European Commission

Assessment of the first long term renovation strategies of national building stocks: Best practice and recommendations

Luca Castellazzi
Daniele Paci
Paolo Zangheri

Concerted Action EED Plenary Meeting
The Hague, **17/3/2016**

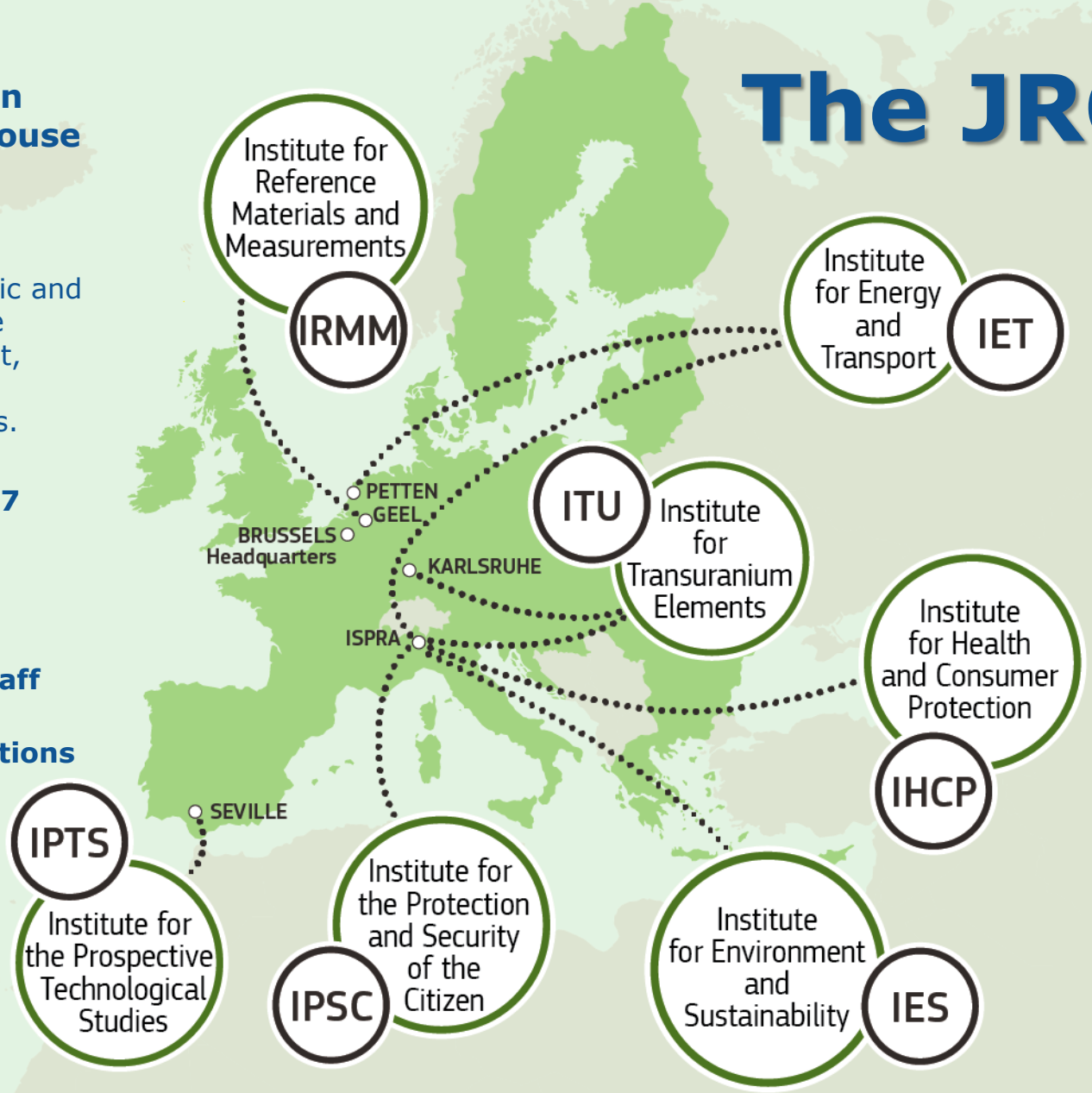
Joint Research Centre

The JRC

JRC is the European Commission's in-house science service

It provides independent customer-driven scientific and technical support for the conception, development, implementation and monitoring of EU policies.

- **Established in 1957**
- **7 institutes in 5 countries**
- **More than 3000 staff**
- **Over 1030 publications in 2015**



European Commission

Role of JRC in the EED and EPBD implementation

- Assessment of NEEAPs
- Annual Report analysis
- Assessment of Art.4 Building Renovation strategies
- NZEB national plans analysis
- Art.18 – ESCO support
- Art. 7 – Energy Efficiency Obligation Scheme
- Art.5 – Central government building
- Art. 9-11 – metering and billing
- Art. 12 – Behavioural changes
- Art. 15 – Demand Response
- Art. 19 – Split incentives
- Support to standard development under M/480

EED Article 4: Building renovation

MSs shall establish a long-term strategy for mobilising investment in the renovation of the national stock of residential and commercial buildings, both public and private. This strategy shall encompass:

a) An **overview of the national building** stock based, as appropriate, on statistical sampling;

b) Identification of **cost-effective approaches** to renovations relevant to the building type and climatic zone;

c) **Policies and measures to stimulate cost-effective deep renovations** of buildings, including staged deep renovations;

d) **A forward-looking perspective** to guide investment decisions of individuals, the construction industry and financial institutions;

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

Evaluation methodology

The evaluation assessed compliance of each strategy to Art.4 provisions in the 5 sub-paragraphs (a, b, c, d, e)

The **level of details** and **accuracy** of the information provided in each section was evaluated and scored on a **0-5 scale**, where:

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

Other elements: *Level of ambition, Strength/Weakness, Best practices, Innovative approaches and Recommendations*

Overall compliance of the strategies

NON-COMPLIANT: 2 requirements or more of Art. 4 MISSING or UNSATISFACTORY covered (i.e. scores 0 or 1)

NOT FULLY COMPLIANT: not compliant with only 1 requirement failed (i.e. 0 or 1), OR at least 3 INADEQUATE/PARTIALLY COMPLIANT (i.e. score = 2)

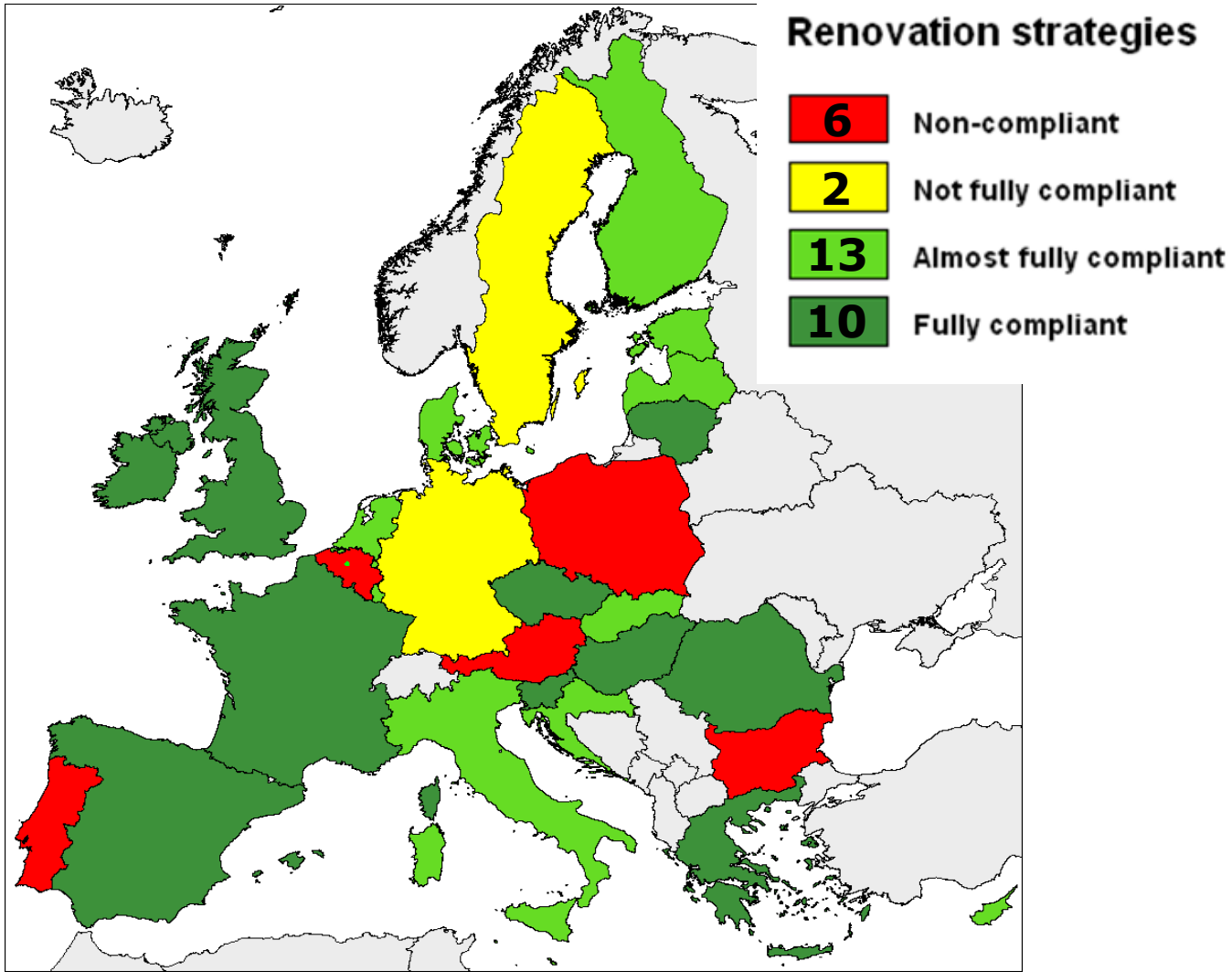
ALMOST FULLY COMPLIANT: INADEQUATE/PARTIALLY COMPLIANT (i.e. score = 2) for maximum two requirements;

FULLY COMPLIANT; meets all the basic requirements (all the scores ≥ 3) for all the requirements.

Overall compliance

European Commission

74% of the strategies satisfactorily address Art4 EED main elements



Overall Strategies compliance

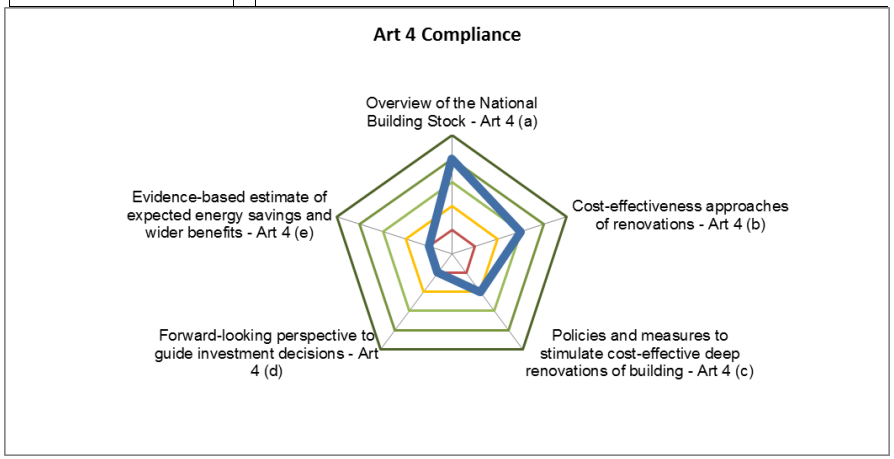
Non-compliant strategies: 6 Austria, Belgium Flanders, Belgium Wallonia, Bulgaria, Poland, Portugal
Non fully compliant strategies: 2 Germany, Sweden
Almost compliant strategies: 13 Brussels Capital Region, Croatia, Cyprus, Denmark, Estonia, Finland, Gibraltar, Italy, Luxemburg, Latvia, Malta, Netherlands and Slovakia
Fully compliant strategies and Best practices: 10 Czech Republic, France, Greece, Hungary, Ireland, Lithuania, Romania, Slovenia, Spain, the United Kingdom

Countries fiches

European Commission

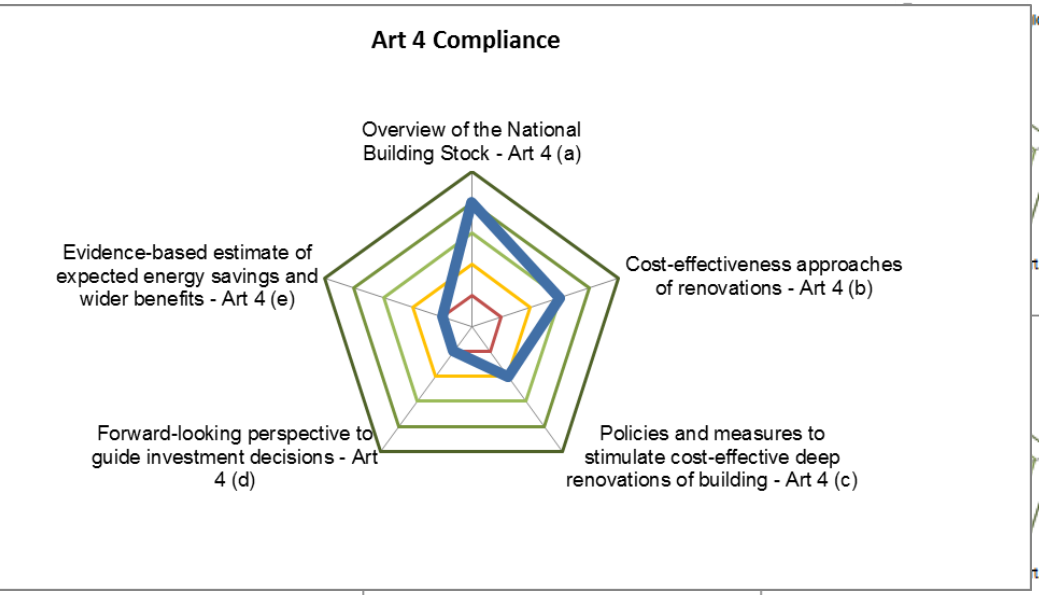
Country	AUSTRIA		
Document Information	The Austrian renovation strategy is provided as an annex (Annex B) of the NEEAP. The document is available in English.		
Introduction	The strategy includes the following items: the development of provisions in building law for major renovation as a policy measure, 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.		
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.	4
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/m²GFAa) 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.	3
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
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
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

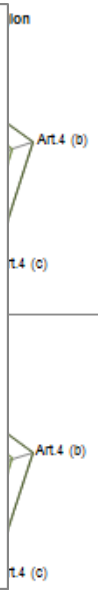
Summary	The Austrian renovation strategy is mainly guided by reducing the heating demand and consumption as well as the decarbonisation of the supply side. This may explain the existence of different financing schemes for the installations of RE systems. A clear strategic assessment of the policy needs to renovate the housing stock is missing
Level of details	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.
Level of ambitions	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
Appropriateness	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.
Comprehensiveness	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.
Strengths	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.
Weaknesses	Not enough details were provided to fully assess the impact of the Austrian renovation strategy. No concrete timeline for interventions provided
Innovative approach	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
Recommendations	The Austrian renovation strategy needs to be revised to include more details (e.g. on policies) and the missing sections (estimated benefits and investments).

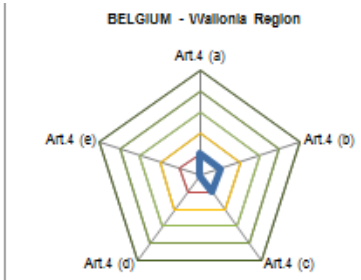


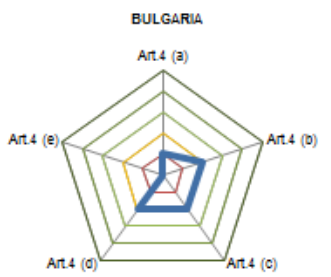
Joint Research Centre

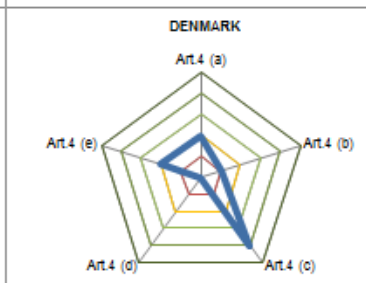
Countries fiches

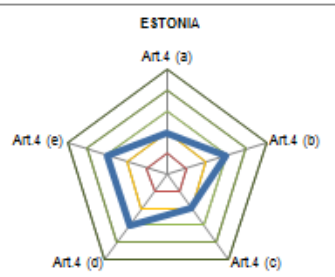


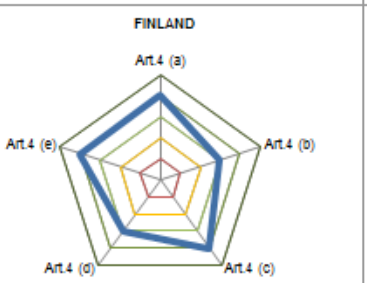


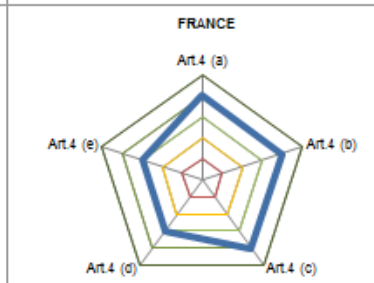


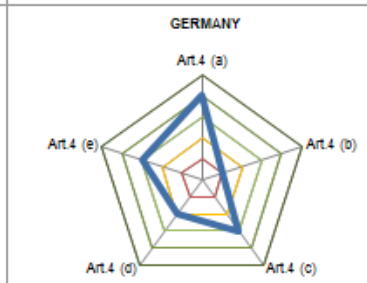


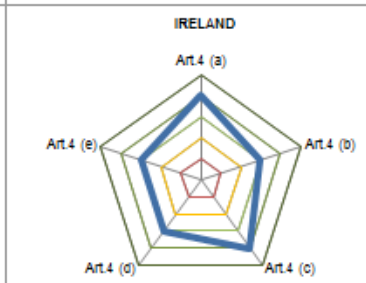


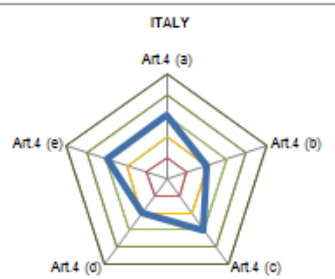


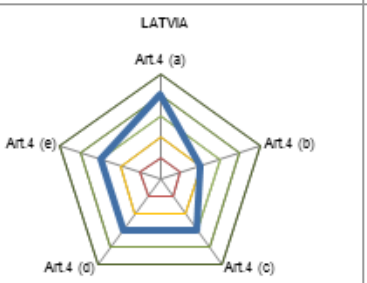


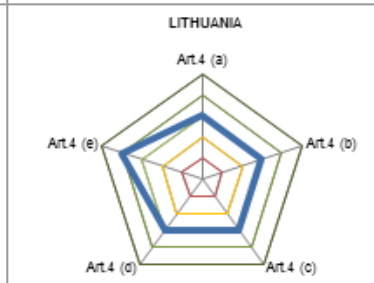


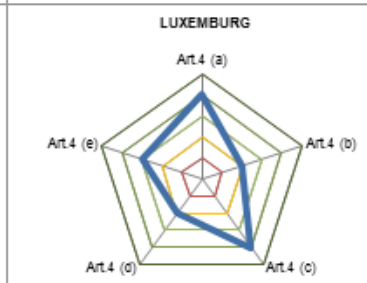


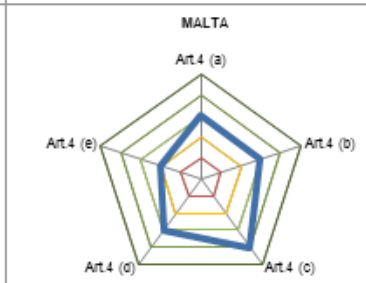


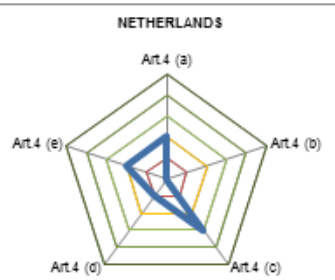








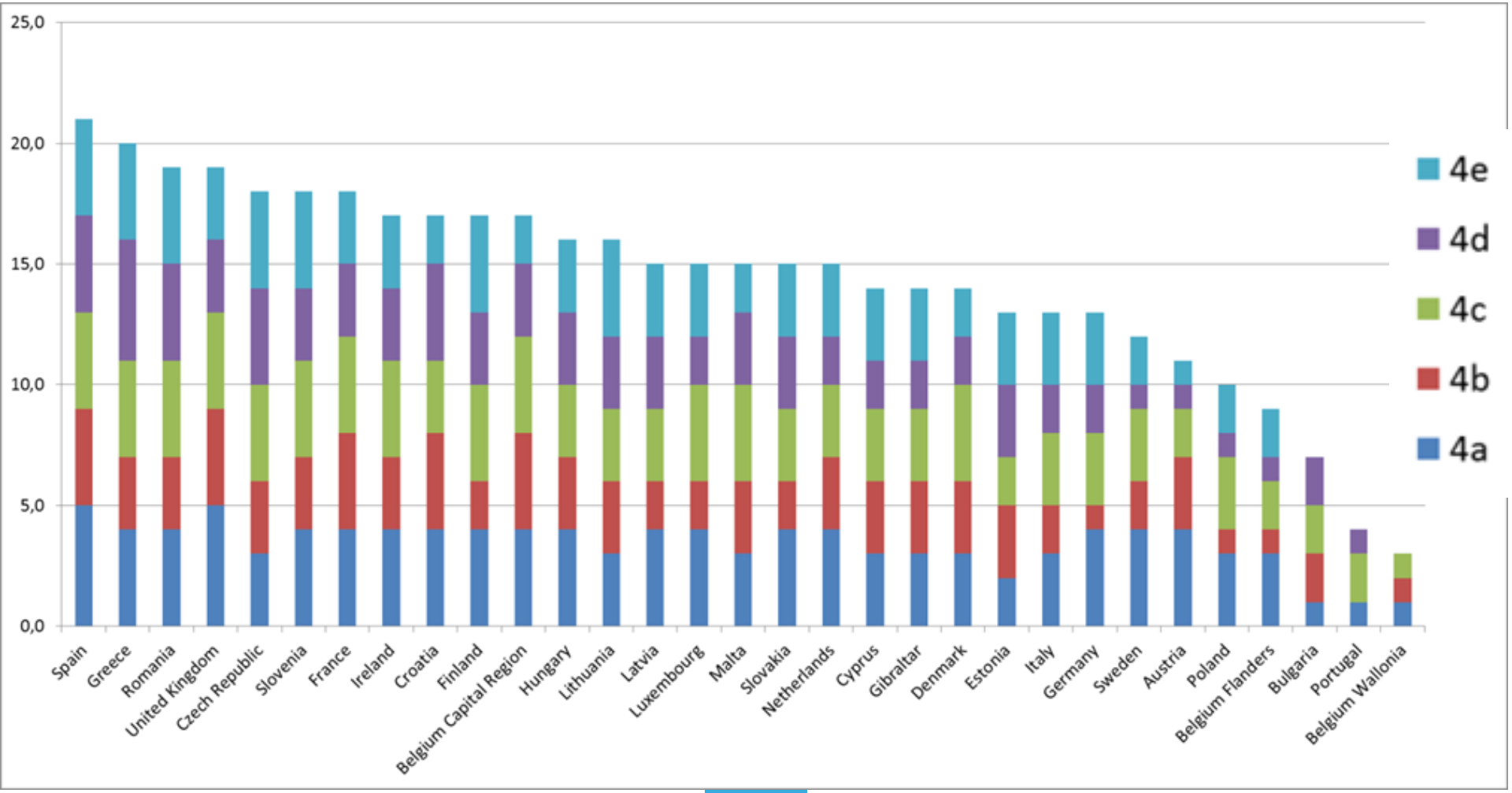




Overall compliance

European Commission

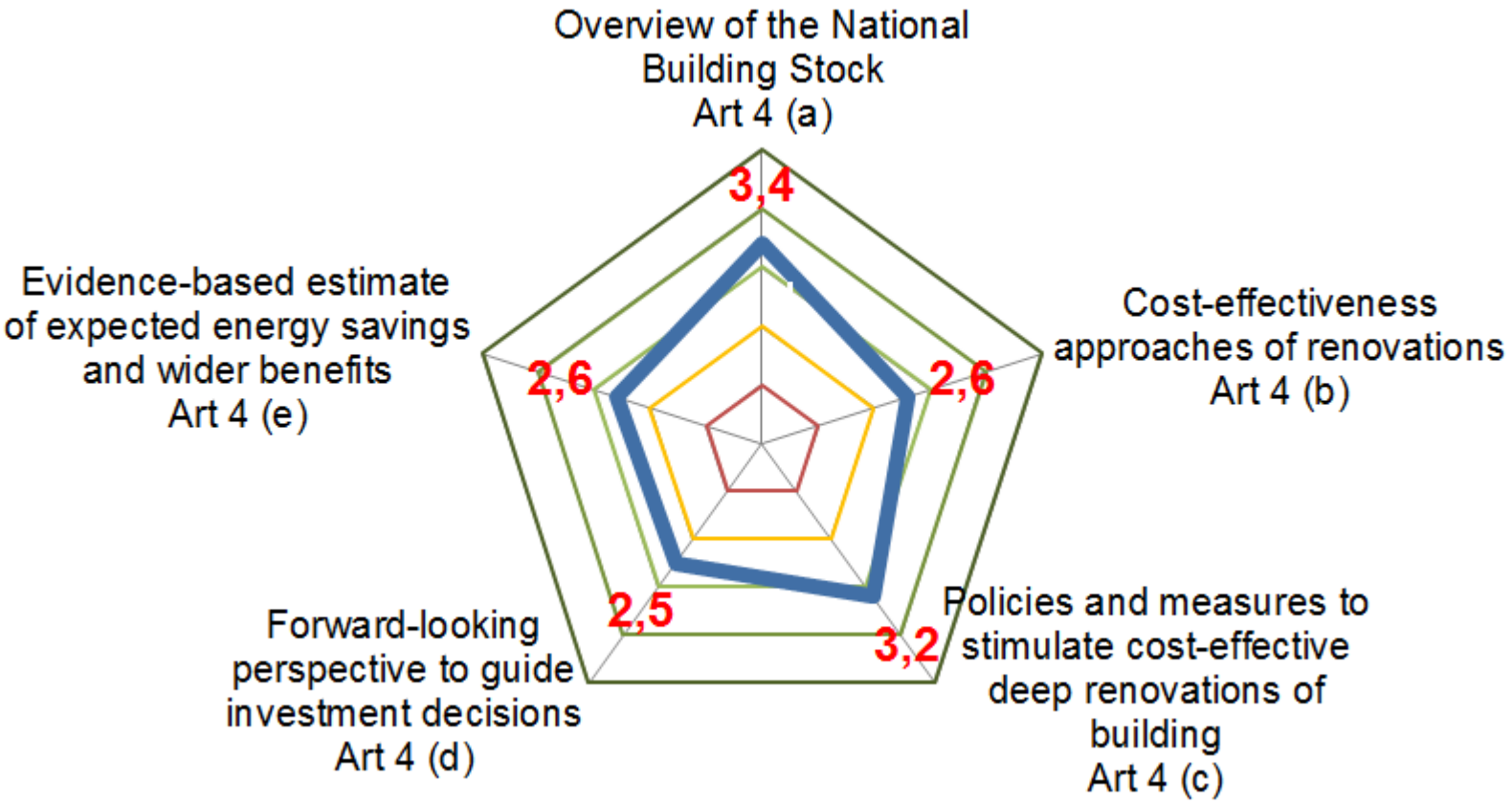
Comparison of the scores of the 31 evaluations



Overall compliance

European Commission

Average scores of the 31 renovation strategy evaluations



Joint Research Centre

Selected Best Practices

Section	Best practice examples
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 and Spain**
Forward-looking perspective to guide investment decisions - **4(d)**	**Greece and Spain**
Estimate of expected energy savings and wider benefits - **4(e)**	**Romania**

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

27 strategies fully compliant, 1 partly, only 3 non-compliant

- In general the building stock well described;
- More info on residential than non-residential building stock;

BEST PRACTICE: UK

The UK provided a comprehensive and very detailed statistical overview of the building stock. It 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")

Cost-effectiveness approaches of renovation – Art. 4(b)

19 strategies fully compliant , 7 partly, only 5 non-compliant

- Several MSs referred to the **cost-optimal analysis** developed to transpose the **EPBD** requirements, but not fully integrated with the rest of the renovation strategy.
- Identifying cost-effective approaches to renovation is considered a difficult exercise, as it depends on many input data and boundary conditions.

BEST PRACTICE: BRUSSELS CAPITAL REGION

Summary of the cost-optimality study (according to the EPBD Directive guidelines). It provides a detailed discussion of the method (based on 6 reference building types) and conclusions about the applicability of different renovation packages. The methodology appears reliable and the identified **cost-optimal levels are quite ambitious**.

Policies to stimulate cost-effective deep renovations, Art 4(c)

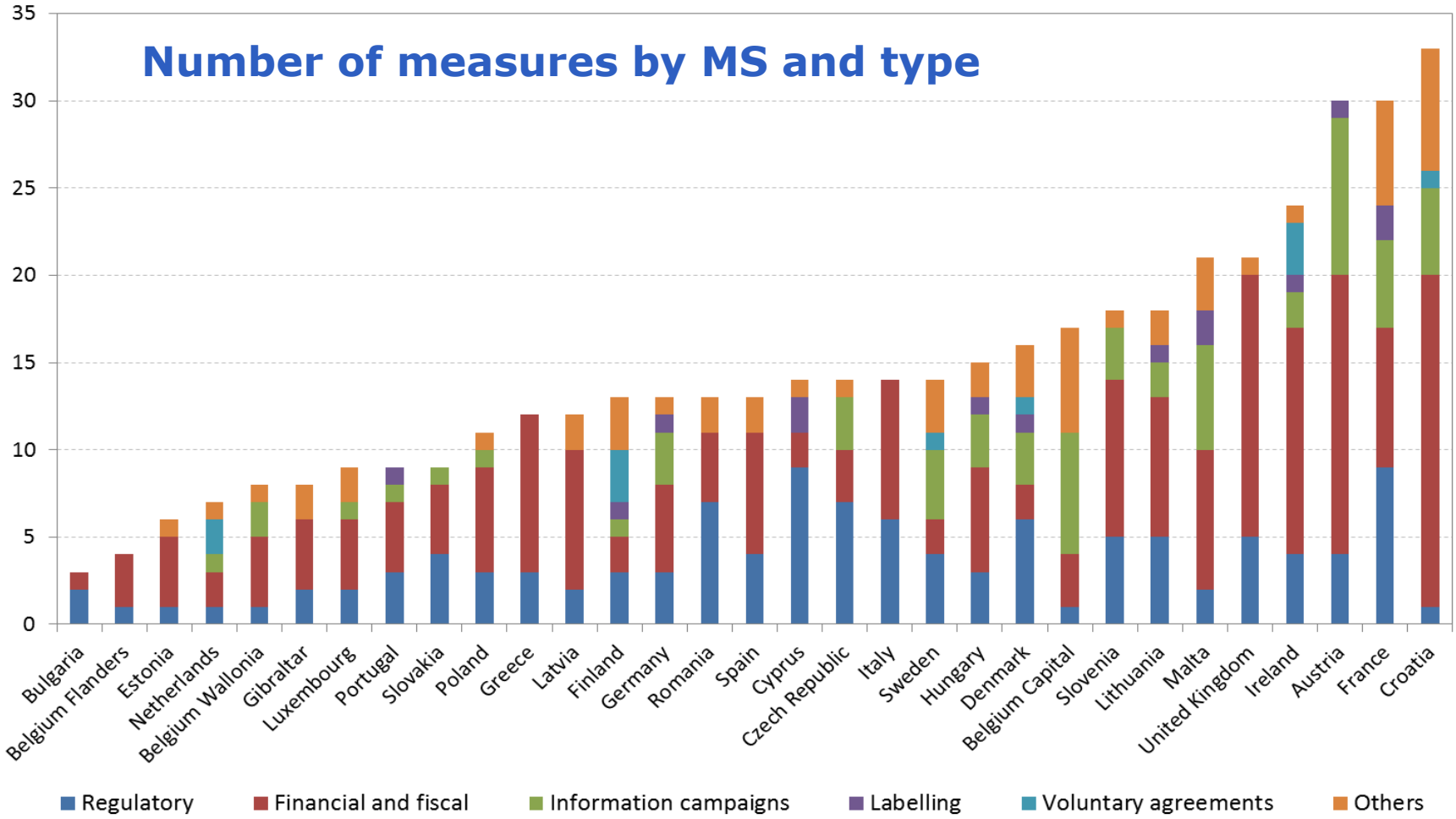
25 strategies fully compliant , 5 partly, only 1 non-compliant

- Core of the majority of the strategies;
- Types of measures: **Regulatory**, **Financial/fiscal**, **Labelling**, **information campaigns**, **Voluntary Agreements** and **Others.**

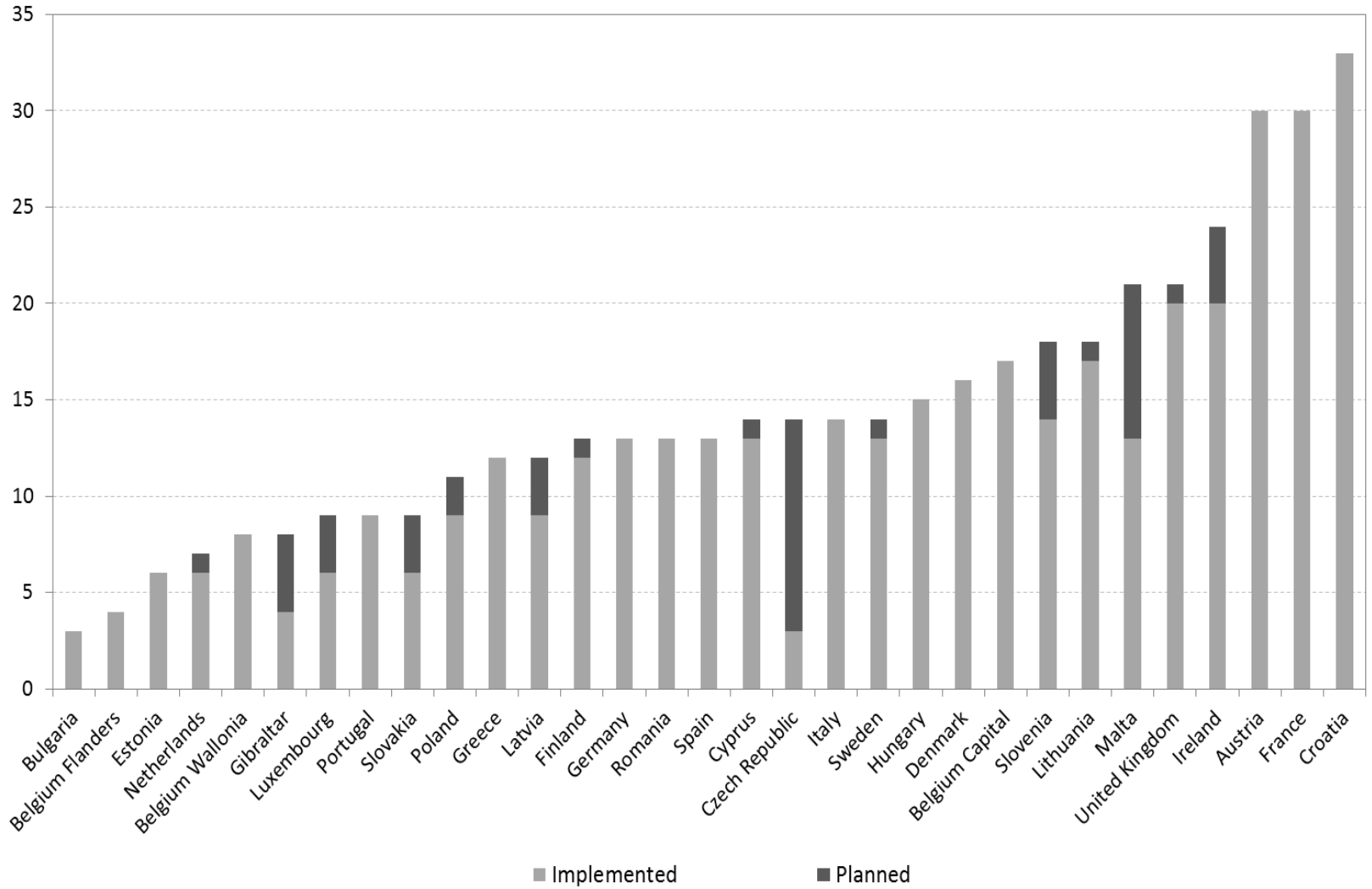
BEST PRACTICE: SPAIN

- Spanish strategy provides a comprehensive description of the existing policies. A number of measures are in place or planned, both financial and regulatory;
- Barriers are also well identified, together with some idea on how future regulation should target them.

Great heterogeneity of policy packages in different MSs



The majority of MSs reported only existing policies



Innovative approaches

MSs 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 considered the following aspects in the selection of these approaches:

- Integrated innovative financing schemes;
- Policies linking the National and local level of renovation;
- Measures that consider district aspects;
- Synergies with research and innovation programmes.

Innovative approaches

Regulatory:

- The **UK**'s mandatory minimum energy efficiency standard for rented properties

Financial and fiscal:

- **FR** Innovative renovation financing scheme: Energies Posit'if
- **NL** "Energiesprong" (Energy Leap)
- **IT** "Conto Termico" (Thermal Account)

Information campaign:

- **LV** "Let's live warmer!" information campaign

Other measures: Research and Innovation

- Research programmes in the **UK** and **DE**

Forward-looking perspective to guide investment decisions – Art.4(d)

17 strategies fully compliant , 8 partly, only 6 non-compliant

- Section that caused most difficulties and the weakest one of the majority of the strategies. Few MSs interpreted correctly this requirement, providing different scenarios of renovation options and a clear roadmap for their implementation.

BEST PRACTICE: GREECE

- 7 scenarios provided (5 residential, 2 non-residential), with different grades and rates of renovation.
- Very ambitious forward-looking perspective: at least 80% of the existing buildings to be renovated by 2050;
- Three renovation phases up to 2050: *initial, acceleration* and *stabilisation*, and for each of them several actions are proposed, covering all main areas of intervention;

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

20 strategies fully compliant , 7 partly, only 4 non-compliant

- Few strategies report issues beyond energy efficiency (eg indoor comfort and air quality, employment, externalities etc)

BEST PRACTICE: Romania

- Very detailed estimate of the building renovation benefits;
- 4 renovation scenarios have been analysed in terms of energy savings, employment and CO2 reduction at 2050. Individual and societal benefits have been identified.
- economic value to wider benefits assigned (i.e. Economic stimulus, societal health, environmental benefits)
- Assessment of overall social benefits: almost 5 time the value of the energy cost saved alone (multiplication value 4.6).

Conclusion and Recommendations 1/2

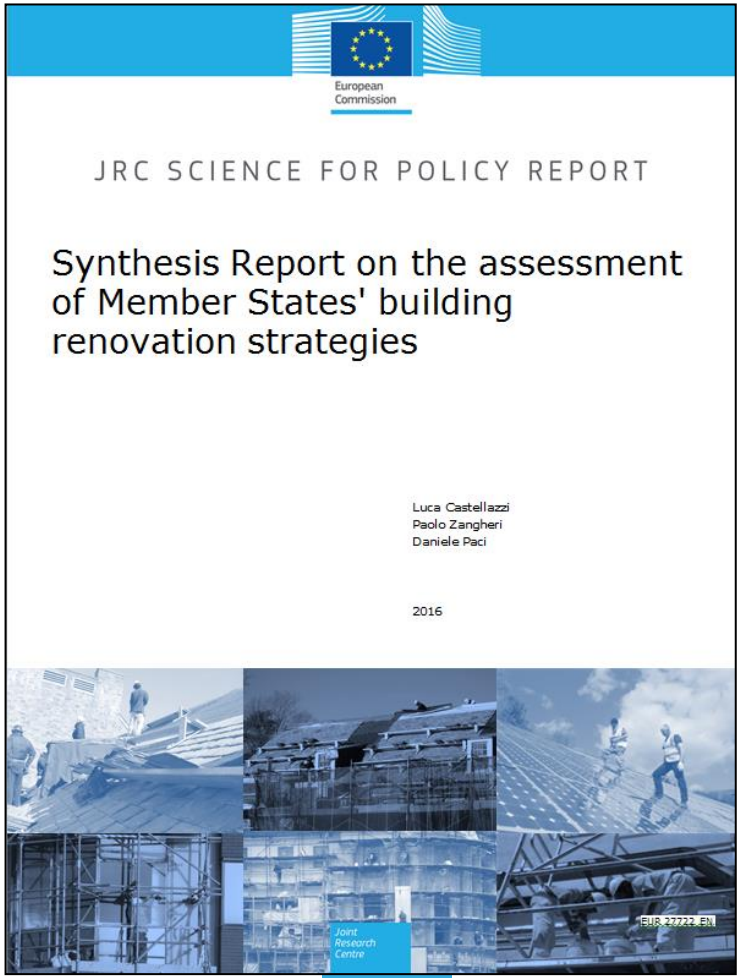
- Large majority of strategies **satisfactorily** addressed the Art4 EED main elements;
- Few MSs reported **"planned" measures**. A vision on the evolution of future policies and measures should be provided;
- A clear indication of **renovation targets** is often missing;
- Few MSs provided **a scenario analysis** on the renovation options, to decide the most appropriate (cost-effective) level of intervention. **Sensitivity analysis** of the main parameters of the study should also be performed;
- the importance of **R&D** in the building sector often neglected

Conclusion and Recommendations 2/2

- The majority of the strategies did not report **issues beyond** energy efficiency (**indoor comfort/air quality**, externalities);
- **Non-residential** building stock is not well covered and described. Improve the collection of data and analysis;
- **Evaluation** / **monitoring** of the policies implemented should also be a section in the future strategies.
- **Strategy as an integrated document**. Each section should be related to the others in a conceptual flow in order to have a more **systematic view** and develop more coherent and complete strategies.

The JRC report is available here:

http://iet.jrc.ec.europa.eu/energyefficiency/



Thank you for your attention

Luca.Castellazzi@ec.europa.eu

DG Joint Research Centre (JRC)
IET - Institute for Energy and Transport
Ispra - Italy
http://www.jrc.ec.europa.eu

Evaluation methodology

European Commission

Information provided on the residential building stock

Member State/Item	Building categories	Age bands	EPC distribution	Climatic zones	Ownership
Austria					
BCR					
Belgium FL					
Belgium Wa					
Bulgaria					
Croatia					
Cyprus					
Czech Republic					
Denmark					
Estonia					
Finland					

= information missing

= information provided with a MEDIUM level of detail

= information provided with a GOOD level of detail

Cost-effectiveness approaches of renovation – Art. 4(b)

Lessons learnt

- Insulation of roof and external walls, replacement of single-glazed windows, improvement of the envelope air-tightness and upgrade of boilers are generally considered cost-effective;
- Installation of mechanical ventilation systems (including heat recovery), ground source HPs, efficient lightning and cooling systems (in non-residential) 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.