used are not described in details and information about the climatic aspect are missing. Further efforts should focus on the implementation of policy measures and on the quantification of benefits at society level, beyond expected energy savings.
<b>Level of ambitions</b>	The level of ambition is good: the selected scenario aims to save 25.4 PJ, that means 12% of the potential savings assessed.
<b>Appropriateness</b>	The policy measures identified appear appropriate and significant.
<b>Comprehensiveness</b>	These measures cover a wide spectrum of policy areas: strategic, economic and financial, legislative and administrative, educational and professional.
<b>Strengths</b>	Technical analysis of energy saving opportunities, modelling of renovation scenarios and holistic approach to identifying policies and measures to stimulate the market.
<b>Weaknesses</b>	Lack of a clear commitment that the selected scenario will be followed and the identified policy measures adopted. Moreover further clarifications are needed for the non-residential buildings.
<b>Innovative approach</b>	n/a
<b>Recommendations</b>	<ul style="list-style-type: none"> <li>- Improve the analysis of the non-residential stock.</li> <li>- Include the potential of renewable technologies.</li> <li>- Provide detailed indications about the implementation (timing, expected impact, etc.) of the identified measures.</li> <li>- Quantify the social and environmental benefits of the strategy.</li> </ul>



## DENMARK

Country	DENMARK		
<b>Document Information</b>	<p>Denmark submitted its document "Strategy for energy renovation of buildings" in May 2014. The strategy, published by Ministry of Climate, Energy and Building, is available in English. It is a stand-alone document with little technical details, a few basic and clear figures and plain language: it is apparently directed mainly to the general public and non-technical readers.</p> <p>The background paper of the Danish Building Research Institute (SBI) "Potential energy savings from ongoing building renovation up to 2050" includes more technical analyses and more clearly reports the main results obtained.</p>		
<b>National Building Renovation Strategy (Art 4 EED) Introduction</b>	<p>The Danish buildings renovation strategy is considered as a key part of the ambitious strategy set by the government in the 2012 report "Vores Energi" ("Our Energy") with a target of 100% energy supply from renewables. Since the 1970s Denmark has put in place various measures (such as building regulations, energy taxation, energy performance requirements for building components, energy efficiency obligation on energy companies) which already contributed to a significant reduction of energy consumption in the building sector. Extensive stakeholders' involvement has been granted during the preparation of the strategy, as described in the "World Green Building Council's Collaborative Policy Making" case study.</p>		
<b>Overview of the National Building Stock - Art 4 (a)</b>	yes	<p>In the overarching document only a very few data on the building stock are reported and only at aggregate level, only few figures are highlighted (e.g. share of heating energy consumption for detached houses).</p> <p>More details are provided in the background paper: e.g. average building size, proportion of insulated buildings, energy consumptions for different building types and construction periods.</p>	3
<b>Cost-effectiveness approaches of renovations - Art 4 (b)</b>	yes	<p>The strategy refers to the report of the Danish Building Research Institute, which includes a detailed assessment of cost effectiveness of different renovation options (including envelope technologies, ventilation systems, heat recovery, automation).</p> <p>More system and RES opportunities should be considered (e.g. heat pumps, district heating, thermal and PV solar, etc.).</p>	3
<b>Policies and measures to stimulate cost-effective deep renovations of building - Art 4 (c)</b>	yes	<p>The strategy set out a articulated, wide, complete and ambitious set of policy measures. Most of them are already implemented and the new one are intended to be an upgrade of the existing measures (such as energy performance requirements).</p> <p>The document describes the policy measures in details, providing a background and a rationale for each line of intervention. Existing and new measures are clearly identified and a sufficiently precise timeline for the implementation is provided. In total, the strategy outlines 21 new initiatives, across 4 sectors: Initiatives aimed at all construction segments; Initiatives targeted at single family dwellings; Initiatives targeting multi-family buildings, commercial buildings and public buildings; and Initiatives targeted at strengthening the skills and innovation to promote energy renovation.</p>	4
<b>Forward-looking perspective to guide investment decisions - Art 4 (d)</b>	partly	<p>The background document "Potential energy savings from ongoing building renovation up to 2050" presents analyses about the energy saving potential related to ongoing building renovations until 2050. It includes a large number of scenario options (17 scenarios for different building regulations and different rates of implementation). However neither this report nor the overarching one provides a sufficient context to guide investment decisions.</p>	2
<b>Evidence-based estimate of expected energy savings and wider benefits - Art 4 (e)</b>	partly	<p>The expected benefit from the strategy are 35% reduction in net energy consumption for heating and hot water in the building stock by 2050 compared to 2011. However, no details are provided and also the background report does not clearly report the impact in terms of expected savings and wider benefits related to the implementation of the strategy.</p>	2

<b>Summary</b>	<p>The Danish building renovation strategy is extremely ambitious and complete in terms of policy measures. The package of 21 new initiatives addresses all building sectors taking into account the specificity of each of them. Skills and R&amp;D plays an important roles and measures on social houses are also included.</p> <p>In conjunction with the complementary SIB report, a sufficient level of details is generally provided, but the forward-looking perspective should be completed and possible funding sources and mechanisms to meet the identified target should be recognised.</p>
<b>Level of details</b>	<p>More details should be included also in the overarching document.</p>
<b>Level of ambitions</b>	<p>The overall energy consumption target is moderate (min. 35% less in 2050), however, it should be noted that Denmark has already reduced significantly energy consumption in buildings during the last 30 years, and now it has less margins for further reduction compared to other countries.</p>
<b>Appropriateness</b>	<p>The package of policy measures described in the strategy appears appropriate to meet the goals of the strategy itself.</p>
<b>Comprehensiveness</b>	<p>The set of measures is comprehensive and includes all sectors and a variety of policy instruments, including R&amp;D.</p>
<b>Strengths</b>	<p>The comprehensive policy package.</p>
<b>Weaknesses</b>	<p>More retrofit options might be taken into account and the future financing framework should be delineated.</p>
<b>Innovative approach</b>	<p>n/a</p>
<b>Recommendations</b>	<p>The forward-looking perspective should be completed and possible funding sources and mechanisms to meet the identified target should be recognised.</p> <p>In general, more details should be included also in the overarching document.</p>

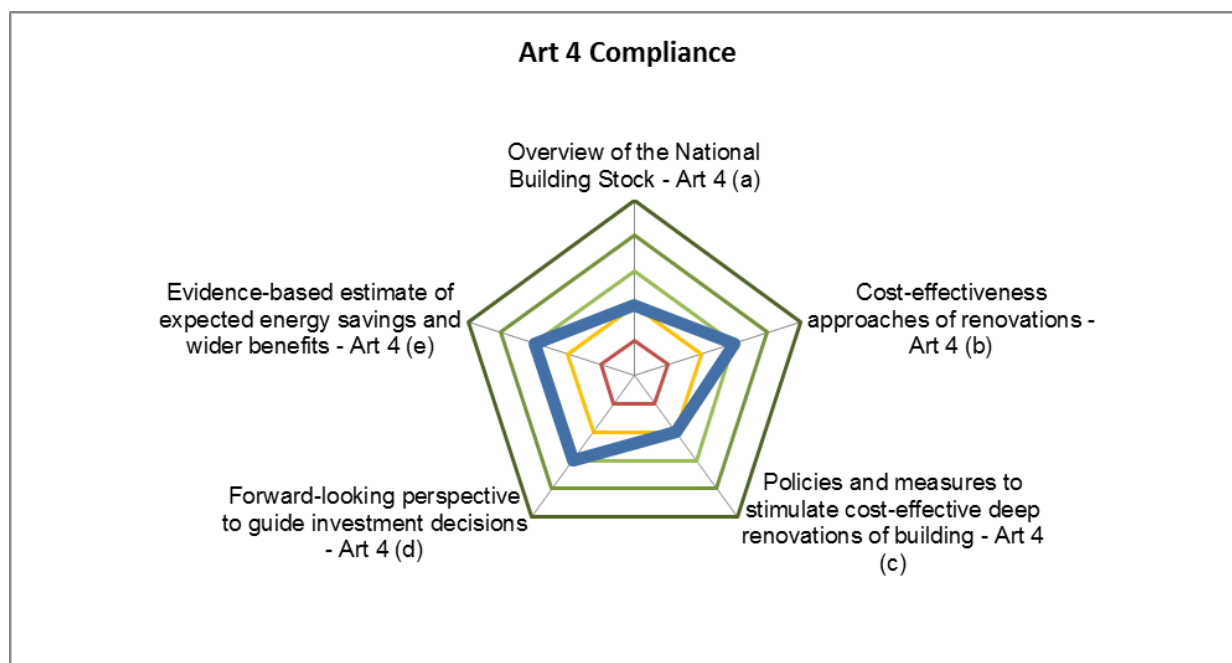




## ESTONIA

Country	ESTONIA		
Document Information	The Estonian building renovation strategy was provided in July 2014 as a separate notification (not included in the NEEAP 2014). The document is available in English.		
National Building Renovation Strategy (Art 4 EED) Introduction	The strategy is structured according to the key elements listed in EED Art. 4. Various policy measures are described: investment support scheme for reconstruction of apartment buildings, Support for performing energy audit in buildings, Renovation soft loan for apartment buildings and a Programme for reconstruction of public sector buildings (both central and local government buildings). A forecast of the potential energy savings that can be obtained, according to different policy intervention scenario, in the building sector at 2030 and 2050 is also provided.		
Overview of the National Building Stock - Art 4 (a)	partly	The data on the Estonian buildings stock are extracted from the State Register of Construction works (as of 30.06.2013) and the classification provided in Regulation no. 78 of the Minister of Economic Affairs and Communications has been used for the classification of buildings. Only the list of buildings divided per purpose of use and per date of construction (differentiate in 2 classes only: before and after 2003) have been provided. Overall the level of detail is insufficient.	2
Cost-effectiveness approaches of renovations - Art 4 (b)	yes	Different renovation packages have been analysed for building types (i.e. apartment buildings, small residential buildings, educational buildings, offices, commercial and service buildings, industrial buildings). A survey was conducted to evaluate the economic and technical potential of the energy savings to be achieved by means of comprehensive renovation of the existing building stock and the unit costs and volumes of the package solutions to be used for the implementation thereof. The energy costs corresponding to the existing situation were calculated for every building type along with the energy savings and costs that accompany 3-4 different level renovation package solutions. The presented cost-effective approach is deemed appropriate, but, as stated in the strategy, further research is needed (i.e. the technical renovation standard solutions must be better identified).	3
Policies and measures to stimulate cost-effective deep renovations of building - Art 4 (c)	partly	In the document only 4 existing measures are reported, i.e. investment support scheme for reconstruction of apartment buildings, Support for performing energy audit in buildings, Renovation soft loan for apartment buildings and a Programme for reconstruction of public sector buildings (both central and local government buildings). No new policies to address barriers and to enable deep renovations are indicated. Moreover, a detailed analysis of the existing barriers to energy efficient in buildings is not included in the strategy (only "lack absence of cooperative construction" is cited).	2
Forward-looking perspective to guide investment decisions - Art 4 (d)	yes	In the strategy, 3 different intervention scenarios have been indicated: The "non-interventional scenario" includes only requirements directly arising from EU directives pursuant to the directive, "minimally interventional scenario" attempts to improve the socioeconomic and living environments by using the existing resources in the most economically efficient ways and the "knowledge-based interventional scenario", that invests and risks (over 40M€/y) in order to receive economic gain from contributing to energy efficiency and pursues a high-quality living environment. Despite the scenarios are described in detail, it is unclear which of the 3 options will be chosen by the Estonian government.	3
Evidence-based estimate of expected energy savings and wider benefits - Art 4 (e)	yes	A broad overview of the potential benefits that renovation of buildings can deliver has been provided. The following benefits have been listed: lowering energy bills, healthier houses, better indoor environment, creation of jobs, economic growth, export and higher tax revenues. Potential energy savings and economic revenues has been assessed for the 3 scenarios. The most ambitious scenario, the "knowledge based" scenario, would result in energy savings of 18% in 20 years and reconstruction-related employment by 4,240 man-years per year.	3

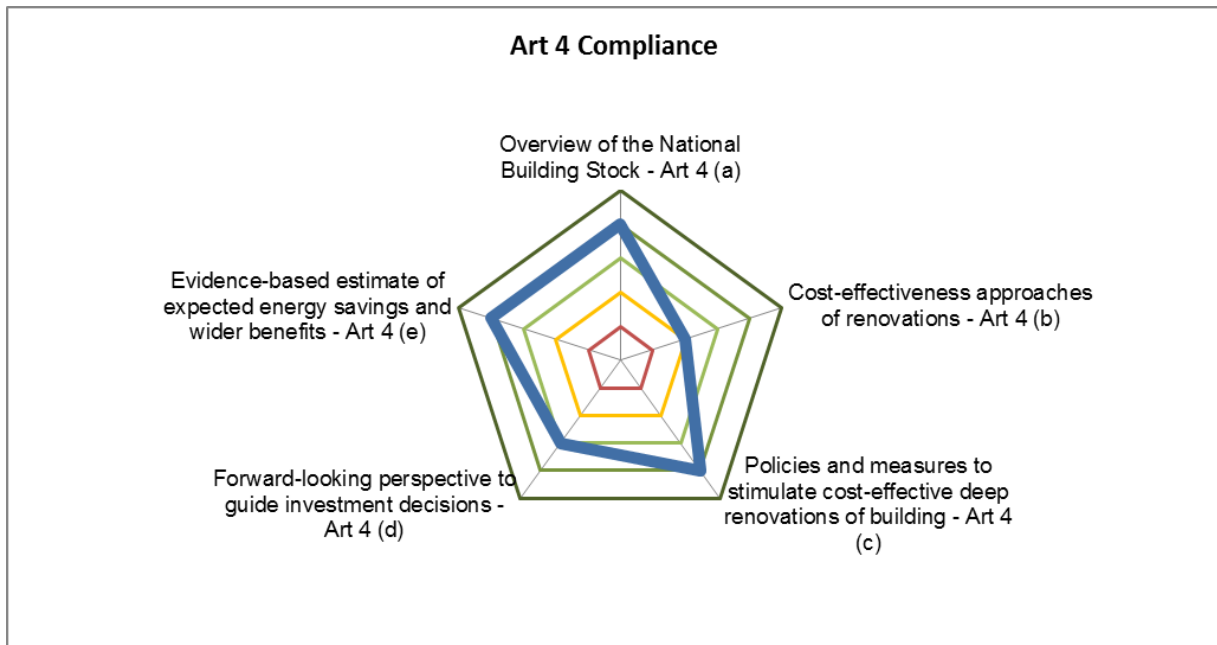
<b>Summary</b>	<p>Despite been short on the description of the building stock, the Estonian strategy covers all the essential requirements of Art.4 of the EED.</p> <p>The document provides a good cost-benefit analysis of different renovation approaches for 7 different buildings categories and 3 different policy scenarios.</p> <p>The presented cost-effective approach is deemed appropriate, but, as stated in the strategy, further research is needed (i.e. the technical renovation standard solutions must be better identified).</p>
<b>Level of details</b>	<p>The overall level of detail is generally low, being satisfactory only in cost-benefit analysis section.</p>
<b>Level of ambitions</b>	<p>The level of ambition is moderate (the overall sectors National energy efficiency target is only to maintain in 2020 the 2010 total final energy consumption in Estonia.) For the building sector, energy savings of up to 3.5 PJ/y must be achieved by 2016. T</p>
<b>Appropriateness</b>	<p>No new measures have been put in place. The existing measures and policies are not enough for an effective building renovation campaign (i.e. knowledge based scenario)</p>
<b>Comprehensiveness</b>	<p>Only 4 existing measures are reported. No new policies to address barriers and to enable deep renovations are indicated.</p>
<b>Strengths</b>	<p>A good scenario analysis for art4d has been provided.</p>
<b>Weaknesses</b>	<p>The overview of the building stock is very limited.</p>
<b>Innovative approach</b>	<p>n/a</p>
<b>Recommendations</b>	<p>To align the measures and the policies with the results of the scenario analysis. More data and details should be provided, especially in the description of the building stock. New policy measures could also be introduced, with a clear timeline for implementation.</p>



## FINLAND

Country	FINLAND		
Document Information	The Finnish building renovation strategy is presented in Annex 5 of the NEEAP 2014. The document is available in English.		
National Building Renovation Strategy (Art 4 EED) Introduction	The main data sources of the Finnish strategy are: Statistics Finland, 2012 and Statistics Finland, 2013B. The document gives a overview of the strategy chosen by the country and covers all elements listed in Art.4, while defining a path towards upcoming policies.		
Overview of the National Building Stock - Art 4 (a)	yes	The Finnish building stock is described in detailed and in comprehensive way. Most of the data are given in graphs represented as share of the total in percentage. There is neither analysis of energy classes, but the climatic issue is discussed. Some information about ownership, tenure status, locations (urban, suburb, rural) are provided.	4
Cost-effectiveness approaches of renovations - Art 4 (b)	yes	Cost-optimal levels of minimum energy performance requirements for renovations are included in the Annex, but the adopted methodology to define them is not described. The deep renovation level is presented with regards to some requirements (building components, technical systems and strategies for proper functioning), but it is not clear to which type of buildings these requirements are adressed. More details should be provided.	2
Policies and measures to stimulate cost-effective deep renovations of building - Art 4 (c)	yes	The strategy provides only a very general description of policies, without concrete measures to be implemented. However, in the Annex 2 of the Finnish NEEAP a very detailed description of each measure is provided (i.e. including implementation timing, estimated savings, funding etc.).	4
Forward-looking perspective to guide investment decisions - Art 4 (d)	yes	On financing, the strategy gives an overview of the state of funds availability towards deep renovations. The state has mostly granted financial support to housing associations, but buildings' owners tend to finance the works by themselves or apply for bank loans. It is mentioned the need to arise other forms of financing besides the traditional ones, although without presenting any concrete measure. While the main barriers are listed, a scenario analysis is not included in the strategy and the financial sources should be better detailed.	3
Evidence-based estimate of expected energy savings and wider benefits - Art 4 (e)	yes	The benefits of the strategy are well described. The impact on employment, as well as national economy are provided.	4

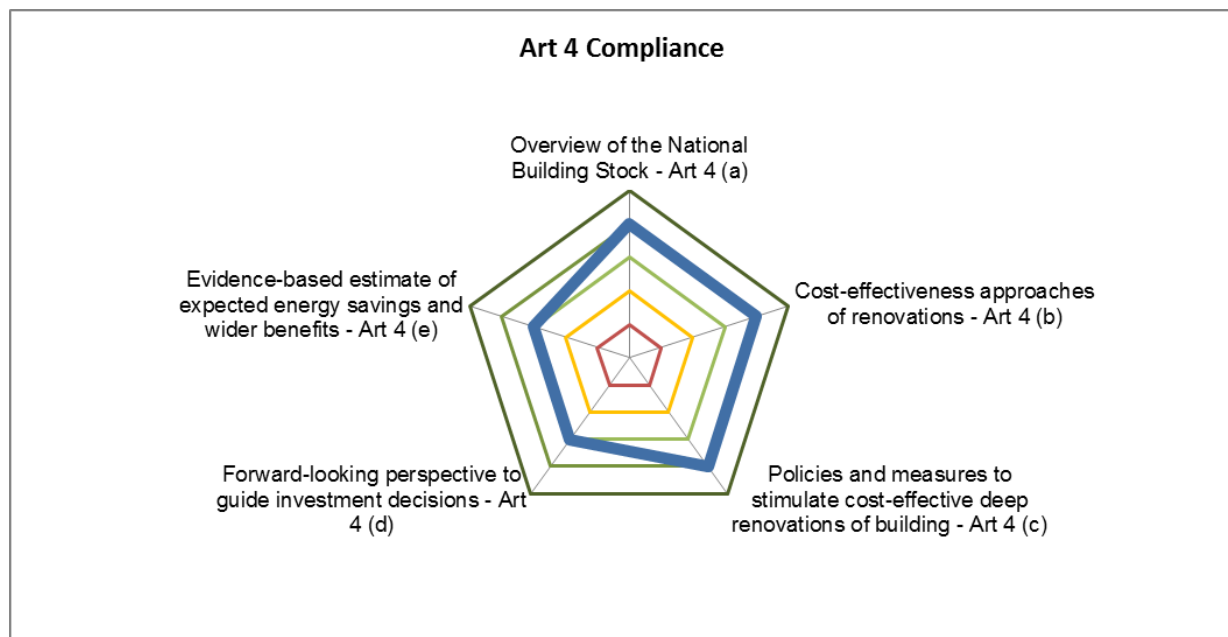
<b>Summary</b>	The Finnish strategy cover all the essential requirements of Art.4 of the EED and it results compliant. The general level of detail is good and the policy measures implemented are appropriate and comprehensive.
<b>Level of details</b>	Considering the additional information provided in other sections of the NEEAP (i.e. for the policy measures), the general level of details is good. The financial sources should be better detailed.
<b>Level of ambitions</b>	The deep renovation requirements, as well as the benefits of the strategy appear quite ambitious.
<b>Appropriateness</b>	The renovation and policy measures identified appear appropriate and significant.
<b>Comprehensiveness</b>	The presented policies and measures that promote building renovations are comprehensive. They cover several fields: regulations, innovations, financial incentives, communications, labour force, know-how and education.
<b>Strengths</b>	Detailed overview of the building stock and good description of the renovation requirements. The benefits of the strategy are well evaluated.
<b>Weaknesses</b>	The adopted cost-effective methodology should be better described. The public financial sources should be better presented.
<b>Innovative approach</b>	n/a
<b>Recommendations</b>	The adopted cost-effective methodology should be better described. The public financial sources should be clearly listed and discussed.



## FRANCE

Country	FRANCE		
Document Information	The French building renovation strategy was provided in July 2014 as a separate stand-alone document, available also in English.		
National Building Renovation Strategy (Art 4 EED) Introduction	The French renovation strategy for residential buildings is based on a 2009 study conducted by Energies Demain for the Ministry (METL-MEDDE 2009). The study is based on statistical data provided by INSEE in 2006. For non-residential buildings the renovation strategy is based on a study conducted by CSTB (French Scientific Centre for Buildings) in 2010 and 2007. The database SITADEL was used for the share of non-residential buildings per building type.		
Overview of the National Building Stock - Art 4 (a)	yes	The French building overview refers to several sources (i.e. INSEE Statistical Institute, FILOCOM tax database and SITADEL database for construction permits for non-residential buildings) and it is well described and comprehensive. However, data provided for residential buildings are based on 2006 statistics. The split private/public in residential buildings is difficult to assess. The number of buildings or m2 per climatic zone and per location (urban/rural) is not provided. Regarding non-residential buildings, data provided are more recent, based on 2010. However, they are less detailed in terms of energy consumption, energy carrier and other parameters. The only breakdown provided is by m2.	4
Cost-effectiveness approaches of renovations - Art 4 (b)	yes	The cost-effectiveness of EE measures were performed for 3 building types (single family house, multi-family building and an office). Single family house constructed between 1950 and 1975 are considered as the primary target for energy renovation. For each of the three buildings calculations were performed for 3 options: shallow renovation by replacing heating system, deep renovation by insulating the building and replacing heating system, high efficient deep renovation by super-insulating the building and replacing the heating system by best available technologies. In the case of the office building the 3rd option includes also the replacement of the lighting and ventilation systems with heat recovery. For each of the selected building, the cost, saving potential and a comparison of the result between the 3 renovation options is provided. RES solutions were not at all included in the cost-optimum calculations.	4
Policies and measures to stimulate cost-effective deep renovations of building - Art 4 (c)	yes	An Energy Renovation Plan for residential buildings was adopted in 2013. It includes a comprehensive set of policies and measures to achieve the French target of 38% reduction of energy consumption of the existing buildings by 2020 via the energy renovation of 500.000 annually by 2017. However, the interaction between different measures and their complementarity are difficult to assess. The progress in the implementation of each measure is also difficult to assess. Measure for the non-residential sector were not included in the strategy. The only policy referenced for the non-residential sector is the voluntary agreement signed with different stakeholders which is considered as the first step towards mandatory renovation of non-residential buildings that should be included in the revised building energy code.	4
Forward-looking perspective to guide investment decisions - Art 4 (d)	yes	The French strategy provides a forward-looking perspective more related to future measures to address renovation barriers, than a clear guide to investment decisions. The planned measures are comprehensive and address all the economic sectors (i.e. launch of a guarantee fund to support the energy renovation plan, involvement of local banks and local authorities, introduction of innovative financing schemes such as SEM Ile De France, R&D programmes etc). Overall the French forward looking strategy is deemed compliant, however this section of the report should be more focused on the definition of investment requirements.	3
Evidence-based estimate of expected energy savings and wider benefits - Art 4 (e)	yes	The energy cost reduction for the owners was provided as part of the cost-optimal calculation. Other impacts such as job creation, health impact, CO2 emission reduction are mentioned but not figures were provided	3

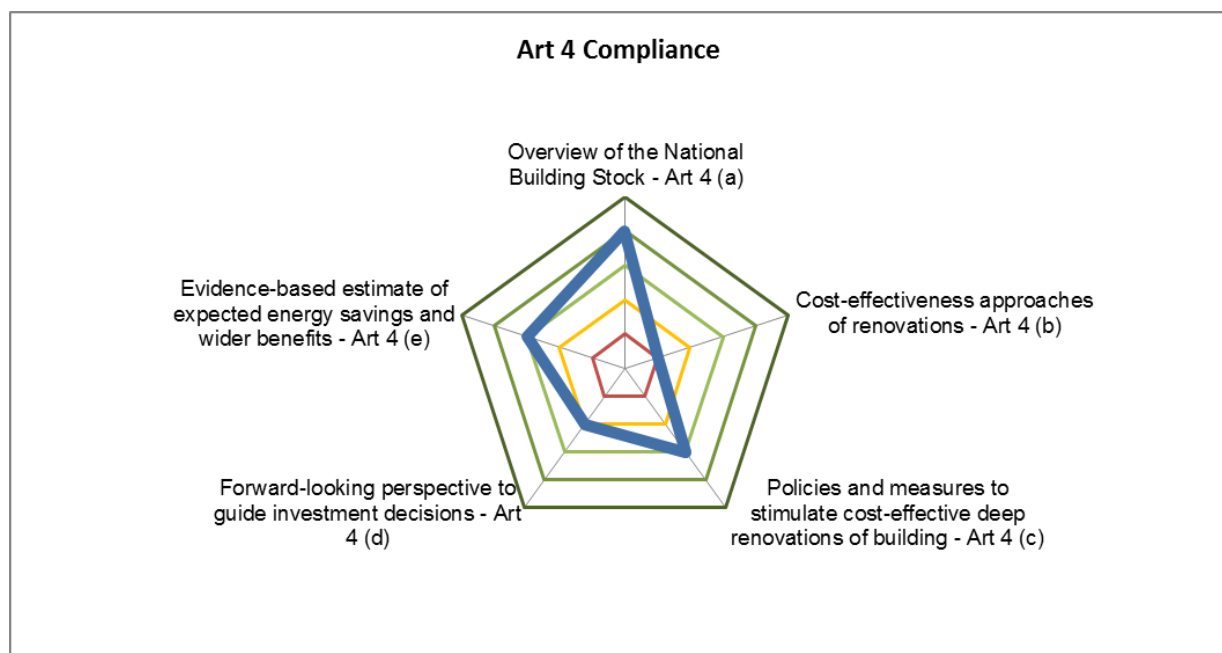
<b>Summary</b>	The French renovation strategy is guided by the French Grenelle law (2009) which stipulates in its article 5 that energy consumption of existing buildings should be reduced by 38% by 2020 and that 400.000 dwellings should be energy renovated every year starting from 2013. In 2013 an Energy Renovation Plan for Housing was adopted; the aim is to have, by 2017, 500.000 dwellings renovated each year. The plan includes all the policies and measures adopted by the government to reach its 38% reduction of energy consumption of existing buildings by 2020. Several components of the French renovation strategy have therefore pre-existed the EED. The French renovation strategy provides a comprehensive and detailed technical appraisal of the building stock and energy saving opportunities. It recognises the strategic importance of building renovation, including the link to wider urban regeneration, and broader social and economic benefits. Specific actions that reduce the barriers, and help the financing of renovation measures, have been identified and described as well as the policies in place and planned to reach the energy efficiency target.
<b>Level of details</b>	The strategy offers a very good level of details in the description of residential buildings stock. The non-residential building stock is less detailed. The cost-optimum calculations are provided for the less efficient buildings and those with the highest share in terms of sqm. 3 renovation options were considered for each of the three building category selected. However, the calculations do not cover all the climatic zones. A comprehensive set of policies and measures is described in the strategy. However, the interactions between all these measures and their complementarities are bit difficult to assess.
<b>Level of ambitions</b>	The French strategy is quite ambitious as stipulated in the Grenelle law (2009) and in the Energy Renovation Plan for Home adopted in 2013. The target is to reduce energy consumption of the existing buildings by 38% by 2020 through the renovation of 500.000 dwellings by 2017. The strategy includes all stakeholders and at different level of governance. However, it is difficult for the information provided to assess how realistic is this target in terms of market capacity to deliver all the planned renovations.
<b>Appropriateness</b>	The measures and policies designed for the strategy are appropriate. However, it is difficult to assess if they will allow to reach the target of 500.00 dwellings annually renovated by 2017.
<b>Comprehensiveness</b>	The French renovation strategy is comprehensive for residential buildings. It proposes a set of complementary measures that should lead to the renovation of all type of building for different tenure status and income of the households. Regarding the non-residential sector, the strategy is not yet sufficiently developed.
<b>Strengths</b>	The French renovation strategy started when the Grenelle law was adopted in 2009, stakeholders at different level of governance are all prepared to embark in the energy renovation plan. The target of reducing by 38% energy consumption of the building sector by 2020 has been re-confirmed in 2013 and the number of dwelling to be renovated annually has increased to 500.000
<b>Weaknesses</b>	Minor points in the provision of data (e.g. climatic zones). No concrete timeline for interventions provided
<b>Innovative approach</b>	One-stop shop, Guarantee fund and innovative financing (SEM Ile de France), R&D programme and several demonstration projects to enhance bio-climatic design
<b>Recommendations</b>	More details on actual timeline for implementation should be provided. More data and measures for the non-residential sector. Estimate of wider benefits of the energy renovation plan.



## GERMANY

Country	GERMANY		
Document Information	The German strategy has been provided as a separate stand-alone document in April 2014. The document is available in English.		
National Building Renovation Strategy (Art 4 EED) Introduction	The National Building Renovation Strategy provides an overview of the national building stock, including ownership and tenancy structure. It lists national policies and financial mechanisms for promotion and support EE renovation of buildings.		
Overview of the National Building Stock - Art 4 (a)	yes	The German strategy provides a good overview of the national building stock and its energy performance, based on the data from the Federal Ministry of Transport, Construction and Urban planning (2012) and the Bremen Energie Institute (2011). For the residential sector, data on building age and tenure are provided, together with a detailed break down of the rental housing stock in Germany in 2012. A detailed overview of the non residential buildings and public buildings (divided by central and local administration), including military facilities, is also provided. For the non residential sector is not provided the building structure by age band, building size and type of construction. The strategy does not provide information about the climatic zones in Germany, energy consumption of buildings, energy performance quality of external walls and windows.	4
Cost-effectiveness approaches of renovations - Art 4 (b)	no	Cost-effectiveness approaches of renovation are not identified. The strategy provides only a very general statement about the renovation policy without any details regarding technical opportunities and cost effectiveness. No links or references to other studies/reports on this topic are reported, even if it is known that Germany worked on renovation cost-effective approach.	1
Policies and measures to stimulate cost-effective deep renovations of building - Art 4 (c)	yes	Several financial and regulatory measures are in place in Germany to stimulate renovations. Among the regulatory measures it is worth mentioning the Energy Savings Ordinance (i.e. EnEv) and the tenancy law that allows landlords to increase rents to cover the cost of energy renovation. The amended EnEV 2013 includes the decision to reduce the permitted annual primary energy demand by an average of 25%. The largest supporting programme is the KfW "CO2 Building Rehabilitation Programme". Since 2006 this programme has founded EE renovation or construction of 3.5 million homes with a total investments of around EUR 159 billion. An analysis of the existing barriers and indications on how future legislation should target them are not provided in the report.	3
Forward-looking perspective to guide investment decisions - Art 4 (d)	partly	The report does not indicates specific scenarion or measures which can guide investments decisions. The renovation of buildings is placed in the context of a Germany long-term strategy for a reliable, economically viable and environmentally sound energy supply. It is noticed that the current strategic approach needs to be developed further in order to enable use and cost-effectiveness of the technical possibilities for energy renovation of the building stock. The report states that the German federal government will develop a long term national renovation plan for buildings. It shall be used as an concrete guide for owners and investors. In additions was given an overview of the supporting financial and research initiative.	2
Evidence-based estimate of expected energy savings and wider benefits - Art 4 (e)	yes	The report includes two tables from the second NEEAP of Germany for energy savings in buildings broken down by measures: first one with calculation of energy savings according the top down method and the second one according the bottom up method. In addition is given an overview of other non clearly quantifiable measures in Germany. The report does not include estimation or calculation of wider benefits resulted from the implementation of the renovation strategy.	3

<b>Summary</b>	The German strategy provides a good overview of the building stock, including energy performance of buildings. It also offers a comprehensive overview of the policies and financial instruments regarding implementation of the EE measures in the building sector. However, the report does not include a comprehensive and detailed technical appraisal and cost effectiveness analysis of the energy saving opportunities. It recognises the strategic importance of building renovation, broader social and economic benefits (job creation, quality of life, etc.). The strategy refers to a forthcoming long-term national roadmap to be developed and published by the German Government.
<b>Level of details</b>	The strategy offers a satisfactory level of details in the description of the building stock and very detailed description of the rental housing stock in Germany. The report includes detailed information on the EE policies in buildings as well as for the on going programmes for financing of building renovation. However, the document does not include the cost-effectiveness and benefits calculation exercise.
<b>Level of ambitions</b>	The German strategy can be considered ambitious, as the estimate savings from chosen measures set in the second NEEAP (337 PJ/year for period 2008-2020). The most of the energy savings in buildings should be resulted from implementation of EE Ordinance for residential and non residential buildings. The rest should be resulted from different KfW programmes for buildings including 70PJ/year from the KfW EE renovation programme.
<b>Appropriateness</b>	The measures and policies designed for the strategy are appropriate and suitable to reach the goals established.
<b>Comprehensiveness</b>	Germany has in place a good set of legislative measures for EE in buildings. The Tenancy Law provides for effective incentives for energy modernisation of the rental housing stock. There are lot of financing and research programmes supporting EE and RE in the building sector. However, a more articulated approach for renovation of building stock is needed.
<b>Strengths</b>	The report provides analyses of the building residential and non residential stock (especially detailed for public sector) as well as especially detailed analyses of the rental housing stock in Germany, which is one of the most important sectors in Germany in terms for building renovation. In addition given is detailed overview about the legislation related to EE in buildings with specific focus on the Tenant Law (also very important for renovation strategy). Germany is especially focused on research activities related to development of new building materials and EE technologies.
<b>Weaknesses</b>	The report does not provide information of cost effectiveness of the building renovation as well as about forward looking perspective for investment decisions.
<b>Innovative approach</b>	Research and innovation programmes (i.e. "Research for Energy Optimised Building" and "Research for energy-efficient town and cities" initiatives)
<b>Recommendations</b>	The cost effectiveness approach and forward perspective of building renovation should be revised and detailed elaborate.

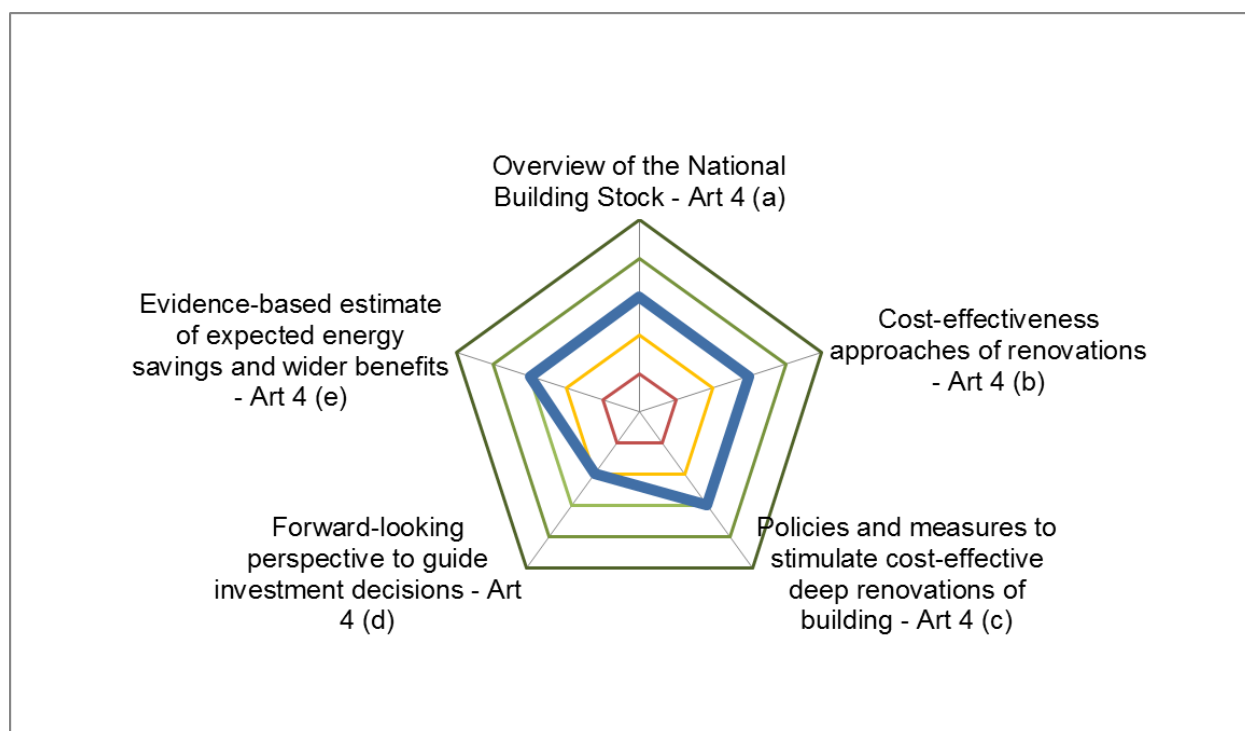




## GIBRALTAR

Country	GIBRALTAR		
Document Information	The Gibraltar strategy has been provided as a separate notification, in May 2015.		
National Building Renovation Strategy (Art 4 EED) Introduction	The structure of the document follows the main section headings in EED Art. 4.		
Overview of the National Building Stock - Art 4 (a)	yes	The report gives a quite clear picture of the particular attributes of Gibraltar building stock, but the data provided are not up to date (i.e. based on 2001 census) and not very detailed, especially for non-residential categories. However it is stated that a 2012 census is due to be published soon. Most of the available information relates to public buildings (i.e. with nearly 70% of buildings constructed before 1980 and 40% before 1960).	3
Cost-effectiveness approaches of renovations - Art 4 (b)	yes	Different renovation packages have been analysed for different building categories (i.e. public buildings, Old and Upper Town buildings, recent buildings, non-residential buildings) and the related energy saving potential is provided. In the strategy is stated that these packages are the result of a cost optimality assessment, but no details on the calculation are provided (i.e. a "cost optimality report" is cited but no detailed references are provided).	3
Policies and measures to stimulate cost-effective deep renovations of building - Art 4 (c)	yes	In the strategy, a detailed analysis of the barriers to energy efficiency take up is provided, divided per building types. An general overview of policies and measures, already put in place and planned, both legislative and financial (e.g. tax relief scheme, loan and grant schemes), to stimulate energy efficient renovation of buildings is provided, but the level of detail is low.	3
Forward-looking perspective to guide investment decisions - Art 4 (d)	Partly	The strategy provides only a qualitative assessment of the main financial barriers to investments. Different funding source options are not discussed in detail. A clear indication on investments requirement is missing. No scenario analysis is provided.	2
Evidence-based estimate of expected energy savings and wider benefits - Art 4 (e)	yes	In the reports, an energy saving potential of 6,7 GWh of primary energy by 2020 and 88.8 GWh by 2050 has been identified. Nevertheless, an evidence-based estimates of energy savings for each of the policies described in the strategy has not been provided. Wider benefits have not been identified (e.g. reduce fuel poverty, increase energy security, e improved health).	3

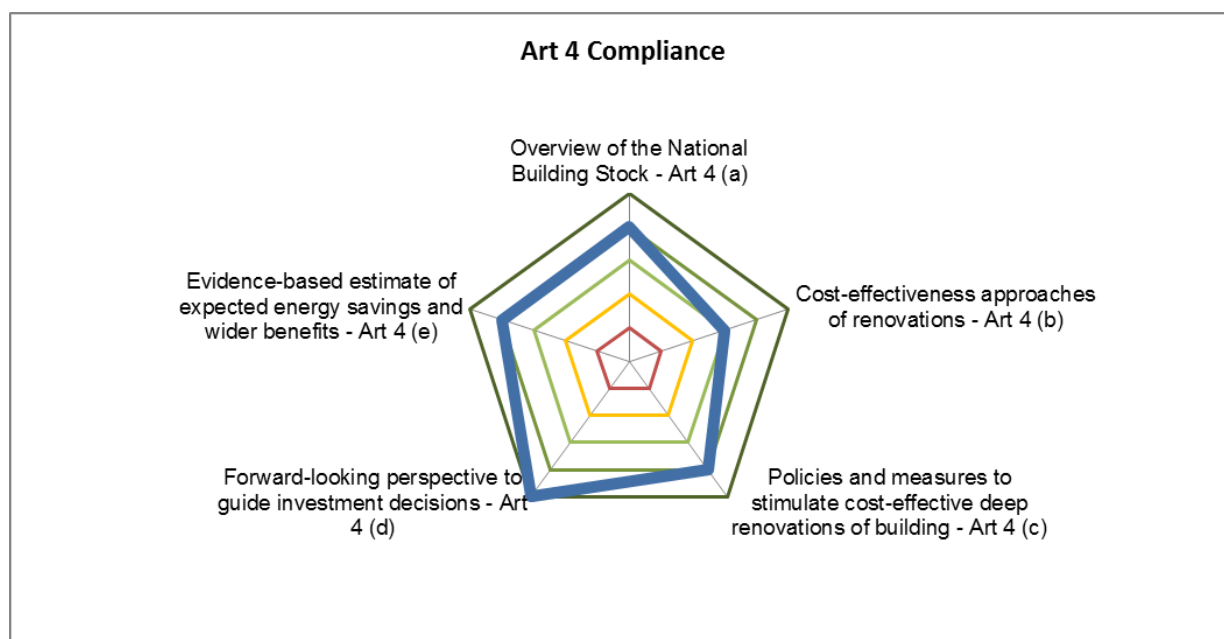
<b>Summary</b>	Gibraltar provided a renovation strategy that covers all aspects of Article 4, and can be considered as compliant with Art. 4 requirements, with the exception of point 4d (i.e. Forward-looking perspective to guide investment decisions). The principles of the strategy are in line with those of the EED and, if properly and quickly applied, the measures planned can lead to the target identified.
<b>Level of details</b>	The general level of details is low
<b>Level of ambitions</b>	The building renovation strategy will lead to small savings by 2020 (i.e. 6.7 GWh of primary energy or 2%). More savings are expected in the period 2020-2050 (i.e. 88.8 GWh or -28%, in comparison to 2015 primary energy consumption).
<b>Appropriateness</b>	The measures and policies designed for the strategy are appropriate and suitable to reach the goals established, even if more specific policies targeting deep renovation should be put in place
<b>Comprehensiveness</b>	Gibraltar has in place a good set of measures for the building sector
<b>Strengths</b>	Very detailed analysis of barrier to energy efficiency
<b>Weaknesses</b>	limited information on the building stock
<b>Innovative approach</b>	n/a
<b>Recommendations</b>	Provide more details on the building stock; A clear forward-looking perspective to guide investment decisions, including a roadmap with key dates, targets, milestones, needed resources, should be added.



## GREECE

Country	GREECE		
Document Information	The Greek strategy has been provided as a separate stand-alone document, dated December 2014		
National Building Renovation Strategy (Art 4 EED) Introduction	Greece provided a detailed long-term strategy for building renovation, developed by the Ministry of the Environment, Energy and Climate Change with the support of the TEI Piraeus University. The structure of the document follows the main section headings in EED Art. 4.		
Overview of the National Building Stock - Art 4 (a)	yes	Greece provided a comprehensive and detailed statistical overview of the building stock. This includes an analysis of building types, ages, tenures, energy performances per climatic zones, providing more details on residential than on non-residential buildings. The approach is correct and the segmentation appropriate. The overview is based on data from different sources (i.e. 2011 Census, Tabula 2011).	4
Cost-effectiveness approaches of renovations - Art 4 (b)	Yes	The Greek strategy includes the estimation of the energy saving potential related to cost-effective retrofit opportunities, for each climatic zone and building type. The main envelope technologies and system opportunities are well covered, but some RES are not taken into account (e.g. PV, geothermal heat pumps).	3
Policies and measures to stimulate cost-effective deep renovations of building - Art 4 (c)	yes	In the strategy, a detailed analysis of the barriers to energy efficiency take up is provided (e.g. embryonic markets, technical barriers, lack of reliable technical support, split-incentive issue, too recent regulatory framework, economic crisis). To overcome the existing barriers a long term policy framework have been put in place, including a comprehensive package of measures both for residential and non-residential building, together with an estimation of the related energy savings (e.g. Regulation of Energy Performance of Buildings-KENAK, mandatory installation of solar thermal systems in new residential and tertiary sector buildings, financial incentives for EE improvements in households).	4
Forward-looking perspective to guide investment decisions - Art 4 (d)	Yes	An analysis per scenarios has been developed: combining different types and paces of renovation, 5 scenarios have been defined for residential buildings and 2 scenarios for non-residential ones (because their low numbers). The modelling assumptions are well discussed. The forward-looking perspective is oriented to the progressive and coordinated upgrading of the building stock, so in 2050 at least 80% of the existing buildings will be renovated. Three phases are recognised up to 2050 (initial, acceleration and stabilisation) and for each of them several actions are proposed. The financial framework is well addressed: the overall investment amount is estimated (7.6 billion euros by the end of 2050) and several funding mechanisms are presented.	5
Evidence-based estimate of expected energy savings and wider benefits - Art 4 (e)	yes	Wider benefits have been identified and quantified in detail, e.g. Environmental benefits, health benefits, improved comfort, employment impact (i.e. per million Euro investment, created 21.1 jobs created/million € invested for basic building insulation), energy security, increase the value of the property. A detailed analysis to quantify the additional benefits of energy savings have been provided; Indicative benefits incidental to energy saving in buildings and the respective multipliers cumulatively can amount preservatives least twice the cost savings.	4

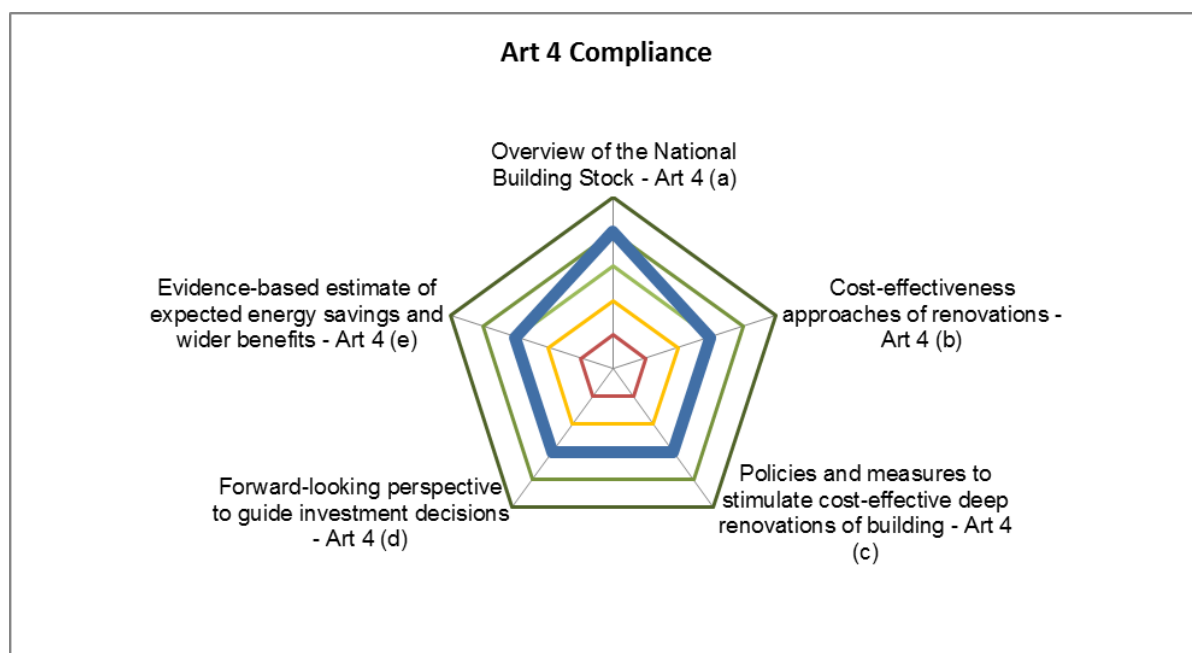
<b>Summary</b>	The Greek building renovation strategy provides a very good and detailed description of the building stock. A detailed analysis of the barriers to energy efficiency take up is also provided, together with the description of a comprehensive package of measures supporting the renovation of residential and non-residential buildings. The Greek forward-looking perspective is comprehensive, ambitious and appropriate. The applied methodology can be signalled as a best practice, useful for the future updating of the strategies of other MSs.
<b>Level of details</b>	The strategy provides an overall good level of details
<b>Level of ambitions</b>	Very ambitious, since the strategy aims to renovate at least 80% of the existing building stock by 2050.
<b>Appropriateness</b>	The measures appear appropriate, but they should be strengthened to achieve the EED requirements. The measures and policies designed for the strategy are appropriate and suitable to reach the goals established,
<b>Comprehensiveness</b>	Greece has in place a good set of measures for the building sector. To move towards the vision of a sustainable building stock by 2050, a very comprehensive package of actions is proposed. It includes governance, infrastructural and practical measures, differentiated by priority and period of implementation.
<b>Strengths</b>	The Greek forward-looking perspective is comprehensive, ambitious and appropriate. The applied methodology can be signalled as a best practice, useful for the future updating of the strategies of other MSs. The operational Program "Competitiveness, Entrepreneurship, Innovation" (Restart), in synergy with the Regional Operational Programmes (ROP), will provide a relevant budget for supporting energy efficiency, smart energy management and renewable energy use in public infrastructures, including public buildings and in the housing sector.
<b>Weaknesses</b>	Some relevant RES technologies, as well district heating, have not been included in the cost-effective analysis. Also staged renovations should be taken into account.
<b>Innovative approach</b>	Within the retrofit opportunities, also technologies limiting the phenomenon of urban heat island have been taken into account.
<b>Recommendations</b>	Some retrofit options should be included in the cost-effective analysis.



## HUNGARY

Country	HUNGARY		
<b>Document Information</b>	The Hungarian strategy has been provided as an Annex of NEEAP 2014 (Annex 4), in March 2015. The document is available only in Hungarian.		
<b>National Building Renovation Strategy (Art 4 EED) Introduction</b>	The strategy is structured according to the key elements listed in EED Art. 4 and has been developed by the "Building Quality and Innovation" NGO for the National Development Ministry that has adopted it on 18/02/2015. It provides a good overview of the national building stock, a description of the national policies and financial mechanisms supporting building renovations in the country.		
<b>Overview of the National Building Stock - Art 4 (a)</b>	Yes	The Adopted National Building Renovation Strategy could rely on 3 different information sources (Green Inventory, Environmental Operative Program, Regional and Urban Innovation VATI dataset) as well as census and statistical data on the building stock. It gives a detailed description of several reference building types, characterised by surface and age bands (15 types for residential buildings, 42 for the public buildings incl. offices, health and social buildings, education etc.). The information on industrial, commercial and agricultural buildings are aggregated.	4
<b>Cost-effectiveness approaches of renovations - Art 4 (b)</b>	Yes	The Strategy extensively builds on the concept of cost optimality approach (the methodology is based on the governmental degree 7/2006 laying down the building energy requirements, and the applied calculations for the different building types is described in a separate document). The heating, cooling needs, together with the DHW are taken account with the determined U-values and are used for all the residential building types. For non residential buildings two renovation levels are considered. The current and the cost optimal energy consumption values (after renovation) are presented for the various building types together with their corresponding costs. The methodology how the calculation selected the final cost optimal option from the various alternatives could be incorporated more clearly in the document.	3
<b>Policies and measures to stimulate cost-effective deep renovations of building - Art 4 (c)</b>	Yes	In the Hungarian strategy a comprehensive set of measures is described. Three types of policy measures are listed as measures expected to stimulate renovations: (1) legislative measures, (2) financial incentives such as grant schemes for building renovation funded by the State budget and by EU structural funds, (3) information and education programmes. A R&D project related to energy efficiency in buildings is also mentioned. A brief and not very detailed analysis of renovation existing barriers is provided.	3
<b>Forward-looking perspective to guide investment decisions - Art 4 (d)</b>	Yes	The strategy provides a quantitative assessment for only one financial scenario, providing a breakdown of the government and private resources needed. The other stakeholders like the financial sector and NGO perspectives are missing.	3
<b>Evidence-based estimate of expected energy savings and wider benefits - Art 4 (e)</b>	Yes	The strategy identifies the expected savings per building categories and also the wider benefits are quantified (e.g. the energy carrier import effects, employment effects, budget balance effects, CO2 emission reduction, future financial savings for the owners). However more detailed description of the calculations could be given.	3

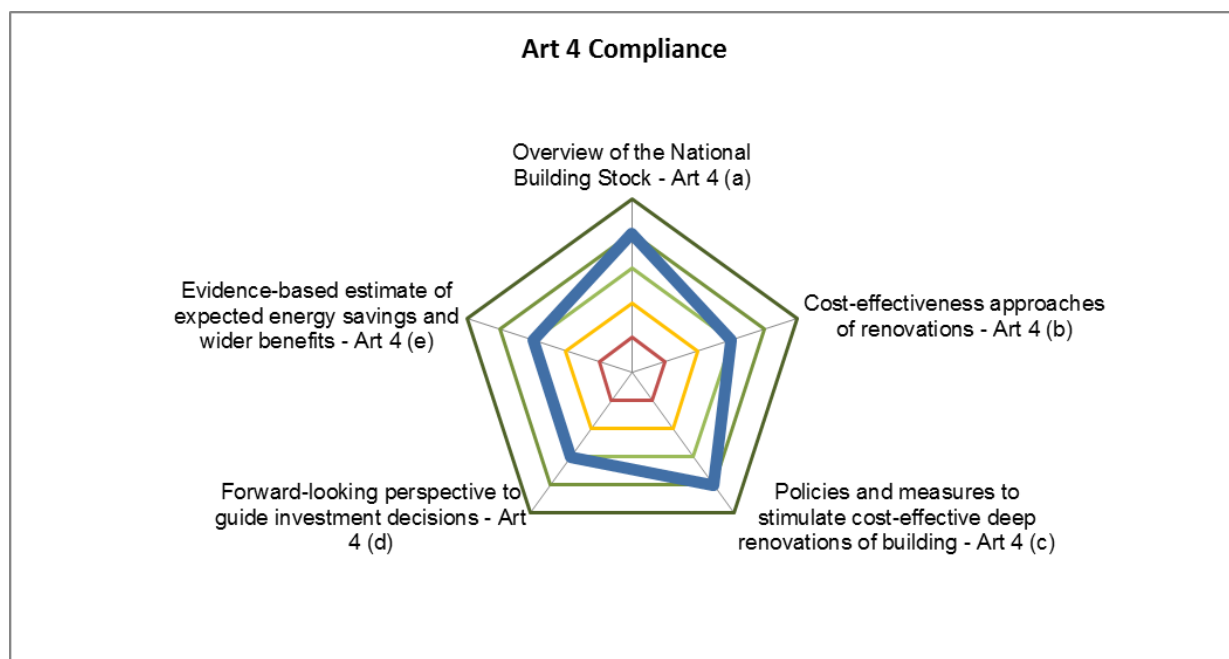
<b>Summary</b>	The Hungarian Renovation strategy covers most of the requirements of the Article 4. It gives an in-depth description of the energy performance of the Hungarian building stocks, and provides the policies and measures how the government approaches the implementation of the EED requirements in Hungary. The document contains only one part of the "Forward-looking perspective to guide investment decisions": the government - owner interaction, and misses the financial sector from this part.
<b>Level of details</b>	The building stock overview has a good level of details. The barriers and the financial background of the strategy needs to be more detailed.
<b>Level of ambitions</b>	On technical level the ambitions are set at a level that shows good correspondence to the cost optimal level of energy performance, but the financial, organisational aspects are not dealt with at a similar level.
<b>Appropriateness</b>	The strategy lists the past, the ongoing and the planned measures as well as their energy consumption related impacts adding the corresponding financial burdens as well.
<b>Comprehensiveness</b>	It gives a comprehensive overview of the building stock and the related government policy, but misses the other stakeholders groups perspectives.
<b>Strengths</b>	Good building stock overview
<b>Weaknesses</b>	Financial perspective to be improved
<b>Innovative approach</b>	n/a
<b>Recommendations</b>	the financial sector should be included in the forward-looking perspective.



## IRELAND

Country	IRELAND		
<b>Document Information</b>	The Irish renovation strategy was provided as a separate notification, in July 2014. The document explicitly states that the strategy is a first version that will be, after a stakeholders public consultation, revised and updated by the end of 2014. However, at the date, no further version have been submitted.		
<b>National Building Renovation Strategy (Art 4 EED) Introduction</b>	The strategy does not follow the structure of the EED Art. 4 key elements. It assesses separately the residential, public and commercial & Industrial sectors. In total, 86 energy efficiency measures, that could deliver 33TWh energy savings across all the sectors, have been identified. The following measures in the building sector have been already implemented: mandatory building energy ratings for every commercial or residential dwelling offered for sale or rent, renovation grants (e.g. Better Energy Programme, Better Energy Homes scheme), building regulations, tax rebate on home improvement works, Energy Efficiency Obligation for Energy Suppliers (20% of the energy saving annual target must be delivered in the residential sector), energy efficiency upgrading in social houses (6,6% of total residential building stock), demonstration projects and information & awareness campaigns (i.e. the Power of One campaign).		
<b>Overview of the National Building Stock - Art 4 (a)</b>	yes	The Irish building stock overview is based on data from 2011 census and from the European Housing review (2007) and is deemed comprehensive and detailed. The residential, the public and the commercial building stock is well described and treated in separated sections of the document. The level of details is good, but in the report some information are missing (i.e. division of the building stock in clusters with common features for targeted interventions and to set priorities).	4
<b>Cost-effectiveness approaches of renovations - Art 4 (b)</b>	yes	The strategy rely on a preliminary study that, based on a marginal abatement cost curve analysis, identified the most cost effective energy efficiency measures for all the sectors. In total 86 energy efficiency measures have been included in this analysis, across the residential, commercial, industrial and public sectors. The current analysis is considered to be preliminary and need to be amended with more details and further analysis (i.e. typical packages of retrofit measures for different house type, different intervention scenarios etc.).	3
<b>Policies and measures to stimulate cost-effective deep renovations of building - Art 4 (c)</b>	yes	In the document, a detailed analysis of the barriers to the adoption of efficiency measures is provided, for the residential, (i.e. informational/motivational, Economic, competition/trust barriers), the public (i.e. Economic, information and leadership barriers) and the commercial (i.e. Information, Organisational, Split incentives, financial) sectors. The existing and planned policy measures have been described in details for the residential, the public and commercial sectors. Despite the progress made by the existing policy measures, the strategy states that additional measures were necessary to boost the renovation rate and it describes the new policies put in place (i.e. Energy Efficiency Obligation for Energy Suppliers, Better Energy Finance). Moreover, the introduction of a mandatory minimum thermal efficiency standards for rented property is under discussion.	4
<b>Forward-looking perspective to guide investment decisions - Art 4 (d)</b>	yes	In the report, existing programmes and source of funding, divided per sectors (i.e. residential, public and commercial) are well described. In this version of the strategy (that it is claimed that would have been revised by the end of 2014), the level of details could be improved (i.e. more details are provided in the Irish NEEAP). Ireland has traditionally relied on State supports to incentivise energy efficiency measures in buildings and approximately €203m in Exchequer funding has been invested in recent years; nevertheless, to achieve the ambitious energy efficiency targets, new measures to mobilise private sector investment in retrofit have been launched (i.e. Better Energy Finance). A clear forward-looking perspective to guide investment decisions, including a roadmap with key dates, targets, milestones, needed resources, is not included.	3
<b>Evidence-based estimate of expected energy savings and wider benefits - Art 4 (e)</b>	yes	Only a broad overview of the potential benefits that large scale renovation of buildings can deliver has been provided. Additional benefits have been mentioned: lowering energy bills, boosting the domestic economy, meeting Ireland's climate targets, lowering energy system costs, more comfortable homes, healthier, cost effective to run. Studies suggest that a comprehensive programme of renovation could create between 23,000-32,000 new direct jobs in Ireland.	3

<b>Summary</b>	Ireland provided a comprehensive document describing an encompassing framework of policies, measures and regulations to persuade households and business to invest in building retrofit. The strategy sets out a clear pathway to overcoming the barriers to renovation works and achieving the national targets by building on the success of existing policy measures, with the addition of new policy goals, designed to mobilise investment to increase the rate of renovation in the economy. The strategy explicitly states that the current version will be, after a stakeholders public consultation, updated by the end of 2014. However, to date, no further version have been submitted.
<b>Level of details</b>	The overall level of detail of the study is good, even if some aspects could be improved (i.e. division of the building stock in clusters with common features for targeted interventions and to set priorities).
<b>Level of ambitions</b>	Ireland has set an ambitious target to reduce energy usage in the public sector by 33% by 2020; Moreover a very challenging target to deliver a near-zero emissions building sector by 2050 has been set.
<b>Appropriateness</b>	The policy measures identified appear appropriate and suitable to reach the set targets
<b>Comprehensiveness</b>	All the building sectors have been covered and the policy package outlined is comprehensive.
<b>Strengths</b>	Strong focus on the public sector. The Energy Efficiency Directive already requires EU Member States to reduce energy consumption in those buildings under the remit of central government. This strategy goes further, targeting all those buildings in the public sector, rather than just those under the remit of central government.
<b>Weaknesses</b>	The strategy is based on preliminary studies that need to be consolidated. Stakeholders' consultation is still on-going and a new up-dated version of the strategy should be released soon, as announced in the document.
<b>Innovative approach</b>	n/a
<b>Recommendations</b>	A clear forward-looking perspective to guide investment decisions, including a roadmap with key dates, targets, milestones, needed resources, should be added.

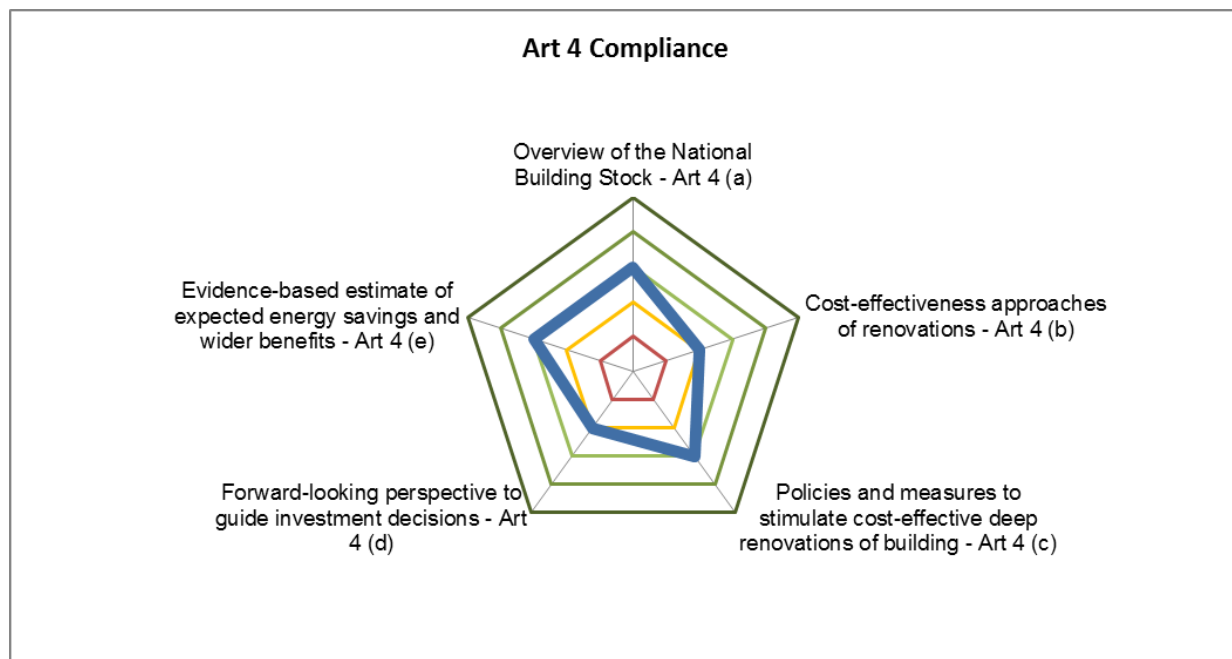




## ITALY

Country	ITALY		
Document Information	The long-term buildings renovation strategy is included in the NEEAP, published in July 2014, but not as a separate annex. It is available in English.		
National Building Renovation Strategy (Art 4 EED) Introduction	The Italian strategy does not follow the structure of the EED Art. 4 key elements and it is presented as a paragraph of the NEEAP (paragraph 3.2). The strategy, linked to the National Energy Strategy, is mostly based on the revision of the Minimum Energy Performance Standards (MEPS) for new buildings.		
Overview of the National Building Stock - Art 4 (a)	yes	The Italian overview is based on the official data of the latest ISTAT census of 2010 and on the data collected by other bodies (ENEA, ANCE, CRESME, etc.). The main figures of the national building stock has been established, albeit in a preliminary and non-exhaustive manner. For instance, only the total number of residential buildings is given, with no specification of the types (single family, apartments etc). Additional data have been provided (e.g. area breakdown, volume, building location province and municipalities inhabitants), but more information would have been needed.	3
Cost-effectiveness approaches of renovations - Art 4 (b)	partly	Cap. 3.2.1.1 of the Italian NEEAP presents a summary of the cost-optimal methodology applied in accordance with Art. 5.2 of EPBD Recast. This overview is too general to obtain a clear picture of the developed method and the results achieved. About existing buildings only a comparison between cost-optimal thermal transmittance values and current regulatory requirements is given. More details should have been provided and the results should have been better presented.	2
Policies and measures to stimulate cost-effective deep renovations of building - Art 4 (c)	yes	In the Italian strategy, a good overview of the existing policies and measures to promote building renovation is provided. Over the last decade, national energy policies have evolved significantly. New legislation and methodologies have been introduced together with technical regulatory measures to promote a rational use of energy. Apart from White Certificates, tax deductions, and thermal account, several funds and schemes have been introduced to promote energy efficiency of buildings. Among these there are: National Energy Efficiency Fund, Funds for home purchase (plafond casa), financial instruments for schools, social housing and hotels, and measures promoted by Regions. However, the effectiveness of existing policies or the need of new policies should be better detailed.	3
Forward-looking perspective to guide investment decisions - Art 4 (d)	partly	Overall renovation investments are estimated per year in the residential and non residential sectors. However, existing sources of funding for renovation as well as financial mechanisms are not assessed. Several barriers towards the improvement of energy performance of buildings are described. For example, in the civil sector, high initial investments discourage energy efficiency actions. Overcoming these barriers is seen as a priority to reach the estimated savings. Nevertheless, a specific guide for investment decisions of individuals, industry or financial institution is missing.	2
Evidence-based estimate of expected energy savings and wider benefits - Art 4 (e)	yes	Investing in building renovation is seen as important and 170-180 billion eur investments are foreseen by 2020 in traditional and green economy. Only expected energy savings benefits are quantified towards 2020. The building's contribution to national targets is estimated at 4.9 Mtoe/y. A reduction of 24% primary energy consumption is foreseen in comparison with the business as usual scenario. Wider benefits are not estimated, but it is stressed that energy efficiency is a cost-effective way to reduce CO2 emissions, with a positive return on investment. It is generally stated that energy efficiency increases energy security and creates growth and employment in national enterprises.	3

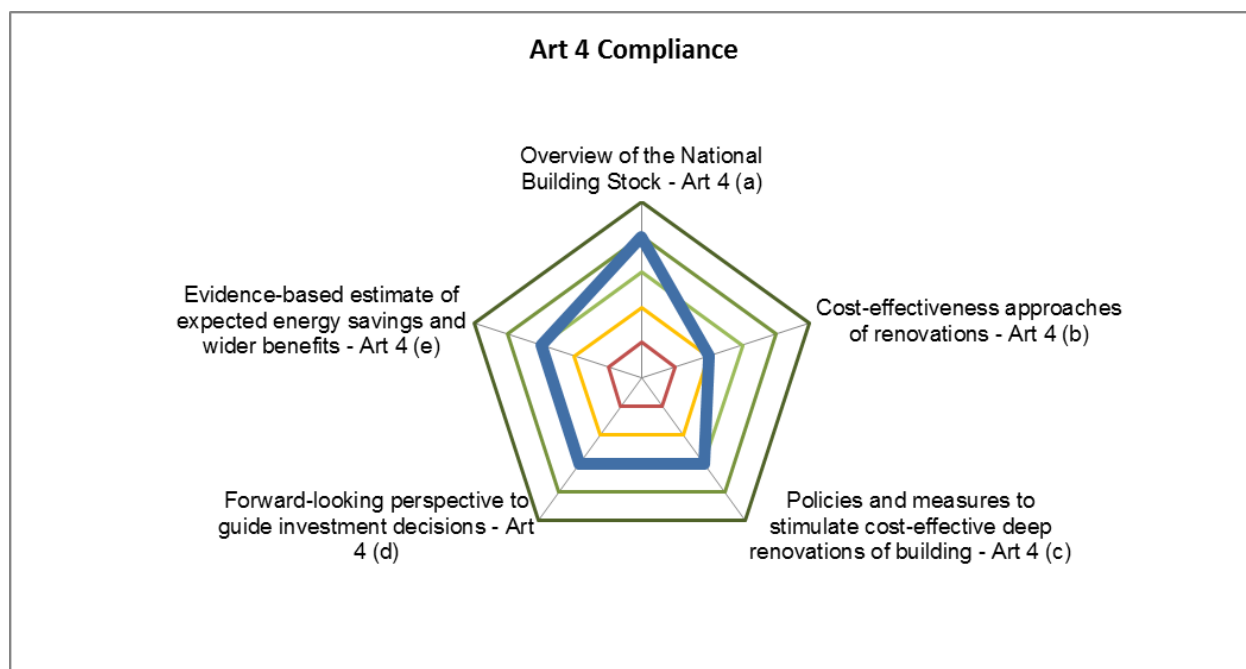
<b>Summary</b>	The Italian strategy is not fully compliant with the Art.4 prescriptions. The description of the national building stock is not very detailed and a forward-looking perspective to guide investment decisions is provided in general terms. Italy provides a good set of already implemented policy measures, but the cost-effective overview is too general and not linked to new planned measures.
<b>Level of details</b>	Overall, the level of details appears to be low. The national building stock is not completely described in each segment, and low technical details on the measures are provided. Cost-effective and calculation details are not reported.
<b>Level of ambitions</b>	The Italian targets are in line with the EPBD and EED Art.5 prescription (i.e. nZEB, 3% retrofit rate etc). The target for the renovation of the existing building stock should be clarified.
<b>Appropriateness</b>	Despite, the policy measures identified appear appropriate and suitable to improve the energy efficiency of the building stock, more details are needed to assess the overall appropriateness of the strategy.
<b>Comprehensiveness</b>	The study appears to be quite fragmented and the level of comprehensiveness could be improved. Moreover, specific actions to address finance renovation barriers should be introduced.
<b>Strengths</b>	Good set of already implemented policy measures (i.e. tax deduction, "contotermico", white certificates).
<b>Weaknesses</b>	The Italian strategy is not clearly structured. The cost-effective overview is too general and not linked to new planned measures. A specific guide for investment decisions of individuals, industry or financial institution is missing.
<b>Innovative approach</b>	"Conto Termico" measure
<b>Recommendations</b>	Provide more details about the building stock, identify a precise cost-effective approach towards renovation and develop a renovation scenario analysis per building type and climate zone to guide investment decisions.



## LATVIA

Country	LATVIA		
Document Information	The Latvian long-term building renovation strategy was provided as a NEEAP 2014 Annex.		
National Building Renovation Strategy (Art 4 EED) Introduction	The document provides a good overview of the Latvian strategy for mobilising investment in the renovation of the building national stock, and structured according to the elements listed in EED Art. 4. Various policy measures, mainly financed by European Regional Development Funds are mentioned, such as building renovation grant schemes (i.e. Improvement of heat insulation of multi-dwelling buildings and of social residential buildings), awareness raising campaigns (i.e. Let's Live Warmer), and the establishment of a rotation fund providing soft loans and revision of minimum building energy performance requirements. According to EU funds programming documents 2014-2020, an indicative amount of € 247 million will be allocated for the improvement of the energy performance of buildings. In the Latvian Annual Report is stated that in January 2013 a new law on the Energy Performance of Building came into force, together with several implementing regulations. "Latvia's Energy Long-Term Strategy 2030" defines the main energy policy goals and directions of action, including improvement of the energy performance of public and residential buildings.		
Overview of the National Building Stock - Art 4 (a)	yes	Latvia provided a comprehensive and detailed statistical overview of the building stock, based on data from different sources (i.e. the National Real Estate Cadastre, Central Statistical Bureau, 2011 Energy efficiency monitoring report). The overview includes number and heated area of several building categories (residential and non-residential), a breakdown per construction period and a very detailed breakdown by locations. Additional information about the ownership types, the defined climatic zones and some reference U-values are provided. Also interesting the data about the consumption of renewable energy.	4
Cost-effectiveness approaches of renovations - Art 4 (b)	partly	In the Latvian strategy, this section is very short and it is stated that this topic is addresses in the report "on energy performance requirements in Latvia for new buildings and buildings to be reconstructed in compliance with cost-optimal level pursuant to Article 5 of Directive 2010/31/EU on the energy performance of buildings", available on the Ministry of Economics' website. Unfortunately this link is not working. It is stated that in a recent regulation amendment, the new required U-values of envelope elements approximate the cost-optimal levels. How this affects the refurbishment of existing buildings should be clarified.	2
Policies and measures to stimulate cost-effective deep renovations of building - Art 4 (c)	yes	In the strategy a detailed analysis of the barriers, in relation to different renovation measures is presented (i.e. financial, lack of qualified workforce, low quality of construction works). To address these barriers a comprehensive set of measures, financed almost entirely by EU structural funds, has been put in place. New policies measures (i.e. revision of building minimum requirements, establishment of a rotation funds, establishment of a National Energy Efficiency Funds - NEEF. workforce trainings) have been identified and planned to stimulate the energy efficiency improvement of the building stock.	3
Forward-looking perspective to guide investment decisions - Art 4 (d)	yes	A comprehensive analysis of the financial sources available for renovation of building is presented in the strategy. This includes an estimate of the total annual investment demand, a detailed analysis of investment barriers and a list of possible finance source and mechanism (i.e. rotation funds, municipal energy service company, energy services). Nevertheless, a clear forward-looking perspective to guide investment decisions, including a roadmap with key dates, targets, milestones, needed resources, is not included.	3
Evidence-based estimate of expected energy savings and wider benefits - Art 4 (e)	yes	Latvia's Energy Long-Term Strategy 2030 defines the main energy policy goals, including improvement of the energy performance of public and residential buildings. As one of the policy performance indicators to be met, the Strategy 2030 envisages that by 2030 the average consumption of thermal energy for heating will be reduced by 50 %. Latvia must renovate 3% of State owned and used building areas each year, so that, by using EU Funds financing together with local government renovation, energy savings of 186 GWh over the 2014–2020 period will be achieved. No scenario analysis have been performed and wider benefit are only listed (i.e. improved health condition, Increased work productiveness, Improved of social conditions, Reduced load on the energy supply system).	3

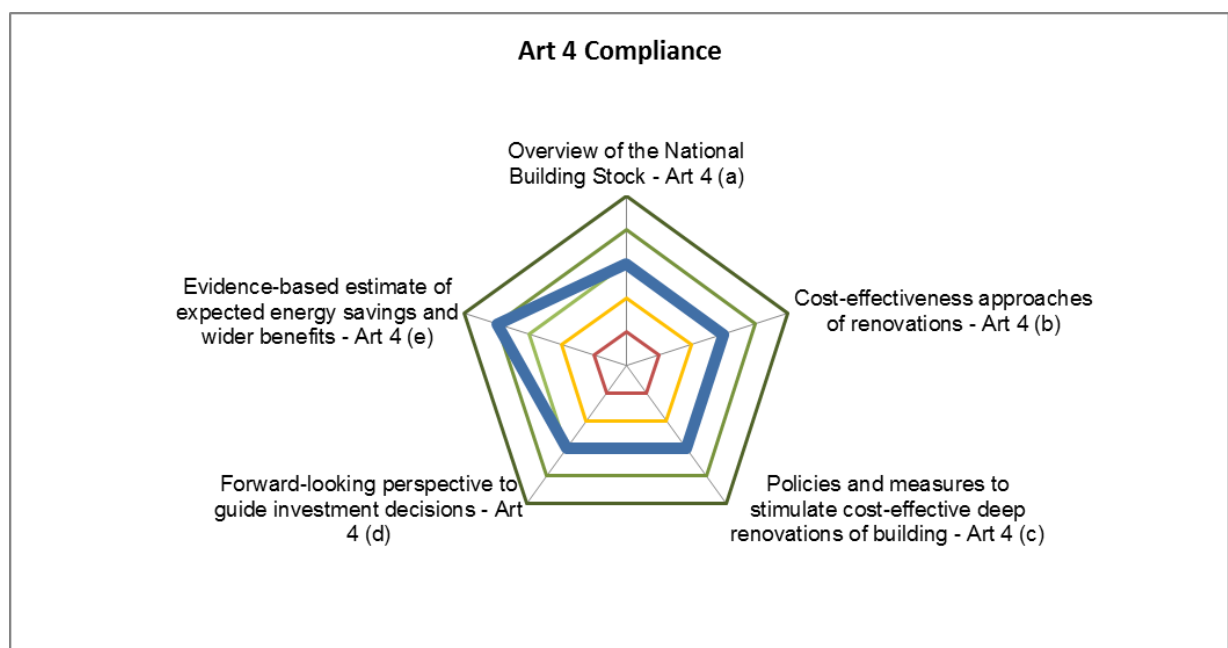
<b>Summary</b>	The Latvian building renovation strategy is comprehensive and detailed. It is structured exactly according to the EC guidelines. Latvia's Energy Long-Term Strategy 2030 defines the main energy policy goals and directions of action, including improvement of the energy performance of public and residential buildings. As one of the policy performance indicators to be met, "Latvian Strategy 2030" envisages that by 2030 the average consumption of thermal energy for heating will be reduced by 50 % against the current indicator, which is approximately 200 kWh/m <sup>2</sup> /year with climate correction (in 2009 – 202 kWh/m <sup>2</sup> ). The planned and existing set of measures is coherent with this target.
<b>Level of details</b>	For some of the strategy sections, i.e. Art4a, c and d, the level of details is commendable, for the others it should be improved.
<b>Level of ambitions</b>	The Strategy envisages that by 2030 the average consumption of thermal energy for heating will be reduced by 50 % against the current indicator, which is approximately 200 kWh/m <sup>2</sup> /year with climate correction (in 2009 – 202 kWh/m <sup>2</sup> ).
<b>Appropriateness</b>	The set of identified measures can bring to a relevant improvement of the existing building stock, but a scenario analysis to guide investment decisions has not been provided.
<b>Comprehensiveness</b>	Latvia put in place a comprehensive set of measures and has planned a several new policies to stimulate the energy efficiency improvement of the building stock.
<b>Strengths</b>	In depth analysis of the building stock
<b>Weaknesses</b>	A scenario analysis is missing
<b>Innovative approach</b>	Rotation fund financial scheme for renovation, and "Let's live warmer!" information campaign
<b>Recommendations</b>	A cost-effective analysis for the renovation of the existing building stock in Latvia shall be included in the strategy.



## LITHUANIA

Country	LITHUANIA		
Document Information	The Lithuanian long-term building renovation strategy was provided in July 2014 as a separate notification. It is available also in English.		
National Building Renovation Strategy (Art 4 EED) Introduction	The Lithuanian strategy provides an overview of the status of the building sectors, sets out the key national provisions and implementation guidelines up to 2020 and offers further guidance up to 2030. 7. The Strategy discusses investment planning and sources and structure of financing for the renovation of buildings and presents a broader evaluation of energy savings envisaged and direct and indirect benefits of the renovation of buildings.		
Overview of the National Building Stock - Art 4 (a)	yes	The analysis has been developed by the State enterprise Construction Products Certification Centre. The building stock of has been described with moderate detail, in terms of number/surface by construction period. However the heat consumptions are provided for only a certain group of buildings. For these, building structures and thermal systems are evaluated taking into account the purpose and the year of construction of the building (in a graphical form). Buildings are attributed to Classes A, B, C, D, E, F and G by their energy consumption. Some additional information are available about ownership and location.	3
Cost-effectiveness approaches of renovations - Art 4 (b)	yes	A "basic set of measures" has been identified to ensure the greatest energy savings with the minimum investments. It includes the insulation of the building envelope, the replacement of windows and entrance doors, and the renovation of the heat supply system. In accordance with case studies of renovated buildings, the application of measures included in the "basic set" usually achieves Class C of energy performance. The priority group of buildings for the renovation has been identified: it includes multi-apartment buildings, residential buildings for social groups, public buildings and special-purpose buildings built before 1993. To increase the ambition of the strategy. other renovation options (e.g. heat recovery strategies, RES, efficient lighting systems, etc.) should be considered.	3
Policies and measures to stimulate cost-effective deep renovations of building - Art 4 (c)	yes	In the strategy, the barriers to buildings renovation have been identified. To address these barriers a comprehensive set of regulatory and financial measures, mainly grants financed by EU structural funds, has been put in place. An Energy Efficiency law, transposing in the national legislation the EED provision for stimulating the energy efficiency improvement of the building stock.	3
Forward-looking perspective to guide investment decisions - Art 4 (d)	yes	An analysis of the financial sources available for building renovations is presented in the strategy. This includes an estimate of the total annual investment demand (but by 2020 only), a qualitative analysis of investment barriers and a list of possible finance source and mechanisms (i.e. EU structural and state funds, ESCO, lower loan interest rates).	3
Evidence-based estimate of expected energy savings and wider benefits - Art 4 (e)	yes	Benefits of building renovation have been identified for building owners, businesses and the state. Investments of LTL 1 836 billion in the renovation of public-sector and residential buildings will renovate a surface area of 2.5 million m2. It was estimated it will save at least 500 GWh of thermal energy. A scenario analysis of implementing basic set of measures has been considered. Wider benefits are listed: improved health condition, increased work productivity, improved of social conditions, reduced load on the energy supply system, greater energy security, reduced energy poverty and improved living conditions.	4

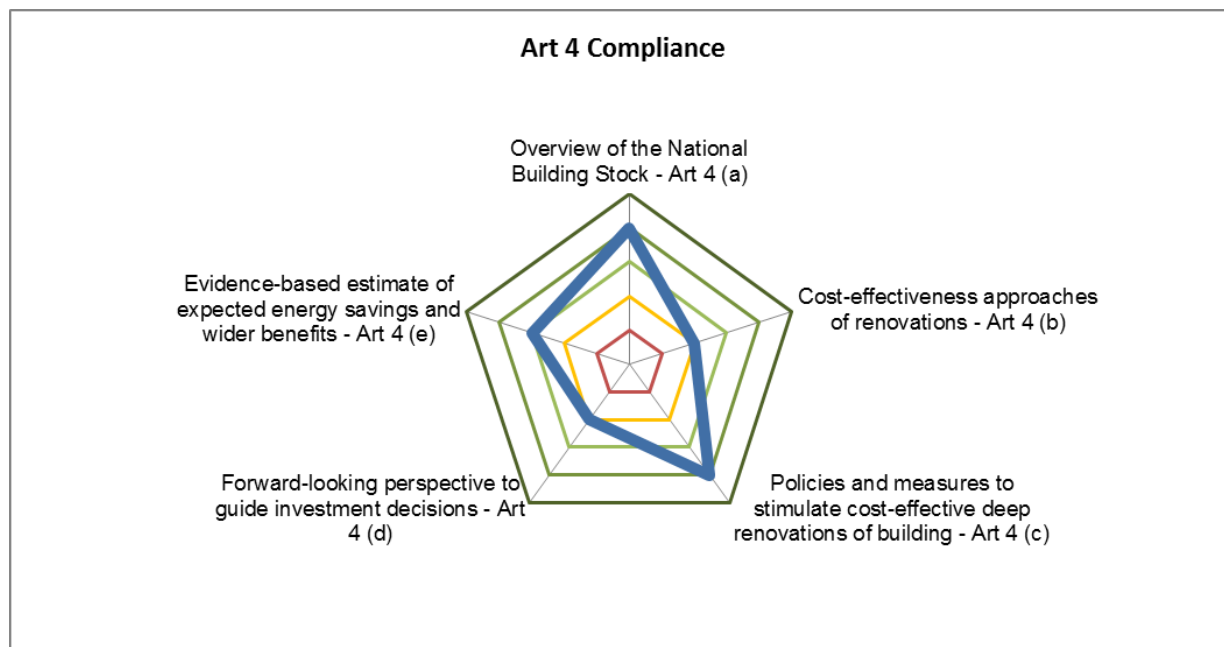
<b>Summary</b>	The Lithuanian building renovation strategy provided the required information and it is structured according to the EC guidelines. Lithuanian Energy Long-Term Strategy 2030 defines the main energy policy goals and directions of action, including improvement of the energy performance of public and residential buildings. As one of the policy performance indicators to be met, the Strategy 2030 envisages that by 2020 it will save at least 500 GWh of thermal energy (i.e., for space heating).
<b>Level of details</b>	The existing building stock is described with sufficient level of detail, but the heat consumptions are provided for only the labelled buildings (8% of the total).
<b>Level of ambitions</b>	The Strategy 2030 envisages that by 2020 it will save at least 500 GWh of thermal energy (i.e., for space heating).
<b>Appropriateness</b>	The policy measures appears appropriate to the objective described in the strategy
<b>Comprehensiveness</b>	The presented initiatives cover several scopes (regulatory, financial, information/training and labelling).
<b>Strengths</b>	A scenario analysis of implementing basic set of measures has been developed.
<b>Weaknesses</b>	Analysis of the building stock could be more detailed as energy consumption is provided for 45000 buildings that represent 5% of total building stock
<b>Innovative approach</b>	n/a
<b>Recommendations</b>	More renovation options (e.g. heat recovery strategies, RES, efficient lighting systems, etc.) should be considered, within the cost-effective analysis. More indications about the implementation (in particular the expected impacts) of the implemented and planned measures should be provided.



## LUXEMBURG

Country	LUXEMBURG		
Document Information	The Luxemburg strategy has been provided as an annex to the NEEAP in December 2014. The document is available in German.		
National Building Renovation Strategy (Art 4 EED) Introduction	The building renovation strategy provides an overview of the actual status related to energy renovation of buildings in Luxembourg, overview of the national building stock and description of the energy characteristic of buildings as well as policy and financial measures for implementation of EE renovation.		
Overview of the National Building Stock - Art 4 (a)	yes	Luxemburg provided a well detailed and comprehensive overview of the national building stock. It uses official data from the statistic office of Luxemburg (Census 2011) as well as from the Government of Luxemburg. The data presented in the report are a small selection of the data available. The residential and non residential buildings are treated separately for conceptual and data reasons. The approach is correct and the segmentation appropriate. Since the Luxemburg is a small country, there is no need to define different climatic zones.	4
Cost-effectiveness approaches of renovations - Art 4 (b)	partly	The strategy does not includes a cost-effective analysis for the renovation of the existing building stock in Luxemburg. However in the strategy was mentioned that the cost effective analysis has been provided in a separate report for calculation of cost-optimal levels of minimal requirements for EE for new and existing residential and non-residential buildings. This report considers different scenarios for renovation, taking in account all parameters (micro and macro economic, primary energy demand of different types of buildings, assumption on energy prices, building types, etc.).	2
Policies and measures to stimulate cost-effective deep renovations of building - Art 4 (c)	yes	In Luxemburg strategy, a comprehensive set of measures to increase the quantity and quality of building renovations is described. This includes both financial and regulatory measures (already in place or planned). Moreover, a very detailed overview of the training and educational programmes for energy auditors and energy advisors is provided. Among the financial measures, it is worth mentioning the "PRIME House Programme" for financing EE measures in buildings in private households and municipalities. Legislative and financial barrier to building renovations are well identified together with some indications on how future policy actions should target them. On the other hand, more details on future policies and a clearer picture of the strategy in the long term is missing.	4
Forward-looking perspective to guide investment decisions - Art 4 (d)	partly	The report does not provide any scenarios to guide investment decisions neither for the residential nor for the non-residential sector. It is only given a general overview on the barriers to investments and planned measures to overcome them.	2
Evidence-based estimate of expected energy savings and wider benefits - Art 4 (e)	yes	The Luxemburg recognize the potential for energy savings in existing buildings. The strategy of Luxemburg includes two measures for EE renovation of residential and non-residential buildings. Estimated energy savings from these measure contribute with around 7% to the estimated total energy savings and 7.5% to total reduction of CO2 emission in final consumption in 2020 (excluded savings from obligation schemas). The strategy does not provide any other information or calculation of the benefits (employment, health, energy security).	3

<b>Summary</b>	The Luxemburg building renovation strategy provides a comprehensive and detailed technical appraisal of the building stock. In the strategy is given an good overview of the national polices and financial mechanisms for EE renovation of the buildings. In addition the report contains analyses of the existing barriers related to legislation and financial issues as well as some planned measures to overcome identified barriers. In addition was mentioned the Ministry of Economy in cooperation with myenergy will consider implementation of the national initiative for energy renovation of buildings. The strategy shall be enhancement in the framework of this initiative.
<b>Level of details</b>	The strategy offers a sufficiently high level of details in the description of the building stock, as well as on the policies and financial recourses for founding building renovation. Little information is available in the remaining sections, especially on the cost-effectiveness approaches.
<b>Level of ambitions</b>	A clear target for the renovation of the existing building stock is not indicated.
<b>Appropriateness</b>	The measures and policies designed for the strategy are appropriate and suitable to reach the goals established
<b>Comprehensiveness</b>	Luxemburg has in place a set of measures for the building sector, however, more details on future policies and a clearer picture of the strategy in the long term is missing.
<b>Strengths</b>	Very detailed analyses of the building stock. Good overview of the national information and training programmes.
<b>Weaknesses</b>	The strategy does not include cost effective approach as well as analyses of the benefits resulted with implementation of the strategy.
<b>Innovative approach</b>	n/a
<b>Recommendations</b>	The appropriate results of the cost effective analysis carried out by Luxemburg should be integrated in the renovation strategy. Scenarios to guide investment decisions for the residential and non-residential sector should be developed.

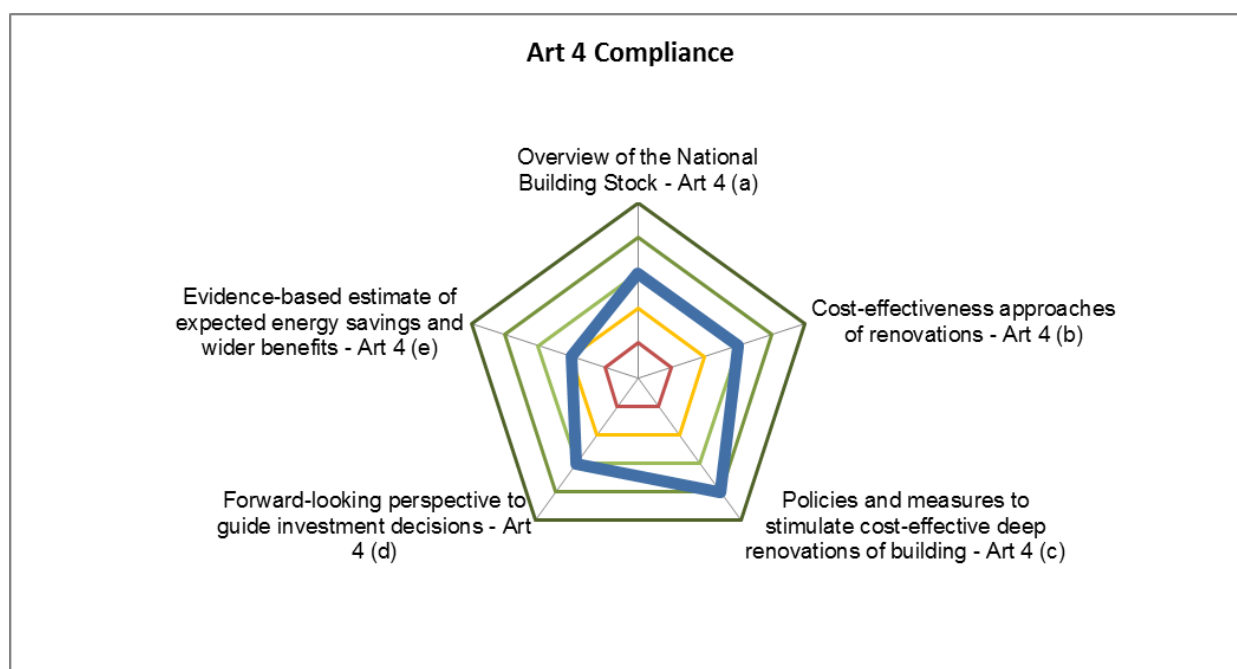




## MALTA

<b>Country</b>	<b>MALTA</b>		
<b>Document Information</b>	The Maltese strategy has been provided in April 2014 with the document "Malta's Long-Term Strategy for Mobilising Investment in the Renovation of the National Stock of Residential and Commercial Buildings".		
<b>National Building Renovation Strategy (Art 4 EED) Introduction</b>	The strategy encompasses an overview of the national building stock, it identifies cost-effective approaches to renovations, policies and measures to stimulate such renovations and provides a forward-looking perspective to guide investment decisions in the sector. Furthermore the report gives a qualitative evidence-based estimate of expected energy savings and wider benefits. The document focuses specifically on single-family houses of different types, apartment blocks/multi-family buildings, and office buildings. In order to encompass a holistic strategy towards the energy performance of buildings in Malta, the report was structured in such a way as to represent an ongoing working document which shall be reviewed every three years.		
<b>Overview of the National Building Stock - Art 4 (a)</b>	yes	The report gives a quite clear picture of the particular attributes of the Maltese buildings, but the data provided are not very detailed (especially for other non-residential categories). The overview describes the method of construction, energy consumption patterns and limitations of the local building sector, based on the Census data of 2011. Some additional information are available in the NEEAP 2014 (Cap. 5.2).	3
<b>Cost-effectiveness approaches of renovations - Art 4 (b)</b>	yes	The report is based on the studies 'Cost-optimal energy performance levels in new and existing residential buildings in Malta' and 'Cost-optimal energy performance levels in new and existing office buildings in Malta' (issued in 2014) and the calculations have been performed as per methodologies established in Malta for energy performance rating/certification of buildings. They are based on 14 residential and 9 office types characterised by primary energy consumptions, but not described in detail. The results provided are consistent with the Maltese context.	3
<b>Policies and measures to stimulate cost-effective deep renovations of building - Art 4 (c)</b>	yes	The main existing barriers are discussed and 21 policy measures are identified. The Maltese government has been promoting energy efficiency and green energy for the last decade. Two of the most successful campaigns where the energy rating of household appliances and the replacement of incandescent light bulbs. To improve the building envelope, the new proposed measures will be specifically targeted and set on measures highlighted by the cost-optimal studies. This shall be done primarily by implementing financial incentives and grants, progressive electricity tariffs and soft loans.	4
<b>Forward-looking perspective to guide investment decisions - Art 4 (d)</b>	yes	The document presents a series of financial support actions were already taken by Government and local private banks to support residential buildings and SMEs. Plans are also being established to set up various financing schemes (which will include financing from EU Structural and Cohesion Funds and schemes from domestic banks leveraging market finance through public funds) for energy efficiency developments in buildings.	3
<b>Evidence-based estimate of expected energy savings and wider benefits - Art 4 (e)</b>	partly	The potential benefits are listed but not quantified.	2

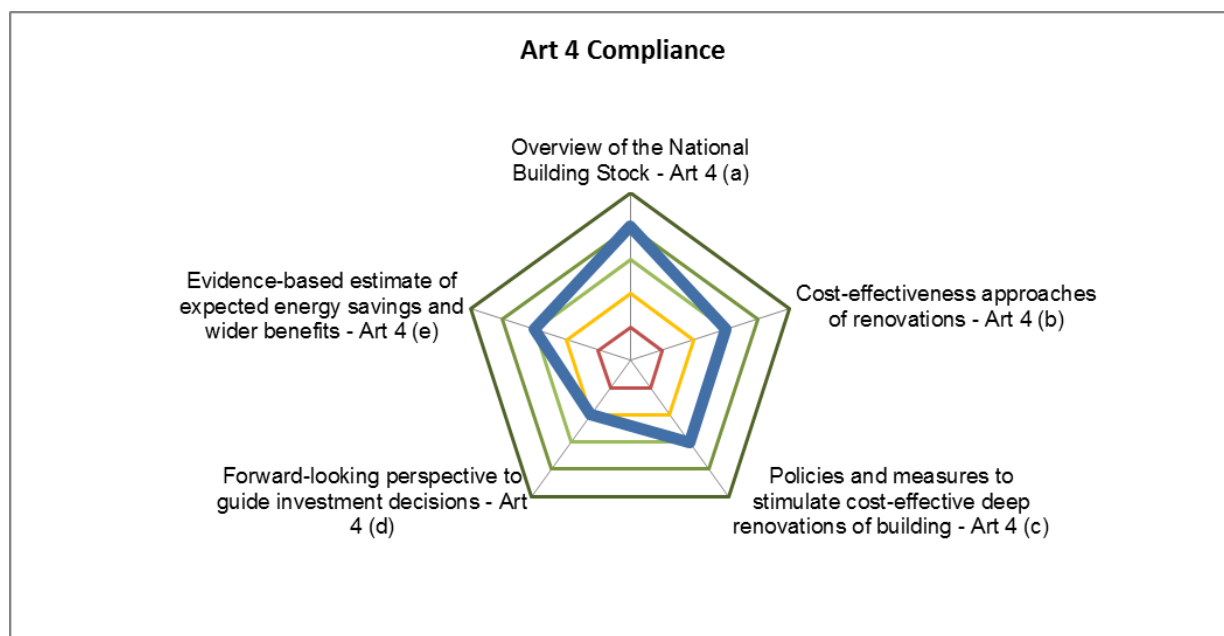
<b>Summary</b>	Malta provided a renovation strategy that covers points a-d of Article 4, while the evidence-based estimate of expected benefits (point e) is outlined in a qualitative way. In general the level of detail is adequate and the identified measures appear appropriate and comprehensive.
<b>Level of details</b>	The level of details reported for the building stock (especially for non-residential categories) is low. Overall, the level of detail is not satisfactory for the overall strategy (lacks of quantification of benefits, methodologies).
<b>Level of ambitions</b>	The obtained cost-optimal levels seem coherent with the national context, but they should be better described and the total energy saving target should be explicitly defined.
<b>Appropriateness</b>	The set of identified measures can push the stock building towards a significant improvement, but a quantitative assessment of his impact is not provided.
<b>Comprehensiveness</b>	The policy measures cover a wide spectrum of policy areas: economic and financial, legislative and administrative, labelling, educational and training, pilot projects.
<b>Strengths</b>	The comprehensiveness of the identified measures and the analysis of the main barriers.
<b>Weaknesses</b>	Lack of a quantitative assessment of the expected benefits.
<b>Innovative approach</b>	Policy measures aimed at overcoming very specific barriers to the RES penetration.
<b>Recommendations</b>	<ul style="list-style-type: none"> <li>- Extend the analysis to the other building categories.</li> <li>- Define explicit energy saving targets up to 2050.</li> <li>- Estimate the benefits in a evidence-based way.</li> </ul>



## NETHERLANDS

Country	NETHERLANDS		
<b>Document Information</b>	The Dutch strategy for building energy renovation was provided as part of the NEEAP in June 2014. The document is available in English, while the four key background documents referenced in the strategy are available only in Dutch.		
<b>National Building Renovation Strategy (Art 4 EED) Introduction</b>	The Dutch building renovation strategy is developed in the framework of the Energy Agreement for Sustainable Growth, published in September 2013, aimed at achieving 80-95% reduction in CO2 emissions by 2050, and at least a 40% CO2 reduction in 2030. The Energy Agreement set the following goals for existing buildings: - 300,000 existing buildings per year to improve by at least two energy label steps; - Average social rental property to achieve label B, while 80% of private rental to achieve minimum label C in 2020; - At least an average energy label A for buildings in 2030.		
<b>Overview of the National Building Stock - Art 4 (a)</b>	yes	The strategy document provides basic aggregate figures on the total number of residential buildings; the (estimated) number of dwellings in each energy class (showing an important improvement over time), average electricity and gas consumption over the period 2004-2010. Only non residential buildings are divided by typology and gas and electricity consumption are calculated by sector/type of building. More detailed information are provided in two background papers, cited in the strategy ("Energiebesparing: Een samenspel van woning en bewoner" and "Verbetering referentiebeeld utiliteitssector" by ECN and RIGO). They include also additional interesting data about the penetration of energy-saving measures, energy behaviours and investing in energy efficiency.	4
<b>Cost-effectiveness approaches of renovations - Art 4 (b)</b>	yes	"Cost-effectiveness" is not covered in the Dutch renovation strategy main document. Nevertheless, references are made to other sources ("Energiebesparing: Een samenspel van woning en bewoner" and "Verbetering referentiebeeld utiliteitssector" by ECN and RIGO), where quite detailed analyses of saving potentials are included.	3
<b>Policies and measures to stimulate cost-effective deep renovations of building Art 4 (c)</b>	yes	In the Dutch strategy a coherent set of measures and initiatives is described. However details are not always sufficiently reported especially on the implementation status and the actors involved. Measures cover also social housing and includes an exemplary role of the Government. The main approach is based on a limited monetary intervention by the government, as citizens and business are considered to have sufficient incentives to undertake building renovation, when awareness on the benefits and a favourable environment for private investments is created.	3
<b>Forward-looking perspective to guide investment decisions - Art 4 (d)</b>	partly	Within the overarching document no information, quantification and/or discussion is provided about this section. However the background document "Het Energieakkoord: Wat gaat het betekenen?" ("The Energy Agreement: what will it mean?", by ECN) includes an overview on the energy efficiency measures in the built environment and on investments up to 2020. This can be considered as a starting point, that should be improved (also with a scenario analysis) to define a comprehensive forward-looking perspective to guide investment decisions to 2050.	2
<b>Evidence-based estimate of expected energy savings and wider benefits - Art 4 (e)</b>	yes	The strategy calculates that, if all dwellings were to be improved to an A rating, primary savings of 197 PJ/a would be achieved, representing a 39% reduction compared to 2011 consumption levels. For the non-residential sector, the technical saving potential for gas is 67 PJ/a, and for electricity is 29 PJ/a. On wider benefits, the Energy Agreement, identifies the job creation potential and hence economic impact of investing in energy saving. The background document "Achtergronddocument bij doorrekening SER Energieakkoord - sector Gebouwde omgeving" (ECN) provides more details about the impact of planned measures.	3

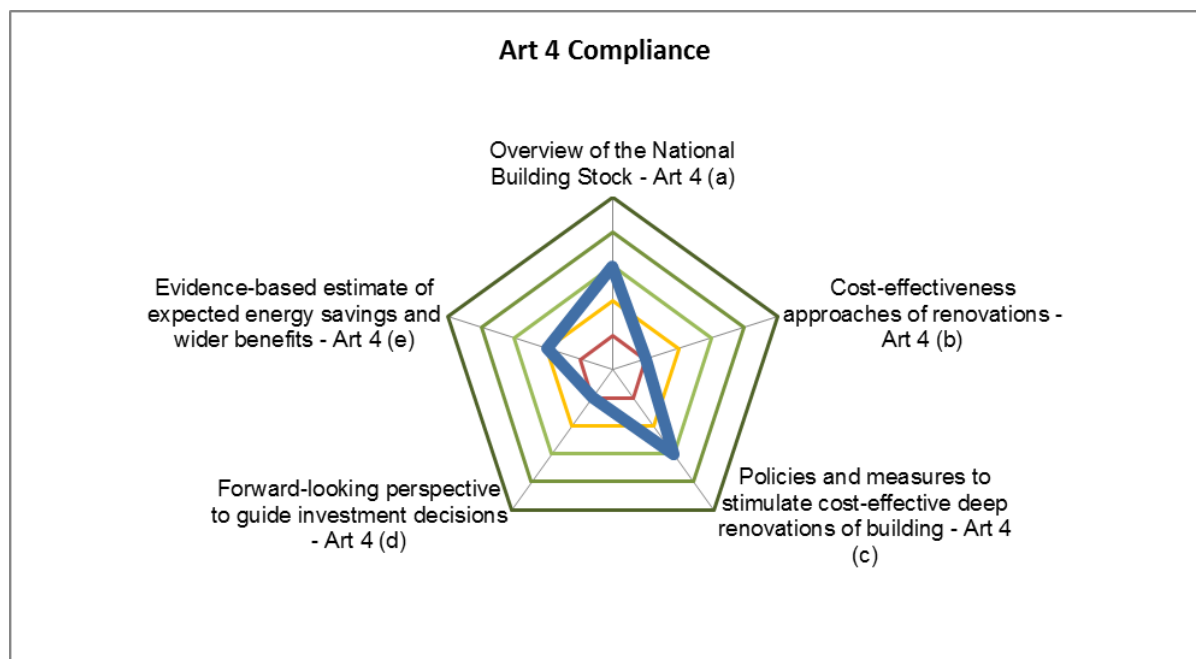
<b>Summary</b>	<p>The document provides an overview of the strategy and it put it in the framework of a larger national strategy for sustainable growth. Three key policy areas for intervention are identified: informing and raising awareness; facilitating/removing barriers; and financial incentives, while the latter is seen less important. The benefits from energy renovation are not only seen as 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 planned, and in some case already implemented, a number of approaches that are quite innovative and potentially appropriate to stimulate improvements in building energy performance.</p> <p>In terms of Article 4 requirements, the Dutch strategy covers the five requirements only in conjunction with the quoted background documents. In order to be considered fully compliant, it would be necessary to extract the relevant conclusions of the technical analysis in these background documents and include them in a summary in the overarching document. Moreover the forward-looking perspective section should be improved.</p>
<b>Level of details</b>	Considering the referenced four key background documents, the strategy provides a sufficient level of detail.
<b>Level of ambitions</b>	The strategy has relatively ambitious goals.
<b>Appropriateness</b>	The policy initiatives appears in line with the objective described in the strategy
<b>Comprehensiveness</b>	The policy package put in place is comprehensive and include all actors (including energy and construction companies, citizens, municipalities).
<b>Strengths</b>	Innovative approach to policy initiatives with less impact on public budget
<b>Weaknesses</b>	The Forward-looking perspective section in the strategy needs to be improved
<b>Innovative approach</b>	The initiative "Energiesprong"
<b>Recommendations</b>	It is recommended to extract the relevant conclusions of the technical analysis in the referenced background documents and include them in a summary in the overarching document. Moreover the forward-looking perspective section should be improved.



## POLAND

Country	POLAND		
<b>Document Information</b>	The Polish strategy has been provided as an Annex of NEEAP 2014 (Annex 4), in October 2014. The document is available in English.		
<b>National Building Renovation Strategy (Art 4 EED) Introduction</b>	The strategy is structured according to the key elements listed in EED Art. 4 and has been developed by the Ministry of Economy. It provides a good overview of the national building stock, mainly based on 2011 National General Population and Housing Census data, and a description of the national policies and financial mechanisms supporting building renovations in the country.		
<b>Overview of the National Building Stock - Art 4 (a)</b>	yes	The Polish building stock overview is mainly based on the 2011 National General Population and Housing Census. The building stock is described in terms of type, energy consumption (including energy carrier), age of buildings, ownership with more details on the residential sector. The "renovation gap", i.e. renovation requirements not covered, for different categories of residential buildings (i.e. cooperative housing stocks, municipal and private-owned buildings) is provided. About the non-residential sector, some important data (i.e. total number of buildings and the age bands) are missing.	3
<b>Cost-effectiveness approaches of renovations - Art 4 (b)</b>	no	No cost-effective approaches to renovations have been presented. Only a list of possible good practice renovation interventions is provided (i.e. improve thermal insulation and heating systems), together with a list of packages of best practice renovation intervention, per 3 different typology of buildings (i.e. individual residential buildings, multi-apartment residential buildings, public utility buildings). No cost optimal analysis is provided. Whether deep renovations should be undertaken as a single package, or staged over a period of time is not indicated.	1
<b>Policies and measures to stimulate cost-effective deep renovations of building - Art 4 (c)</b>	yes	In the Polish strategy a comprehensive set of measures is described. Three types of policy measures are listed as measures expected to stimulate renovations: (1) legislative measures (mainly EPBD-related measures such as min EP levels, (2) financial incentives such as grant schemes for building renovation (i.e. Thermomodernisation and Repair Fund) funded by the State budget and by EU structural funds, (3) information and education programmes (i.e. Ecological education programme). A National Research and Development project related to energy efficiency in buildings is also mentioned. A brief and not very detailed analysis of renovation existing barriers is provided.	3
<b>Forward-looking perspective to guide investment decisions - Art 4 (d)</b>	no	The strategy provides only a short qualitative assessment of the main financial barriers to investments (i.e. high cost of deep renovation upfront investment, simplification of administrative procedures to access to the national grants, lack of expertise). A clear indication on future investments requirement is missing.	1
<b>Evidence-based estimate of expected energy savings and wider benefits - Art 4 (e)</b>	partly	A broad overview of the potential benefits that renovation of buildings can deliver has been provided. The following benefits have been listed: energy savings (with an estimate of the primary energy demand reduction for 3 building types), creation of jobs, better comfort, economic growth. No scenario analysis has been provided.	2

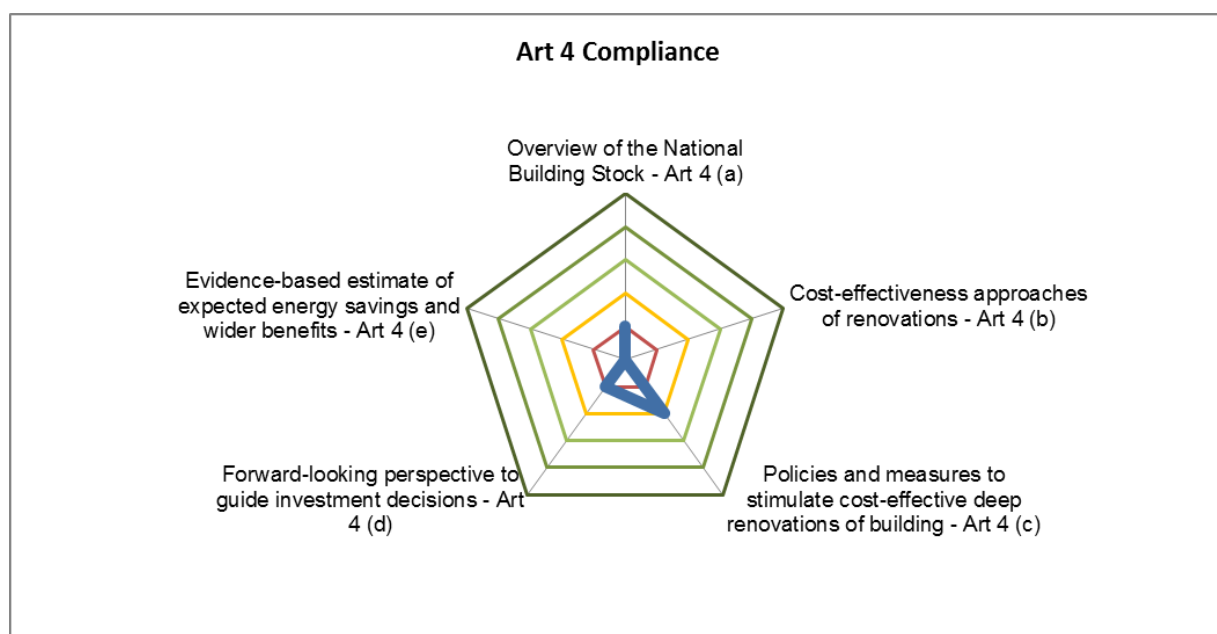
<b>Summary</b>	Poland provided a renovation strategy that covers only some of the requirements of Article 4 (Art. 4a and 4c), and need to be improved for Art.4b, 4d and 4e aspects. The lack of basic information, namely the identification of cost-effective approaches to renovation, a forward-looking perspective to guide investment and a not detailed quantification of benefits, translates into an overall non compliance with Article 4 requirements.
<b>Level of details</b>	Overall, the existing building stock is discussed with a good level of detail, but more data on the non-residential sector should be included in the report. Moreover, more details are needed on the quantification of benefits at society level, beyond expected energy savings.
<b>Level of ambitions</b>	The overall targets of the Polish strategy are not well identified. The Ministry of Infrastructure and Development is preparing a National Plan aimed at increasing the number of low energy consumption buildings, but no information are provided on this plan.
<b>Appropriateness</b>	The policy measures already implemented, mainly related to grant support, are appropriate and significant, but a quantitative assessment of their impact is not provided. Moreover, no new measures, addressing the identified barriers, have been put in place
<b>Comprehensiveness</b>	The described measures cover a wide spectrum of policy areas: financial, legislative , educational and R&D.
<b>Strengths</b>	Good use of grant schemes (using also already secured EU structural funds) for financing building renovation projects.
<b>Weaknesses</b>	lack of a cost-effectiveness and benefit calculation exercise and of scenario analysis
<b>Innovative approach</b>	n/a
<b>Recommendations</b>	Improve the analysis of the non-residential stock; Include a cost-effectiveness analysis; Include a scenario analysis of different policy options; Quantify the social and environmental benefits of the strategy.



## PORTUGAL

Country	PORTUGAL		
Document Information	The Portuguese strategy was delivered in August 2014 as a stand-alone document. It is available in Portuguese only.		
National Building Renovation Strategy (Art 4 EED) Introduction	The strategy follows the proposed structure in Art. 4 of the EED and outlines the national policies regarding the energy efficiency of buildings. It presents a basic overview of the national building stock with a few details (percentage distribution of buildings typologies, a demographic distribution and a historic timeline from 2000 to 2012 of the number of new constructions or renovations). The document also includes an analysis of energy consumption in buildings in comparison with other Member States and the technical specifications for new buildings and large renovations as outlined in recent (2013) legislation.		
Overview of the National Building Stock - Art 4 (a)	no	The overview of the Portuguese building stock presented in the National Strategy is very qualitative and does not provide much relevant information. It is presented a table with the statistics from 2000 to 2012 regarding the number of construction works (new and others) in buildings, but without an indication of the overall number of existing buildings in the territory. There is also no indication of the breakdown of different categories of buildings, the age bands or the number of buildings per energy class, besides an information on the distribution percentage of the different uses of non-residential buildings. About climate, there are presented 6 zones: 3 for winter conditions and 3 for summer conditions.	1
Cost-effectiveness approaches of renovations - Art 4 (b)	no	No cost-effective approaches to renovations have been presented. Only very general considerations regarding legislative initiatives to unlock potential barriers for the renovation of buildings and general initiatives regarding investment support are presented.	0
Policies and measures to stimulate cost-effective deep renovations of building - Art 4 (c)	partly	The Portuguese renovation strategy does not contain an analysis of barriers or give an sufficient appraisal of relevant policies used elsewhere and consequently does not provide new a policy pathway in order to overcome the barriers in order to achieve the desired national building renovation. The measures presented in the strategy are directly extracted from the NEEAP. There are also presented measures regarding the efficiency of equipment, which do not aim for the renovation of buildings by themselves, but for the energy consumed in buildings and should probably not be presented in the document.	2
Forward-looking perspective to guide investment decisions - Art 4 (d)	no	The Portuguese strategy for the renovation of buildings does not quantify the total annual investment requirements and only in the NEEAP are identified possible sources of funding for building energy renovation. The barriers for investment are also not identified.	1
Evidence-based estimate of expected energy savings and wider benefits - Art 4 (e)	no	The Portuguese building renovation strategy does not address an evidence-based estimate of expected energy savings and wider benefits.	0

<b>Summary</b>	The Portuguese building renovation strategy presented does not address the majority of the mandatory elements presented in the Art.4 of the EED and in the Commission's guidance notes. The national building stock description does not cover the entire panorama of the building stock in Portugal and only aggregate data are provided. The measures presented in the report are the same as the ones presented in the NEEAP and are mainly driven by the transposition of the EPBD and consequent measures identified by the process of the buildings' certification. There are also presented measures that should not be taken into consideration in this document since these relate to the energy efficiency of equipment. In the report references to funding mechanisms without much detail are made. It was needed to access the Portuguese NEEAP for some more detail on the funding mechanisms available that may be suited for hosting the measures related to the renovation of the building stock, and even in the NEEAP this information is scarce and unclear. Cost-effective approaches and the identification of the barriers towards the renovation of the building stock, are missing in the strategy.
<b>Level of details</b>	Very low level of detail or inexistent data, not complying with the mandatory elements outlined in the guidance notes.
<b>Level of ambitions</b>	Since the majority of savings are related to the transposition of the EPBD, the level of ambition is low.
<b>Appropriateness</b>	No new measures have been put in place. The existing initiatives could be not enough for an effective building renovation strategy.
<b>Comprehensiveness</b>	The measures outlined in the strategy are divided in three main areas which are also described in the NEEAP. The main measures in these programmes relate to the promotion of more efficient equipment, efficient lighting, glazing and insulation; certification under minimum energy efficiency classification of new and renovated buildings; and the promotion of solar heating for the residential and services sectors.
<b>Strengths</b>	The presentation of the energy savings for the measures proposed and the up-to-date status of achievement of such targets
<b>Weaknesses</b>	Very low detail and non-compliance of the minimum elements to be present in the report.
<b>Innovative approach</b>	All the measures proposed are business as usual and do not present an innovative approach
<b>Recommendations</b>	Improve the description of the building stock with disaggregated data and identify priorities for intervention. A section of cost effectiveness approaches should also be included.

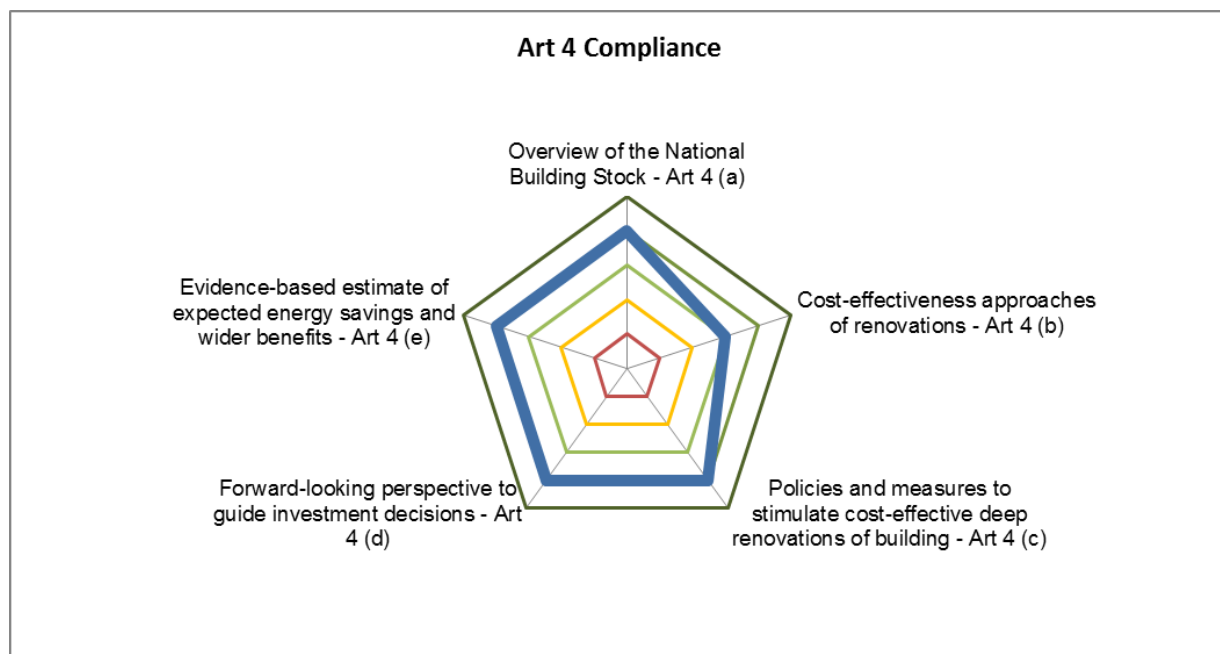




## ROMANIA

Country	ROMANIA		
<b>Document Information</b>	The Romanian strategy has been provided as a stand alone document in April 2014. The document has been submitted only in Romanian.		
<b>National Building Renovation Strategy (Art 4 EED) Introduction</b>	The strategy has been developed by the Ministry of Regional Development and Public Administration following a consultation process with various stakeholders.		
<b>Overview of the National Building Stock - Art 4 (a)</b>	yes	The data has been retrieved from several sources: National Institute for Statistics, National Institute for R&D in Construction, Urban Planning and Sustainable Spatial Development, BPIE data and projects, ENTRANZE project, 2nd Romanian NEEAP, 2002-2011 census data and Eurostat energy data. The national building stock is presented with a satisfactory level of detail. An analysis of the prevalence of each type of energy carrier, of the CO2 emissions related to the building sector and a comparative overview of the energy market have been provided. No climatic zones have been identified and the tenure for the building stock has not been analysed although it could influence the energy consumption. Although the analysis enables targeted intervention it would have benefitted from a better structuring.	4
<b>Cost-effectiveness approaches of renovations - Art 4 (b)</b>	yes	In the Romanian strategy different EE and RES solutions are listed, without pinpointing detailed set of measures for any of the identified categories of buildings. However, the approach to cost-effectiveness taken is to consider packages of renovation activity which change over time, in order to make more attractive the deep renovations. The opportunity to further develop the existing district heating systems has been analysed. Prioritization and planning are either not defined or not sufficiently explained.	3
<b>Policies and measures to stimulate cost-effective deep renovations of building - Art 4 (c)</b>	yes	In Romania, several measures are already in place at regulatory and financial level. An analysis of the existing barriers has been conducted and a significant number of policies has been proposed to address them. However, for some of the individual policies, more details would have been welcomed. Moreover a scenario analysis of three possible sets of policy-packages to be implemented in the period 2020-2030 is presented.	4
<b>Forward-looking perspective to guide investment decisions - Art 4 (d)</b>	yes	In the Romanian strategy a detailed scenario analysis is provided: investment requirements are determined for different sets of policy-packages using two assumptions for the energy price evolution. A detailed description of the role that EU structural fund can play in the context of renovation investments is provided. However a similar exercise could have been done for other funding opportunities identified.	4
<b>Evidence-based estimate of expected energy savings and wider benefits - Art 4 (e)</b>	yes	Four renovation scenarios have been analysed in terms of energy savings, employment and emission reduction implications. Individual and societal benefits have been identified as well. Approximated value for some of the identified benefits has been provided, the total is indicated to be almost five times (multiplication value of 4.6) the value of the energy cost savings.	4

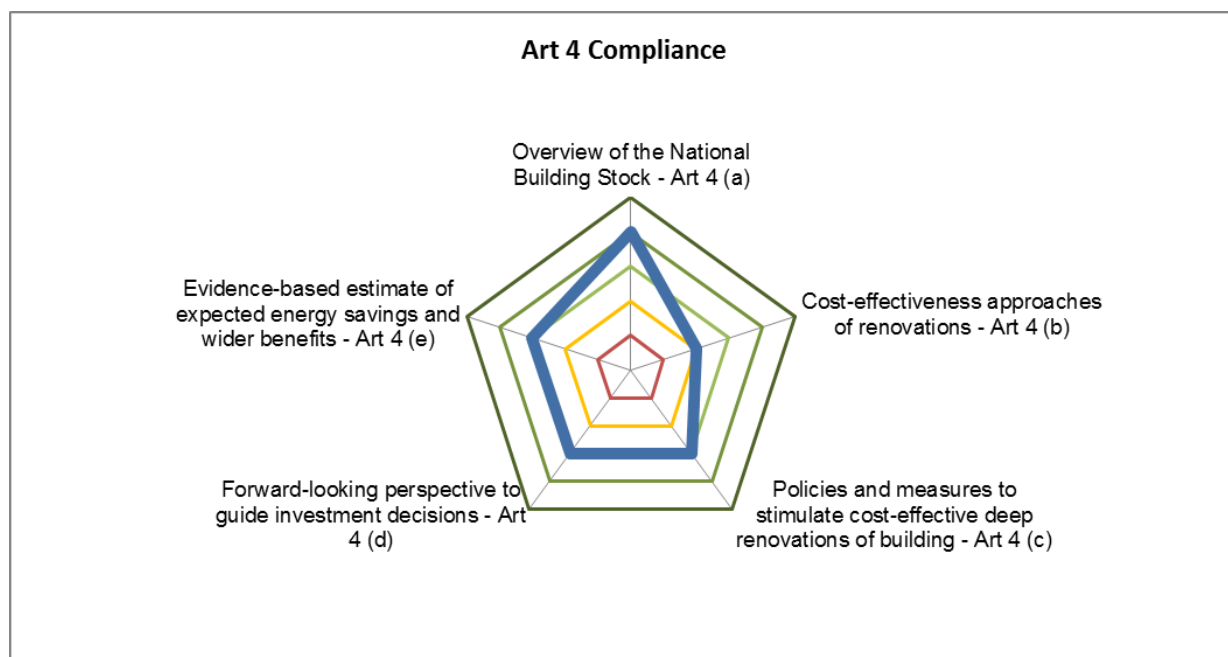
<b>Summary</b>	<p>The Romanian strategy covers the essential requirements of Art.4 of the EED, even if not structured according to the Commission's guidance.</p> <p>The document provides a satisfactory overview of the building stock but it fails to present adequately the technical EE and RES opportunities for each building category. A cost-benefit analysis is used to quantify the economic/ social benefits that arise from undergoing EE improvements in the building sector.</p> <p>While mentioning the policies that will be the focus of the next three years, an extensive list is proposed to address the several barriers identified. Three policy-packages are evaluated from different perspectives, including investment requirements.</p>
<b>Level of details</b>	<p>A major part of the strategy is detailed enough. However, the chapters on the national building stock and the technical opportunities relevant to renovation could have both benefitted from a more detailed presentation.</p> <p>Data sources and the applied methodologies are decently described. Further details on the underlining assumptions would have been beneficial.</p>
<b>Level of ambitions</b>	<p>Prioritization and planning are either not defined or not sufficiently explained. Therefore the level of ambitions is either not transparent or inadequate for a national strategy.</p>
<b>Appropriateness</b>	<p>The policies and measures proposed are appropriate and suitable for the barriers identified and should be compatible also with a high level of ambitions.</p>
<b>Comprehensiveness</b>	<p>The existing measures and policies are not enough for an effective building renovation campaign. However, with the newly-proposed packages, and maybe further analysis regarding the technical opportunities for each building category, the strategy has the potential of addressing all obstacles and unlocking the EE improvement potential of the building sector in Romania.</p>
<b>Strengths</b>	<p>Well defined set of policies and measures that address all identified barriers. Well presented estimation of the benefits to be accrued from building renovation activities.</p>
<b>Weaknesses</b>	<p>Lack of further analysis of the EE and RES technical opportunities in the building sector. A not so detailed presentation of the existing building stock. A not so good structuring of the document.</p>
<b>Innovative approach</b>	n/a
<b>Recommendations</b>	<p>Identifying technical opportunities for retrofit of energy efficiency measures for each building category within the national strategy would offer a good starting point for the authorities that will be in charge of the regional/ local implementation of the strategy and the young Romanian ESCO market that will be involved in the technical implementation of the identified activities.</p> <p>A more detailed implementation timeline should be provided.</p>



## SLOVAKIA

<b>Country</b>	<b>SLOVAKIA</b>		
<b>Document Information</b>	The Slovakian strategy has been provided as a stand alone document in July 2014. The document is available in English, but the annexes are only in Slovakian.		
<b>National Building Renovation Strategy (Art 4 EED) Introduction</b>	The Slovakian strategy is primarily intended to show that investments have been activated (mobilised) in the renovation of the privately and publicly owned national stock of residential and non-residential buildings based on an overview of such stock, the identification of cost-effective approaches to the renovation of such buildings, and the climatic area, with comments on measures for the support of the cost-effective major (deep) renovation of buildings.		
<b>Overview of the National Building Stock - Art 4 (a)</b>	yes	Slovakia provided a detailed overview of the national building stock. It uses official data from two sources (2000 Ministry of Construction and Public Works and 2011 Census). The residential sector is described in 2 segments: the single and the multi family buildings (predominantly panel blocks) as this latter stock represents a huge share in the overall building stock. The approach is correct and the segmentation appropriate as the available energy related data for the multi-family buildings are much more detailed. More details on climatic zones, energy consumption data would have been needed. The few Energy Consumption values given should be better verified. The ownership, urban-non urban and tenure data are missing.	4
<b>Cost-effectiveness approaches of renovations - Art 4 (b)</b>	partly	The strategy provides an overview of the results achieved applying the cost-optimal calculation (EPBD). It is mentioned that 11 reference buildings and from 5 to 12 packages/variants of measures have been considered, but the figures provided in the Annexes V and VII are not enough detailed to understand which packages of measures (that can generate a large amount of energy savings) have been identified for the different building types. This issue should be better linked to the other section of the strategy.	2
<b>Policies and measures to stimulate cost-effective deep renovations of building - Art 4 (c)</b>	yes	In the Slovakian strategy, policies and measures, put in place, both legislative and financial, to stimulate energy efficient renovation of buildings are well described. An analysis of the existing barriers has been conducted and a list of new measures, mainly financed by EU structural funds, have been identified.	3
<b>Forward-looking perspective to guide investment decisions Art 4 (d)</b>	yes	The investment needs for the various segments of the building stock (separately for the public, multi-family and single family houses) are partially identified in the report. Quite many potential investment sources are listed as well from EU, national public and private sources. However the adequateness of these sources and the existing gaps are only partially identified.	3
<b>Evidence-based estimate of expected energy savings and wider benefits - Art 4 (e)</b>	yes	The expected energy savings per measures in the period 2015-20130 have been quantified in detail (cfr. Annex VIII). Nevertheless, the benefit estimates are solely based on the energy savings. Neither the societal, nor the employment, health and energy security benefits are calculated. A scenario analysis is not included in the strategy.	3

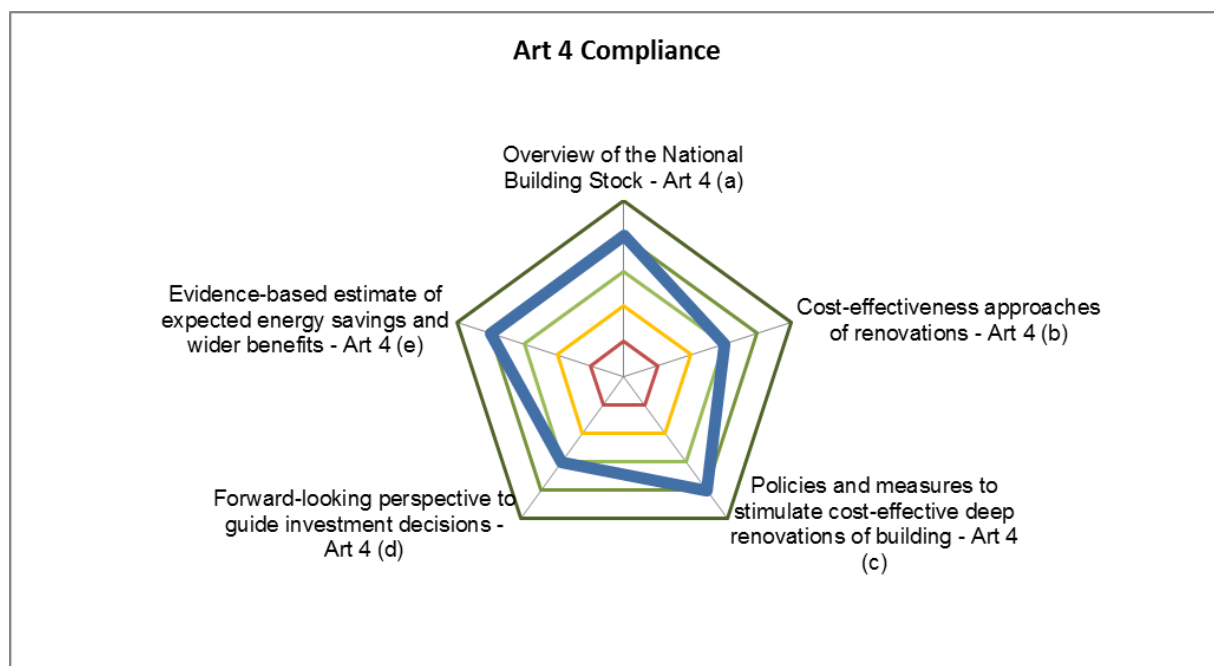
<b>Summary</b>	Slovakia provided a detailed overview of the national building stock and defines strict and ambitious targets.
<b>Level of details</b>	The strategy gives quite a detailed analysis of the physical characteristics of the buildings stocks, however the information on the energy consumption and on the cost effective measures are fragmented or missing.
<b>Level of ambitions</b>	The energy saving targets are quite ambitious, it assumes that total renovation will be completed for most building types by 2030.
<b>Appropriateness</b>	The set targets, the corresponding measures and regulations are suitable with the EED provisions, however it is not clear from the strategy how the least costs approach has been applied throughout the strategy. The starting values given seem to be quite low compared to the values in the other EU Member States.
<b>Comprehensiveness</b>	The strategy did not incorporate the full range of the potential measures proposed by the EED, but was streamlined to the physical potentials in energy savings.
<b>Strengths</b>	The technical analysis on the existing buildings stocks is very detailed. Clear and ambitious targets
<b>Weaknesses</b>	The concept of cost effectiveness is only partially included.
<b>Innovative approach</b>	n/a
<b>Recommendations</b>	The strategy could be further enforced by using different EE packages as alternatives to the presented one, pointing out the strong or weak point of the selected set of measures.



## SLOVENIA

Country	SLOVENIA		
Document Information	The Slovenian renovation strategy has been provided as a stand alone document in October 2015		
National Building Renovation Strategy (Art 4 EED) Introduction	The strategy has been developed in accordance with the national legislation (Energy Act EZ-1 and Bylaws) and country strategy documents (i.e. NREAP 2010-2020 NEEAP 2020 AN SNES, OP TGP 2020 IP EKP 2014-2020).The structure of the document follows the main section headings in EED Art. 4.		
Overview of the National Building Stock - Art 4 (a)	yes	Slovenia provided a comprehensive and detailed statistical overview of the building stock. This includes an analysis of building types, ages, energy performances per climatic zones, providing more details on residential than on non-residential buildings. The approach is correct and the segmentation appropriate. The overview is based on data from different sources (i.e. 2012 Intitut Josef Stefan Centre for Energy Efficiency, Surveying and Mapping Authority, National Statistical Office).	4
Cost-effectiveness approaches of renovations - Art 4 (b)	yes	The strategy starts from the results obtained with the cost-optimal calculation (EPBD) to calculate the energy saving potential related to the implementation of cost-effective measures in different building types (and depending on the building age). The estimation of technical potential of different retrofit opportunities is provided up to 2050. The non-residential sector might be better analysed (including schools, hospitals, stores, etc.) and the packages of measures that can achieve at significant energy saving should be more clearly reported.	3
Policies and measures to stimulate cost-effective deep renovations of building - Art 4 (c)	yes	In the strategy, a comprehensive analysis of the barriers, divided by sectors (e.g. residential, public and private) has been provided, together with detailed SWOT analysis for investment in energy efficiency buildings. To address the existing barriers a long term policy framework have been put in place, including a comprehensive package of measures both for residential and non-residential building. Measures include regulations on energy performances of buildings, instruments to support EPC in public buildings, grant schemes and demonstration projects for the energy efficient renovation of residential buildings, support schemes for the generation of heat from renewables, energy efficiency aid schemes for low-income households, regulations for compulsory division of heating costs in multi-apartment buildings, financial incentives for energy efficient renovation of public buildings, introduction of energy management systems in public buildings, support for renewable electricity and cogeneration for heat and power. New measures are also mentioned: establishing a guarantee scheme allowing securing loans taken out from the reserve fund of multi-apartment buildings, measures establishing a technical office allowing the stipulation of EPC in public buildings, support scheme for the renovation of the built cultural heritage and other special building groups.	4
Forward-looking perspective to guide investment decisions - Art 4 (d)	yes	The investment amount for the renovation of the existing building stock has been estimated for the period 2016-2030 (6.3 Billions EURO). The investment sources are detailed for residential, public and private service sector, but alternative scenarios are not provided.	3
Evidence-based estimate of expected energy savings and wider benefits - Art 4 (e)	yes	A detailed analysis to quantify the additional benefits of energy savings have been provided. Wider benefits have been identified and quantified, eg. economic benefits, energy security, social benefits (7000 new jobs per year), reducing energy poverty, reduction of greenhouse gas and particulate emissions.	4

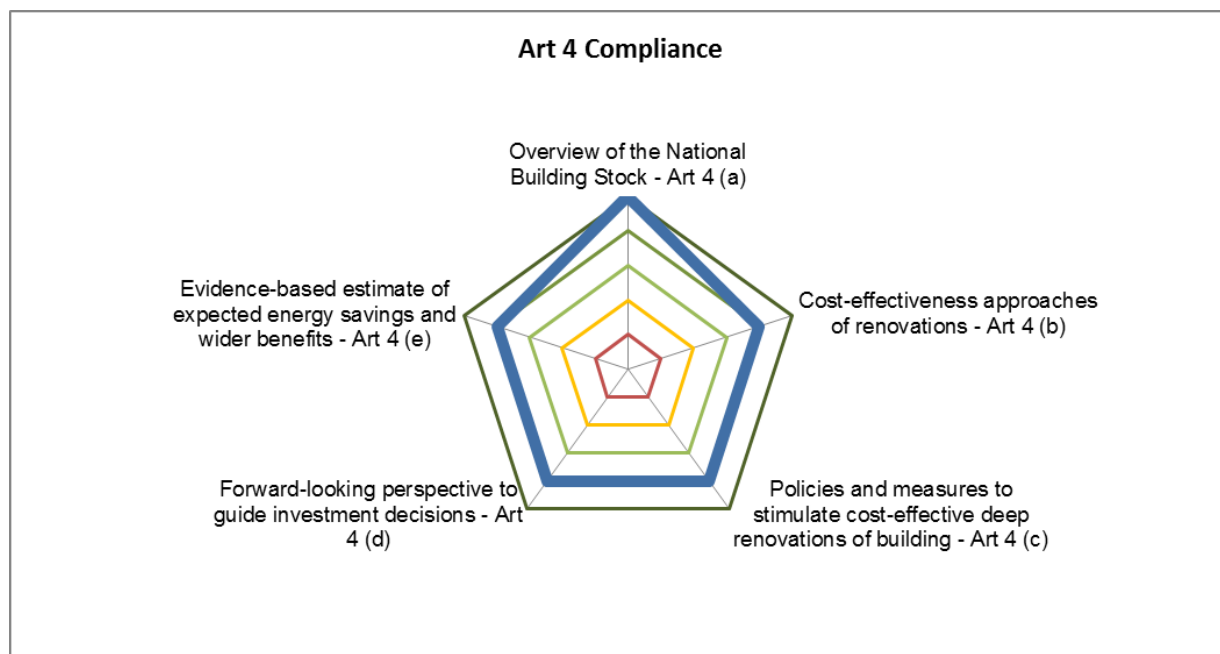
<b>Summary</b>	The Slovenian building renovation strategy provides a good and detailed description of the building stock. A detailed analysis of the barriers to investment on energy efficiency building is also provided, together with the description of a comprehensive package of measures supporting the renovation of residential and non-residential buildings. The forward-looking perspective for investment decisions is detailed in the short-mid term (2023-2030), but should be extended to 2050 with a scenario analysis.
<b>Level of details</b>	The strategy provides an overall good level of details
<b>Level of ambitions</b>	The level of ambition is quite high. The Slovenian strategy aims to generate energy savings for 3 976 GWh (14.3 PJ) by 2030, with an additional investment of more than 5 billions of Euro. These savings represent about 20% of final energy consumptions of residential and service sectors. A long term target, full decarbonisation of the building sector by 2050, has been set.
<b>Appropriateness</b>	The measures and policies designed for the strategy are appropriate and suitable to reach the goals established.
<b>Comprehensiveness</b>	Slovenia has in place a good set of measures for the building sector, covering the main areas of intervention: regulatory, financial, information, etc.
<b>Strengths</b>	The possible funding sources and mechanisms to meet the identified investment profile (up to 2023) are identified in detail.
<b>Weaknesses</b>	In the forward-looking perspective to guide investment decisions should be included a scenario analysis and the total investment amount should be defined over the period to 2050.
<b>Innovative approach</b>	n/a
<b>Recommendations</b>	The packages of retrofit opportunities (e.g. envelope insulation, heat pumps) that can deliver important cost effective energy savings should be more clearly reported and a scenario analysis up to 2050 should be provided.



## SPAIN

Country	SPAIN		
Document Information	The Spanish strategy has been provided as a separate stand-alone document in June 2014. The document is available in English.		
National Building Renovation Strategy (Art 4 EED) Introduction	The Spanish strategy is a comprehensive technical analysis provided by IDAE (Instituto para la Diversificación y Ahorro de Energía), which is the results of an extensive work involving different groups of stakeholders (e.g. National Councils of Architects, Engineers, multifamily housing managers, ESCOs, local authorities, financial institutions). It also built upon technical input provided by the GTR (Grupo de Trabajo de Rehabilitación).		
Overview of the National Building Stock - Art 4 (a)	yes	Spain provided a good detailed and comprehensive overview of the national building stock. It uses official data from two sources (2011 building census and cadastre). The data presented in the report are a small selection of the data available. The residential and non residential buildings are treated separately for conceptual and data reasons. The approach is correct and the segmentation appropriate. More details on climatic zones would be reported in an Annex. Moreover, in the report the building stock is divided in clusters with common combination of features (typologies; age; use), this enables to identify specific groups of buildings for targeted interventions and to set priorities	5
Cost-effectiveness approaches of renovations - Art 4 (b)	yes	The strategy identified different set of measures for different clusters of buildings defined in the previous section. For each of the clusters, relevant energy saving measures (insulation, window replacement, solar protection, ventilation, heating/cooling system) are provided. The costs and savings potential for a typical property in each cluster are provided. Savings range between 60% to over 90% depending on building type and main energy carrier. For the non-residential sectors, "menus" of typical interventions are provided for four sectors: Offices, Health, Hotels & Leisure, and Retail. The methodology is correctly applied, however not all costs are accounted (e.g. transaction costs). Prioritization and planning for the renovation measures are not defined in details	4
Policies and measures to stimulate cost-effective deep renovations of building Art 4 (c)	yes	The Spanish strategy provide a comprehensive description of the existing building renovation strategies. A number of measures are in place or planned, both financial and regulatory ones. Among the first it is worth mentioning the PIMA SOL project and the PAREER plan (now PAREER-CRECE). Barriers are also well identified together with some idea on how future legislation should target them. The link between building renovation, rehabilitation and urban regeneration is made throughout the strategy. However, a more articulated package of measures could have been planned (including for example specialized training) and more details on future plans would also help in having a clearer picture of the strategy in the long term.	4
Forward-looking perspective to guide investment decisions - Art 4 (d)	yes	The report identifies and describes five scenarios: three for the residential sector and two for the non-residential one. A baseline is provided for each group. The assumptions are explicitly stated: the results are expressed in terms of number of properties renovated, investment (including public subsidy level), energy saving, carbon emission reduction and renovated, investment (including public subsidy level), energy saving, carbon emission reduction and jobs created.	4
Evidence-based estimate of expected energy savings and wider benefits - Art 4 (e)	yes	Spain provides clear pictures of the main benefits (energy savings and CO2 emission reduction) for the considered renovation scenarios. Moreover investing in building renovation is seen as a strategically important action, especially in terms of employment: the report estimates 55 additional jobs created for every Million of public spending in the sector. Other benefits are listed: improved public finances, reduced energy bills, revitalisation of the construction sector, increasing property values, reduction of noise transmission due to insulation, and increased energy security.	4

<b>Summary</b>	The Spanish strategy provides a very good and comprehensive and detailed technical appraisal of the building stock and energy saving opportunities. It recognises the strategic importance of building renovation, including the link to wider urban regeneration, and broader social and economic benefits (job creation, quality of life, etc.). Specific actions that reduce the barriers, and help the financing of renovation measures, have been identified and described as well as the policies in place and planned to reach the energy efficiency target.
<b>Level of details</b>	The strategy offers a very good level of details in the description of the building stock; on the policies, and on the cost-effectiveness and benefits calculation exercise. Data, cluster and methodologies are well described.
<b>Level of ambitions</b>	The goals of the Spanish strategy are clear and the level of ambition is high (from 60 to 90% reduction in energy consumption for renovated buildings)
<b>Appropriateness</b>	The measures and policies designed for the strategy are appropriate and suitable to reach the goals established
<b>Comprehensiveness</b>	Spain has in place a good set of measures for the building sector, however, a more articulated package could be more effective in fostering building energy renovation plans (e.g. including also dedicated information campaigns and specialized training)
<b>Strengths</b>	Very detailed and robust analysis of the building stock. Building stock segmentation in clusters to target renovation measures.
<b>Weaknesses</b>	No concrete timeline for interventions provided
<b>Innovative approach</b>	n/a
<b>Recommendations</b>	More details on actual timeline for implementation should be provided.

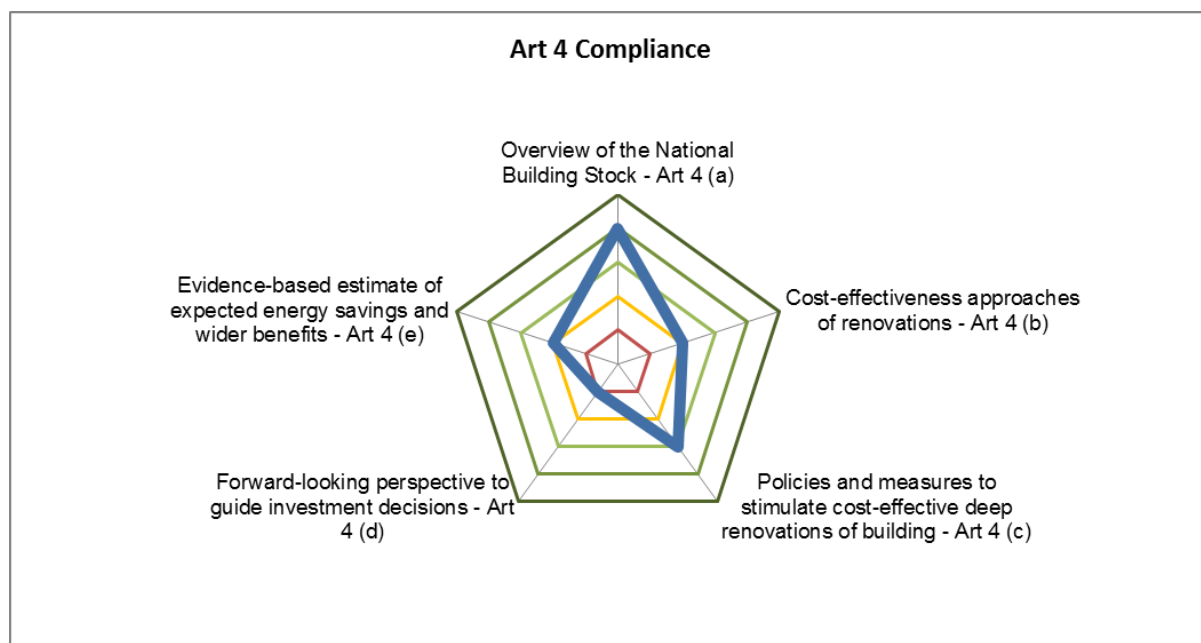




## SWEDEN

Country	SWEDEN		
Document Information	The Swedish strategy has been provided in Annex 3 ("National strategy for renovations to improve the energy efficiency of buildings") of NEEAP 2014. The document is available in English.		
National Building Renovation Strategy (Art 4 EED) Introduction	The strategy is developed in a framework of existing instruments and measures which have been found to have contributed to a reduction in average energy consumption of 11% between 1995 and 2011. As assessed in the NEEAP, Sweden is considered to have an energy-efficient building stock, in comparison to EU average. The present national strategy for investment in renovations to improve the energy performance of the national stock contains a report on the energy performance of the national building stock, the instruments that influence the pace of renovation, and measures to improve energy efficiency in the context of renovations and the expected energy savings from such measures.		
Overview of the National Building Stock - Art 4 (a)	yes	The Swedish Energy Agency and Swedish National Board of Housing, Building and Planning divided the national building stock into detached and semidetached houses, blocks of flats, and buildings for commercial premises and special purposes (this last category is not better specified). The overview is comprehensive and provides detailed data (in form of graphs) regarding the heated area and the energy consumption for heating and hot water in 2011, by year of construction, energy performance for various house types and age brackets. The climatic issue is discussed, but the report does not cover the heating contributed by heat pumps and losses arising from the production and distribution of electricity and district heating.	4
Cost-effectiveness approaches of renovations - Art 4 (b)	partly	The report provides a general discussion about what "building renovation" means. It does not clearly present a cost-effective methodology, but results (in terms of expected savings) are provided at the end of the document for several renovation measures (including actions on envelope and thermal systems) of the residential sector.	2
Policies and measures to stimulate cost-effective deep renovations of building - Art 4 (c)	yes	Sweden has a large number of instruments that affect the incidence of building renovations and provide an incentive for implementing measures to improve energy efficiency in the context of renovations. However the still existing barriers are not discussed in detail and a new policy landscape to address them is not provided in detail.	3
Forward-looking perspective to guide investment decisions - Art 4 (d)	no	Some information about the future perspective to guide investment decisions are included in the description of policy measures, but the document does not present the investment requirements to deliver the identified renovation opportunities over the period to 2050, nor the possible funding sources. Moreover, a scenario analysis should be included.	1
Evidence-based estimate of expected energy savings and wider benefits - Art 4 (e)	partly	In the reference option, the energy purchased for all buildings per square kilometre for heating and hot water is estimated to fall by 12–25 %, while the buildings' energy needs for heating and hot water are estimated to fall by 2–17 % per square kilometre between 2011 and 2050. These calculation results are characterised by great uncertainty and the social benefits were not quantified.	2

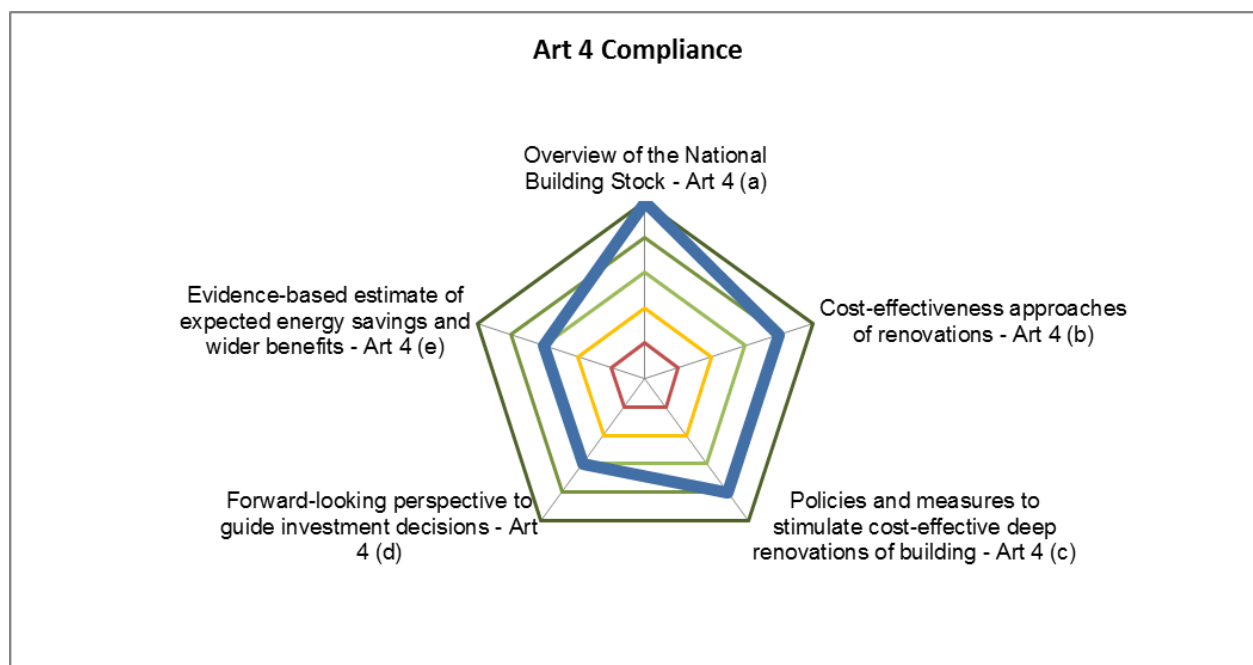
<b>Summary</b>	Sweden provided a renovation strategy that covers points almost all points required by EED Article 4. A forward-looking perspective to guide investment decisions (point d) is missing. The strategy describes in depth the current situation of the building stock and the plans for renovation, even if it does not specify the criteria adopted for the selection of the renovation measures.
<b>Level of details</b>	The existing building stock is discussed with a good level of detail, but the non-residential category "commercial premises and special purposes" should be better specified. Regarding the cost-effectiveness approach, not sufficient information are provided with respect to the methodology to identify the measures
<b>Level of ambitions</b>	The strategy set ambitious and clear target. The "reference option" should reduce by 12-25% the final energy consumption for heating and DHW.
<b>Appropriateness</b>	The policy measures already implemented are appropriate and significant, but the new policy landscape is not provided in detail.
<b>Comprehensiveness</b>	The measures cover a wide spectrum of policy areas: regulatory, financial, local advice, research and demonstration. The environmental quality target Well-Built Environment should provide an additional framework for the implementation.
<b>Strengths</b>	The existing building stock is well analysed and the implemented measures are significant.
<b>Weaknesses</b>	Lack of a forward-looking perspective to guide investment decisions.
<b>Innovative approach</b>	<ul style="list-style-type: none"> <li>- Link between the national and the local level in the renovation plans (Sustainable Municipalities programme)</li> <li>- Synergies with research and innovation programmes</li> </ul>
<b>Recommendations</b>	<ul style="list-style-type: none"> <li>- Describe the adopted cost-effective method and explain how the "reference option" has been selected.</li> <li>- Provide indications about the implementation (timing, expected impact, etc.) of the implemented/identified measures.</li> <li>- Analyse the still existing barriers to investment and define a forward-looking perspective to guide investment decisions.</li> <li>- Quantify the social and environmental benefits of the strategy.</li> </ul>



## UNITED KINGDOM

Country	UNITED KINGDOM		
<b>Document Information</b>	The UK strategy has been provided as an Annex of the third NEEAP (as Annex B) on 11/6/2014.		
<b>National Building Renovation Strategy (Art 4 EED) Introduction</b>	UK provided a detailed long-term strategy for building renovation. This strategy builds on a comprehensive package of measures to overcome existing barriers to buildings refurbishment. The strategy being implemented is supposed to lead, among others, to the introduction of zero carbon homes standards for new homes in England in 2016. The structure of the document follows the main section headings in EED Art. 4.		
<b>Overview of the National Building Stock - Art 4 (a)</b>	yes	UK provided a comprehensive and very detailed statistical overview of the building stock. This includes a detailed analysis of building types, ages, tenures, energy performances, energy demand and energy supply both for residential and non-residential buildings. The overview is based on recent data from different sources (i.e. DECC, UK housing energy fact file-2013, UK census 2011). The only data missing are related to the climatic zones.	5
<b>Cost-effectiveness approaches of renovations - Art 4 (b)</b>	yes	UK provided an estimate of the energy savings potential, that could be achieved through implementing energy efficiency measures between now and that year 2020. This assessment has been carried out through an Energy Efficiency Marginal Abatement Cost Curve (EE-MACC) analysis, both for the residential and the non-residential sectors, identifying the most cost effective measures (i.e. retrofit lighting, smart meters roll out, retrofit insulation, HPs etc.). Envelope measures (i.e. cavity walls, solid wall insulation etc.) have been analysed in detail, with a comprehensive assessment of the remaining potential. Moreover, typical packages of retrofit measures to 4 different house types have been provided for the residential sector.	4
<b>Policies and measures to stimulate cost-effective deep renovations of building - Art 4 (c)</b>	yes	In the strategy, a detailed analysis of the barriers to energy efficiency take up is provided. To overcome the existing barriers a long term policy framework have been put in place, including a comprehensive package of measures both for residential and non residential building. The Green Deal and the Energy Company Obligation, together with Building Regulations and the Energy Saving Advice Service are important elements of this strategy in the residential sector. The Climate Change Agreements, the CRC Energy Efficiency Scheme and the Energy Saving Opportunity Scheme (ESOS) are instead supposed to be the key drivers for energy efficiency renovation in the non-residential sector. Moreover, UK is investing in research to develop the best technologies and processes to make existing buildings more energy efficient and some measures to support R&D are listed in the document. On the other hand, an estimates of energy savings has not been provided for all the measures listed in the strategy.	4
<b>Forward-looking perspective to guide investment decisions - Art 4 (d)</b>	yes	In the report, existing programmes and source of funding, divided by categories (i.e. residential and not-residential Owners' private equity, public expenditure, EU structural and innovation funds and Banks/private investment) have been described with a good level of details. Nevertheless, a clear forward-looking perspective to guide investment decisions, including a roadmap with key dates, targets, milestones, needed resources, is not included.	3
<b>Evidence-based estimate of expected energy savings and wider benefits - Art 4 (e)</b>	yes	In the reports, an energy saving potential of 54 TWh has been identified for the residential sector, broken down renovation interventions (i.e. heat pumps installations and wall insulations have the highest energy saving potential). For the non residential sector, the potential is 27TWh, with the majority of potential savings relate to heating energy. Nevertheless, an evidence-based estimates of energy savings for each of the policies described in the strategy has not been provided. Wider benefits have been identified (i.e. reduce costs to energy consumers, reduce fuel poverty, increase energy security, expanding market, develop skills and supply chains, improved health ) and described shortly in one page BOX.	3

<b>Summary</b>	The UK building renovation strategy provides a very good and comprehensive and detailed description of the building stock and list the most cost effective measures, identified through an energy efficiency marginal abatement cost curve analysis, both for residential and the non-residential buildings. A detailed analysis of the barriers to energy efficiency take up is also provided, together with the description of a comprehensive package of measures supporting the renovation of residential and non residential buildings. In particular, the Green Deal and the Energy Company Obligation, together with Building Regulations and the Energy Saving Advice Service are important elements of this strategy in the residential sector; the Climate Change Agreements, the CRC Energy Efficiency Scheme and the Energy Saving Opportunity Scheme (ESOS) are instead supposed to be the key drivers for energy efficiency renovation in the non-domestic sector. Nevertheless, specific policies addressed to cost-effective deep renovation are missing. Overall, the strategy is deemed to be compliant with EED Art.4,
<b>Level of details</b>	The strategy provide an overall good level of details
<b>Level of ambitions</b>	While UK set a very clear and ambitious overall sectors legally binding target (i.e. cutting carbon emissions by 80% by 2050), specific targets for the building sector are not clearly indicated, except for new buildings (i.e. the introduction of zero carbon homes standards for new homes in England by 2016). Specific target on building renovations, and in particular on deep renovations are not provided.
<b>Appropriateness</b>	The measures and policies designed for the strategy are appropriate and suitable to reach the goals established, even if more specific policies targeting deep renovation should be put in place
<b>Comprehensiveness</b>	UK has in place a good set of measures for the building sector
<b>Strengths</b>	Very detailed and comprehensive description of the building stock.
<b>Weaknesses</b>	no specific new measures targeting deep renovations have put in place
<b>Innovative approach</b>	The Energy Entrepreneurs Fund (EEF) to support the development and demonstration of innovative technologies and processes in energy efficiency and building technologies
<b>Recommendations</b>	More information on evidence-based estimates of energy savings expected from each of the policies put in place should be included in the strategy



## ANNEX B – Official Commission's guidance for NEEAPs

### 1. Provide an overview of the national building stock based, as appropriate, on statistical sampling (EED Article 4(a))

- a) What main building categories have been identified as part of the overview?
  - i) Single-family houses
  - ii) Apartments/multi-residential dwellings
  - iii) Offices
  - iv) Educational buildings
  - v) Hospitals/health establishments
  - vi) Hotels
  - vii) Sports facilities
  - viii) Warehouses/data centres, etc.
  - ix) Retail premises (including restaurants)
  - x) Other types of energy-consuming buildings
- b) What age bands having a material bearing on building energy performance have been identified?
  - i) Traditional construction types, including historic/heritage buildings (typically pre-1900)
  - ii) Buildings constructed prior to regulations on energy performance (e.g. 1901-1960)
  - iii) Early phase building regulations (1961-1990)
  - iv) Mid-phase building regulations (1981-2000)
  - v) New (2001-2012)
- c) What main climatic zones which have a material bearing on building energy performance have been identified?
- d) How many combination of building type, age and climatic zone have been identified?
- e) What ownership and tenure have been identified in terms of the two elements specified below?
  - i) The split by owner – public, private or mixed
  - ii) The split by tenure – owner occupied, rented, (mixed?)
- f) If appropriate, provide a split by location as follows:
  - i) Urban
  - ii) Suburban
  - iii) Rural
- g) What energy use and performance characteristics of each building combination have been identified?
  - i) Construction type and U-value of main building elements:
    - Floor (Walls, Windows and External Doors)
    - Roof
  - ii) Air infiltration rate
  - iii) Energy systems (In all cases, please identify typical replacement lifecycles):
    - HVAC system type/performance level/controls
    - Hot water provision
    - Lighting systems/controls
  - iv) Maintenance regimes (e.g. mandatory annual safety checks/servicing)

v) Energy use for:

- Heating
- Cooling
- Hot water
- Lighting
- Appliances

vi) Energy carriers:

- Gas (natural gas or LPG)
- Liquid fuels (oil, etc.)
- Solid fuels (coal, etc.)
- Renewable fuels (specify)
- District heating (identify energy carriers)

**2. Identify cost-effective approaches to renovations relevant to the building type and climatic zone (EED Article 4(b)).**

a) What technical opportunities for retrofit of energy efficiency measures for each building category have been identified?

- i) Fabric measures
- ii) Windows
- iii) HVAC plant - heating/cooling/hot water
- iv) Air infiltration
- v) Lighting
- vi) Appliances

b) What technical opportunities for retrofit of renewable energy measures have been identified?

- i) Solar hot water
- ii) Solar PV
- iii) Passive solar
- iv) Shading
- v) Wind
- vi) Heat pumps
- vii) Biomass
- viii) Biogas

c) Has the opportunity to connect to a district heating system been considered?

d) What packages of measures that can achieve at significant energy saving, at least up to the prevailing energy performance requirements for new buildings of the same category, have been identified?

e) Has it been determined whether deep renovations should be undertaken as a single package, or staged over a period of time?

f) Has the cost effectiveness of the different packages of measures been determined using cost optimality methodology?

i) Costs – the total installed cost of renovation measures, less any avoided cost due to end-of-life replacement or by undertaking renovation alongside other building maintenance, new construction or modernisation measures

ii) Consider the transaction costs, including costs of temporary relocation of occupants

iii) Have the following benefits (and identify the beneficiary – building owner, building occupier, society at large) been quantified?

- Energy cost savings
- Reduction in Fuel Poverty
- Health benefits
- Increased property value (rental and/or sale value)
- Reduced energy imports/increased energy security
- Employment impact
- Environmental impact (externality value of carbon saving)
- Air quality improvement
- Other social, economic or environmental benefits

g) From the above cost appraisal, have you determined a prioritised set of renovation packages for each building category, and a timeline for implementation?

i) Have you considered the exemplary role of the public sector (at all tiers of government, as well as public services such as public housing, defence, health and education) in leading the drive towards deep renovation, and in exerting influence of citizens and businesses?

ii) Have you considered the appropriateness of targeting the least energy efficient building stock as a priority?

iii) Have you considered different scenarios as to the rate of change of key parameters?

**3. Provide information on policies and measures to stimulate cost-effective deep renovations of buildings, including staged deep renovations (EED Article 4(c)).**

a) Give an appraisal of existing measures/policies in the Member State:

- i) Regulatory (EU, national, regional and local)
- ii) Fiscal (tax incentives, grants, subsidies, loans, etc.)
- iii) Information campaigns
- iv) Labelling (EPCs, etc.)
- v) Voluntary agreements
- vi) Other

b) Provide an analysis of barriers.

c) Give an appraisal of relevance of policies used in other territories.

d) Provide a design of new policy landscape that addresses barriers and enables the delivery of the required ramp up in deep renovation activity, with a particular focus on those measures which need to be introduced within the next 3 years.

**4. Demonstrate a forward-looking perspective to guide investment decisions of individuals, the construction industry and financial institutions (EED Article 4(d)).**

- a) Quantify total annual investment requirements, mapped out over the period to 2050, in order to deliver the identified renovation opportunities.
- b) Identify existing sources of funding for building energy renovation:
  - i) Owners' private equity
  - ii) Public purse (including EU Structural and Innovation Funds)
  - iii) Banks and other sources of private investment (e.g. pension funds)
- c) Analyse barriers to investment.
- d) Identify possible funding sources and mechanisms to meet the identified investment profile.

**5. Provide an evidence-based estimate of expected energy savings and wider benefits (EED Article 4(e)).**

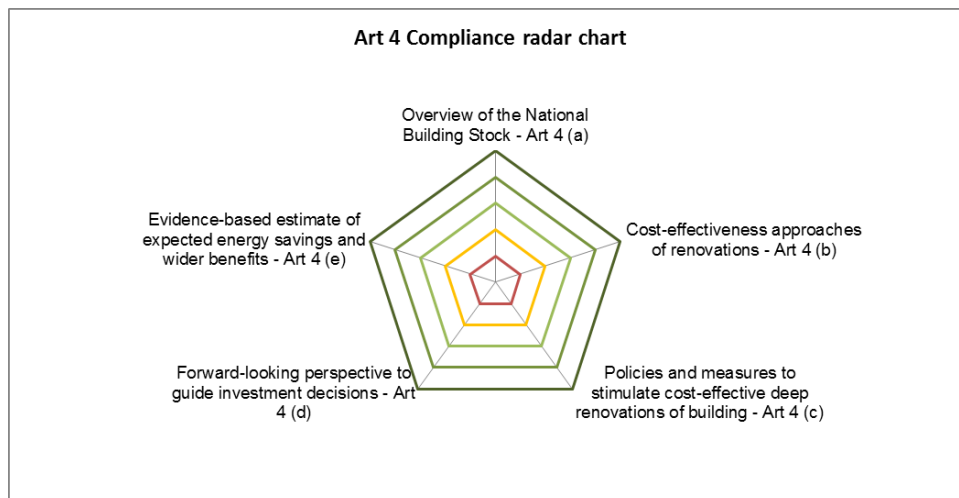
- a) Has the attractiveness to building owners of their direct benefits been identified?
- b) Have the societal benefits arising from deep renovation been identified?
- c) Have ways in which externalities (e.g. societal benefits from reduced CO2 emissions, increased energy security, etc.) can be internalised for the benefit of the investor been identified?



# ANNEX C – Article 4 notifications' evaluation template

## Assessment Synthesis & Overview

Country		
Document Information		
National Building Renovation Strategy (Art 4 EED) Introduction		
Overview of the National Building Stock - Art 4 (a)	yes/no	0-5
Cost-effectiveness approaches of renovations - Art 4 (b)	yes/no	0-5
Policies and measures to stimulate cost-effective deep renovations of building - Art 4 (c)	yes/no	0-5
Forward-looking perspective to guide investment decisions - Art 4 (d)	yes/no	0-5
Evidence-based estimate of expected energy savings and wider benefits - Art 4 (e)	yes/no	0-5
Summary		
Level of details		
Level of ambitions		
Appropriateness		
Comprehensiveness		
Strengths		
Weaknesses		
Innovative approach		
Recommendations		



## Article 4(a) – Overview of the National building stock

Overview of the National Building Stock					
EED article 4(a)					
1. Year					
1.2 Sources					
2. Building categories					
		Number	Area	Energy Consumption	
<b>Residential</b>	Single-family houses /detached				
	Semi-detached				
	Terraced				
	Apartments /multi-residential dwellings / flats				
	Others				
	<b>Total Residential</b>				
<b>Non-residential</b>	Offices				
	Hospitals/health establishments				
	Hotels / Restaurants / lesiure				
	Sports facilities				
	Commercial /Shops				
	Art and laisure (theatres/cimena/museum)				
	Education (schools/libraries)				
	Religious				
	Industrial				
	Warehouse and storage				
	Military				
	Other types of energy-consuming buildings				
<b>Total non-residential</b>					
<b>Total</b>					
3.a. Age bands / Residential					
		<i>Alternative</i>	Number	Area	Energy Consumption
	Traditional / historical / heritage (< 1900)				
	Buildings constructed prior to regulations on energy performance (e.g.1901-1960)				
	Early phase building regulations (1961-1980)				
	Mid-phase building regulations (1981-2000)				
	New (2001-2012)				
3.b. Age bands / Non-residential					
		<i>Alternative</i>	Number	Area	Energy Consumption
	Traditional / historical / heritage (< 1900)				
	Buildings constructed prior to regulations on energy performance (e.g.1901-1960)				
	Early phase building regulations (1961-1980)				
	Mid-phase building regulations (1981-2000)				
	New (2001-2012)				
4. Energy Class					
		Total			
		Residential		Non-residential	
		Number	Area	Number	Area
	Class A				
	Class B				
	Class C				
	Class D				
	Class E				
	Class F				
	Class G				
5. Climatic zones					
		Number	Area	Energy Consumption	
	1. [Description]				
	2. [Description]				
	3. [Description]				
	4. [Description]				
	[...]				

		Number	Area	Energy Consumption	
	1. [Description]				
	2. [Description]				
	3. [Description]				
	4. [Description]				
	[...]				
<b>7. Ownership</b>					
		Number	Area	Energy Consumption	
	Public				
	Private				
	Mixed				
<b>8. Tenure</b>					
		Number	Area	Energy Consumption	
	Main				
	Own occupied				
	Rented				
	Other				
	Secondary				
	Empty				
	Other				
<b>9. Location</b>					
		Number	Area	Energy Consumption	
	Urban				
	Sub-urban				
	Rural				
<b>10. Matrix: Energy use and performance characteristics of each building combination identified</b>					
		[Combination 1]	[Combination 2]	[Combination 3]	[Combination ...]
Types / U- values	Floor				
	Walls				
	Windows & Ext Doors				
	Roof				
	Air infiltration rate				
Energy Systems	HVAC				
	Hot water provision				
	Lighting systems				
	Maintenance regimes				
Energy Use	Heating				
	Cooling				
	Hot water				
	Lighting				
	Appliances				
Energy Carriers	Gas				
	Liquid fuels				
	Solid fuels				
	Solar hot water				
	Solar PV				
	Wind				
	Electricity from the grid				
	Heat pump				
	Biomass				
	Biogas				
District heating					
<b>Synthesis - Comment</b>					
<b>Art 4 Compliance</b>					0-5
<b>Level of details</b>					0-5

## Article 4(b) – Cost-effective approaches to renovation

Cost-effectiveness approaches to renovations					
EED article 4(b)					
<b>1. Technical opportunities for retrofit of energy efficiency measures for each building category identified</b>					
	Yes	No	Partly	Comment / Examples	Evaluation
Fabric/Envelope measures					
Windows					
HVAC plant - heating/cooling/hot water					
Air infiltration					
Lighting					
Appliances					
<b>2. Technical opportunities for retrofit of renewable energy measures identified</b>					
	Yes	No	Partly	Comment / Examples	Evaluation
Solar hot water					
Solar PV					
Passive solar					
Shading					
Wind					
Heat pumps					
Biomass					
Biogas					
<b>3. Opportunity to connect to a district heating system</b>					
			Comments		Evaluation
Considered					
Not considered					
<b>4. What packages of measures that can achieve at significant energy saving have been identified?</b>					
	Description / Comments			Evaluation	
[package 1]					
[package 2]					
[package 3]					
[package ...]					
<b>5. Has it been determined whether deep renovations should be undertaken as a single package, or staged over a period of time?</b>					
	Description / Comments			Evaluation	
single package					
staged					
not determined					
<b>6. Has the cost effectiveness of the different packages of measures been determined using cost optimality methodology?</b>					
	Yes	No	Partly	Comment / Examples	Evaluation
Costs					
a) Total cost of renovation measures					
b) Avoided cost subtracted (e.g. end-of life replacement; other building maintenance)					
c) Transaction costs (including temporary relocation of occupants)					
Benefits					
a) Energy cost savings					
b) Reduction in Fuel Poverty					
c) Health benefits					
d) Increased property value (rental and/or sale value)					
e) Reduced energy imports/increased energy security					
f) Employment impact					
g) Environmental impact (externality value of carbon saving)					
h) Air quality improvement					
i) Other social, economic or environmental benefits					

<b>7. From the above cost appraisal, is a prioritised set of renovation packages for each building category, determined together with a timeline for implementation?</b>			
		Comments	Evaluation
Determined			
Partly determined			
Not determined			
<b>7.a Exemplary role of the public sector (at all tiers of government)</b>			
		Comments	Evaluation
Considered			
Partly Considered			
Not Considered			
<b>7.b Targeting the least efficient building stock as a priority</b>			
		Comments	Evaluation
Considered			
Partly Considered			
Not Considered			
<b>7.c Different scenarios as to the rate of changes of key parameters (includes assumptions on energy prices, discount rates, etc.)</b>			
		Comments	Evaluation
Considered			
Partly Considered			
Not Considered			
<b>Synthesis - Comment</b>			
<b>Art 4 Compliance</b>		0-5	
<b>Level of details</b>		0-5	
<b>Level of ambitions</b>		0-5	

## Article 4(c)- Policies and measures to stimulate cost-effective deep renovation of buildings

Policies and measures to stimulate cost-effective deep renovations of building EED article 4(c)								
<b>1. Existing measures and policies</b>								
Regulatory								
	Name	Description	Level	Status	Timing	Impact	Link	
Financial and fiscal								
	Name	Description	Level	Type	Status	Timing	Impact	Link
Information campaigns								
	Name	Description	Level	Status	Timing	Impact	Link	
Labelling								
	Name	Description	Level	Status	Timing	Impact	Link	
Voluntary Agreements								
	Name	Description	Level	Status	Timing	Impact	Link	
Others								
	Name	Description	Level	Type	Status	Timing	Impact	Link
<b>2. Analysis of Barriers</b>								
	Comments		Evaluation					
Conducted								
Partly Conducted								
Not Conducted								
<b>3. Appraisal of relevance of policies used in other territories</b>								
	Comments		Evaluation					
Conducted								
Partly Conducted								
Not Conducted								
<b>4. Design of new policy landscape to address barriers and to enable deep renovation (particular focus on next 3 years)</b>								
	Comments		Evaluation					
Provided								
Partly Provided								
Not Provided								
<b>Synthesis - Comment</b>								
Art 4 Compliance			0-5					
Comprehensiveness			0-5					
Appropriateness			0-5					
Level of detail			0-5					

## Article 4(d) – Forward-looking perspective to guide investment decisions

Forward-looking perspective to guide investment decisions			
EED article 4(d)			
<b>1. Total annual investment requirements, over the period to 2050, to deliver the identified renovation opportunities.</b>			
	Value (Euros)	Comments	
Quantified			
Not quantified			
<b>2. Existing sources of funding for building energy renovation</b>			
	Yes/ No	Comments	
i) Owners' private equity			
ii) Public purse (including EU Structural and Innovation Funds)			
iii) Banks and other sources of private investment (e.g. pension funds)			
<b>3. Analysis of the barriers to investment</b>			
	Comments / List of Barriers	Evaluation	
Conducted			
Partly Conducted			
Not Conducted			
<b>4. Possible funding sources and mechanisms to meet the identified investment profile</b>			
Name	Comment / description	Evaluation	
<b>Synthesis - Comment</b>			
<b>Art 4 Compliance</b>		0-5	
<b>Level of details</b>		0-5	

## Article 4(e)-Evidence-based estimate of expected energy savings and wider benefits

Evidence-based estimate of expected energy savings and wider benefits							
EED article 4(e)							
<b>1. Attractiveness to building owners of their direct benefits</b>							
		Comments					
Identified							
Partly Identified							
Not Identified							
<b>2. Societal benefits arising from deep renovation been identified?</b>							
		Comments					
Identified							
Partly Identified							
Not Identified							
<b>3. Internalisation of externalities (i.e. societal benefits translated into benefits for the investor)</b>							
		Comments					
Considered							
Partly Considered							
Not Considered							
<b>4. Quantification of benefits</b>							
Type of analysis							
Scenarios							
Assumptions							
Benefits		Scenario [...]		Scenario [...]		Scenario [...]	
		Value	Comment	Value	Comment	Value	Comment
		Energy Savings					
		Employment					
		Emissions Reduction					
		Health					
	Energy Security						
<b>Synthesis - Comment</b>							
<b>Art 4 Compliance</b>		0-5					
<b>Level of details</b>		0-5					



## List of abbreviations and definitions

<b>BCR</b>	Brussels Capital Region
<b>BPIE</b>	Building Performance Institute Europe ( <a href="http://www.bpie.eu">www.bpie.eu</a> )
<b>DECC</b>	Department of Energy & Climate Change (UK)
<b>DG ENER</b>	The Directorate-General for Energy
<b>EC</b>	European Commission
<b>EE</b>	Energy Efficiency
<b>EED</b>	Energy Efficiency Directive
<b>EEOS</b>	Energy Efficiency Obligation Scheme
<b>EFFIG</b>	Energy Efficiency Financial Institutions Group
<b>EPBD</b>	Energy Performance Building Directive
<b>EU</b>	European Union
<b>EU-28</b>	The 28 member states of the European Union
<b>GIS</b>	Geographic Information System
<b>JRC</b>	Joint Research Centre
<b>KfW</b>	Kreditanstalt für Wiederaufbau ( <i>KfW Bankengruppe</i> )
<b>MEPS</b>	Minimum Energy Performance Standards
<b>MS</b>	Member States
<b>nZEB</b>	nearly Zero Energy Building
<b>NEEAP</b>	National Energy Efficiency Action Plan
<b>ONS</b>	Office for National Statistics (UK)
<b>R&amp;D</b>	Research and Development
<b>RED</b>	Renewable Energy Directive
<b>SEAI</b>	Sustainable Energy Authority of Ireland
<b>SWD</b>	Staff Working Document

## List of figures

Figure 1: Comparison of the scores of the 31 evaluations of MSs notifications.....	14
Figure 2: Average scores of the 31 renovation strategy evaluations.....	14
Figure 3: Map illustrating the result of the evaluation of the renovation strategies.....	15
Figure 4: Number of all the measures in the building sector by country and type .....	28
Figure 5: Number of implemented vs planned measures by country .....	29

## List of tables

Table 1: Compliance with EED Article 4 requirements .....	13
Table 2: Summary of strategies compliance with EED Article 4 requirements .....	16
Table 3: A "Best Of" building renovation strategy .....	17
Table 4: Information provided on the residential building stock .....	19
Table 5: Information on the non-residential building stock .....	20
Table 6: Information provided on Cost-effectiveness approaches of renovation .....	24
Table 7: Categorisation of policy measures .....	25
Table 8: Information provided on measures and policies for building renovation .....	26
Table 9: Measures included in the strategies by country and type .....	27
Table 10: Information provided in the strategies on Article 4(d) prescriptions .....	37
Table 11: Information provided in the strategies on Article 4(e) sub-paragraph .....	39
Table 12: Strategies Building renovation targets and/or expected energy savings .....	40

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