Energy renovation: it's time for a paradigm shift in policy design!

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Abstract

The "*Clean Energy for All Europeans*" package confirms the pivotal role of the EU building stock in meeting EU 2030 climate and energy targets. In fact, the projected decarbonisation of the EU energy system is mainly based on the renovation of existing buildings and the increased penetration of renewable energies in heating, cooling and power generation. This paper analyses the expected impacts of the "*Smart Finance for Smart Buildings*" initiative and the proposed changes to the Energy Performance of Buildings Directive and the Energy Efficiency Directive on the emerging energy renovation market. The French energy renovation market is used to illustrate the weaknesses of the proposals. The author concludes that there is a need for a paradigm shift in policy design and funding allocation to meet Europe's obligations under the 2015 Paris Climate Agreement.

Keywords: Clean Energy Package, Smart Finance for Smart Buildings, EPBD, EED, Zero Energy/Carbon Building, Paris Climate Agreement, Efficiency First.

Introduction

The "*Clean Energy for all Europeans package*", also known as a "winter package", released by the European Commission on November 2016, anticipates the leading role of the building stock in the decarbonisation of the EU energy system [1]. Compared to the baseline scenario (EUCO27), which aims at 27% energy savings by 2030, greenhouse gas (GHG) emissions are projected to fall by 9% in the residential sector and by 7% in non-residential buildings if a 30% energy savings target (EUCO30 scenario) by 2030 is adopted jointly by the European Council and the European Parliament. Emissions reduction must go further down if a 40% energy savings target (EUCO+40 scenario) by 2030 is adopted, as the European Parliament and some stakeholders call for. Compared to the EUCO27 scenario, emissions in the residential sector would have to be reduced by 48% while in the non-residential sector, the projected emissions reduction is at 36% (Figure 1).

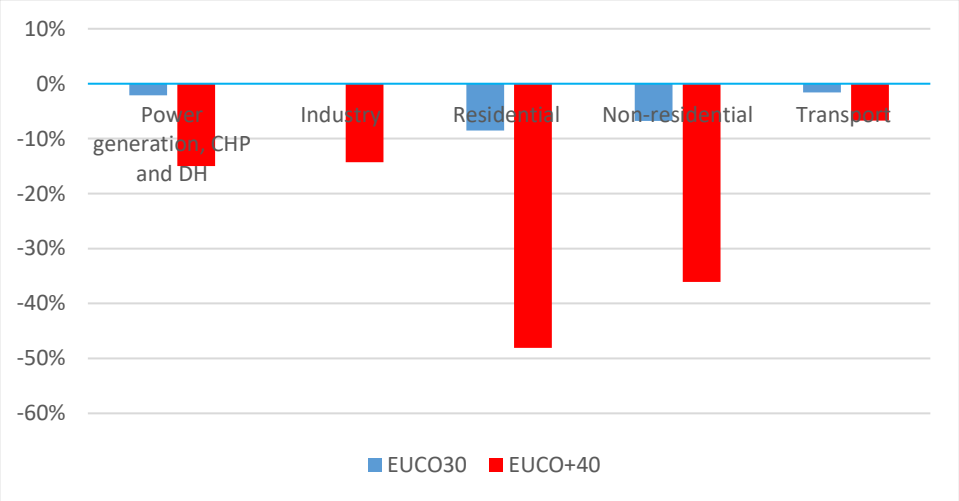

Figure 1: Percentage change of GHG emissions per sector compared to the baseline scenario, EUCO27. Source: PRIMES 2016

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The projected decarbonisation of the EU building stock results from the assumption that annual renovation rates will increase over time leading to reduced energy consumption and increased integration of renewables in buildings. Consequently, this would facilitate the shift to electric heating systems leading to further integration of buildings to the grid. Moreover, the "Winter Package'' proposes changes in both the Energy Performance of Buildings Directive (EPBD) [2] and the Energy Efficiency Directive (EED) [3]. The package also includes a non-legislative proposal, known as "Smart Finance for Smart Buildings'' (SFSB) initiative [4]. The aim of the SFSB initiative and the proposed changes to the existing legislation is to accelerate the energy transition of the EU building stock from being an energy waster to being highly energy efficient and energy producer by removing the identified barriers to ambitious energy renovation and mobilising private finance.

This paper assesses whether the SFSB initiative and the proposed changes to the EPBD and the EED will create enough demand for energy renovation and make existing finance ready to trigger ambitious large-scale renovation projects allowing for costs and burden reductions. The analysis shows that ambitious energy renovation is unlikely to happen without requiring building owners to renovate their buildings at a certain level of performance and defining the level of ambition to achieve after renovation. With the entry into force of the Paris Climate Agreement, the cost-optimum level of energy performance for renovated buildings should be set at zero energy ideally for each building if not for clusters of buildings.

The SFSB initiative proposes to bundle funding dedicated to energy renovation from the European Structural and Investment Funds (ESIF) with those of the European Fund for Strategic Investment (EFSI) within the national/regional investment platforms to be set by member states. Revenues from energy taxes, Emission Trading Schemes (ETS) and Energy Efficiency Obligations (EEOs), which are important funding sources for energy renovation, are not considered for bundling by the SFSB initiative. The expected impacts from the investment platforms might, therefore, be limited, as shown by the French case study.

Moreover, the bundled funding will be made available for Energy Services Companies (ESCOs) and/or third-party financing which would play a role of one-stop-shops and make finance available for individuals. However, experiences from the field show that existing ESCOs and third-party financing schemes do not trigger zero energy/carbon renovation nor have they been successful in scaling-up existing projects at regional/national levels [6]. Prohibitive costs of ambitious energy renovation and the mitigation of the financial and/or technical risks by existing ESCOs and third-party financing are major barriers to the expected role the one-stop-shops would play in scaling-up ambitious energy renovation projects [7]. Likewise, member states may decide to not set up the investment platforms and/or the one-stop shops as the SFSB is a non-legislative proposal and thus there is no legal obligation to do so.

Above all, the SFSB initiative and the proposed changes to the EPBD and the EED assume that individuals will take the initiative to renovate their homes and financial institutions would provide finance for energy renovation if they are both well-informed about the benefits of energy renovation. The "De-risking Energy Efficiency Platform, DEEP'' was developed at EU level for this purpose. However, existing similar tools at national level [8] have, so far, failed in shifting the component-based energy renovation market which is financed, mainly, by grants to a self-financed energy renovation market delivering cost-effective and holistic energy renovation aiming at zero energy/carbon buildings.

Overall, the impact of the "Winter Package'' on energy renovation might well be limited, as shown in the following sections, unless the European Parliament asks the European Commission to further strengthen existing instruments keeping in mind that energy renovation is a societal issue, which cannot be addressed by individuals.

Analysis of the proposed changes to the EPBD and the EED

The proposed changes to the EPBD, which will have a direct impact on energy renovation, include measures to link financial incentives provided by public funds with the energy savings achieved. However, the calculation of the savings will be based on the cost-optimum methodology, which does not lead to ambitious energy renovation. In fact, using this methodology, the cost-optimum level ranges between class C and class B (Figure 2). In most member states, energy consumption of buildings in class B and C is far from zero energy consumption and might well lead to lock in the savings potential until the next round of renovation. Literature suggests a renovation round of 30 years for residential buildings and 15 years for non-residential ones [9]. In practice, shallow renovation puts Europe at risk of not meeting its 2050 decarbonisation objective.

The proposed changes to the EPBD do not require building owners to renovate their buildings at a certain level of energy performance. It is, therefore, assumed that energy renovation is required only if buildings undergo major renovation as defined in the current version of the EPBD [2]. The major renovation concept applies if "the total cost of the renovation relating to the building envelope or technical systems is higher than 25% of the value of the building, excluding the value of the land upon which the building is situated; or if more than 25% of the surface of the building envelope undergoes renovation" [2]. Based on this definition, the number of residential buildings undergoing renovation to be considered for setting minimum energy performance requirements will be limited [10]. Overall, linking finance to the achieved energy savings is a good practice. However, the impact of this measure will be weakened by the lack of requiring an ambitious energy performance target for the renovated buildings.

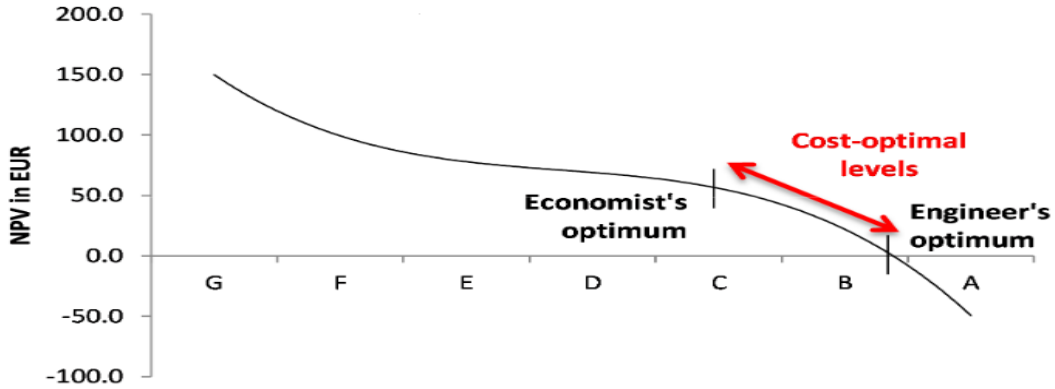

Figure 2: Net Present Values for different optimums. Source: EIB presentation at EEFIG workshop in 2017

Among the proposed changes to the EED, the continuation of Article 7 of this directive with its Energy Efficiency Obligation Schemes (EEOSs) will have a direct impact on energy renovation. For the current period, member states' reporting shows that 42% of the overall savings under Article 7 will take place in the building sector [11]. With savings from financing schemes and grants estimated at 19% out of the total and those from taxes at 14% out of the total [11]. The share of savings from energy renovation using EEOSs varies across member states. The United Kingdom expects 100% of the savings to take place in buildings [12], followed by France with 67% [13] while in Slovenia this share goes down to 7% [14]. Consequently, total public investments through EEOSs in energy renovation varies across member states. It is estimated for 2015 at €1,072 million in the United Kingdom, against €657 million in France and only €2 million in Slovenia [15]. While, the implementation of EEOSs has led to the emergence of a new market and new actors in the building sector, existing literature does not provide evidence about the contribution of EEOSs to ambitious energy renovation. In fact, EEOSs allow for providing grants to purchase energy efficient products. However, the amount of each grant is too low to trigger ambitious energy renovation, especially if the grant cannot be combined with other incentives such as tax credit, tax reduction and eco-loans.

Analysis of the "Smart finance for Smart Buildings'' Initiative

The SFSB initiative is a non-legislative proposal included in the "Clean Energy for all Europeans package''. The initiative is a de-risking framework, articulated around three pillars where each pillar addresses one set of risks. SFSB is based on lessons learnt at EU and national level in mobilising private financing to accelerate energy renovation of existing buildings by removing the identified barriers. The initiative builds on existing EU financing strands and instruments that support energy efficiency and deployment of small-scale renewables, such as the European Structural and Investment Funds (ESIF) which allocates around €18 billion for energy efficiency (out of which €13 billion are allocated to buildings) over the period 2014-2020 and the European Fund for Strategic Investments (EFSI), where energy efficiency projects represent more than 10% of the EFSI guarantee usage so far [1].

- The first pillar of the initiative aims at financial de-risking by merging EU funds to provide an easy access to EU finance and a guarantee mechanism, which would lower interest rates for energy renovation. This would reduce financial costs of energy renovation and would be implemented through national/regional investment platforms. These platforms have been inspired by the Private Finance for Energy Efficiency (PF4EE) scheme funded by the EU and managed by the EIB and the scheme implemented in Germany via KfW. The platforms will ensure an effective combination of European funds from the European Structural and Investments Funds (ESIF) and the European Funds for Strategic Investments (EFSI). They would play the role of a risk sharing facility, allowing for mitigation of the risk of financial intermediaries and will also encompass technical assistance for the rolling out of lending programmes [1].
- The second pillar of the initiative aims at technical de-risking by providing technical assistance to allow for aggregation of small projects. This would reduce technical costs of energy renovation and would be implemented through local one-stop-shops, which are inspired by the existing ESCOs/Third-party financing models. The aim is to reduce the transaction costs, address operational obstacles, and develop project pipelines of bankable projects allowing for economies of scale [1].
- The third pillar of the initiative aims at behavioural de-risking by providing accurate and detailed information on energy consumption, energy savings and the cost of energy renovation to various market actors. The objective is to change the perceived risk of energy renovation and to trigger renovation work. It will be implemented through various EU/national/regional information platforms [1]. The DEEP database and the European building observatory were developed for this purpose.

The proposed instruments under the SFSB initiative is a valuable step forward. However, the initiative will only succeed to mobilise private financing at the scale needed if the regulatory framework is strengthened by requiring building owners to renovate their buildings at an ambitious level of energy performance (see previous section). Furthermore, the initiative is unclear about how EU funds will be bundled with ETS, EEOSs and tax revenues, despite the high share of these revenues in the overall public funding allocated to energy renovation as shown by the French schemes below, and if the investment platforms will have the technical capacity to bundle all the funds available for energy renovation. It is only through the bundling of all those sources that there would be sufficient funds for an ambitious renovation.

Moreover, the initiative does not address the technological costs which makes the pay-back time and the costs of zero energy renovation prohibitive and shallow renovation cost-effective in the short-term (Figure 3). The SFSB initiative will reduce the financial costs by lowering the interest rates of renovation loans while reducing the technological costs requires moving away from step by step renovation towards an integrated and holistic renovation [7,10].

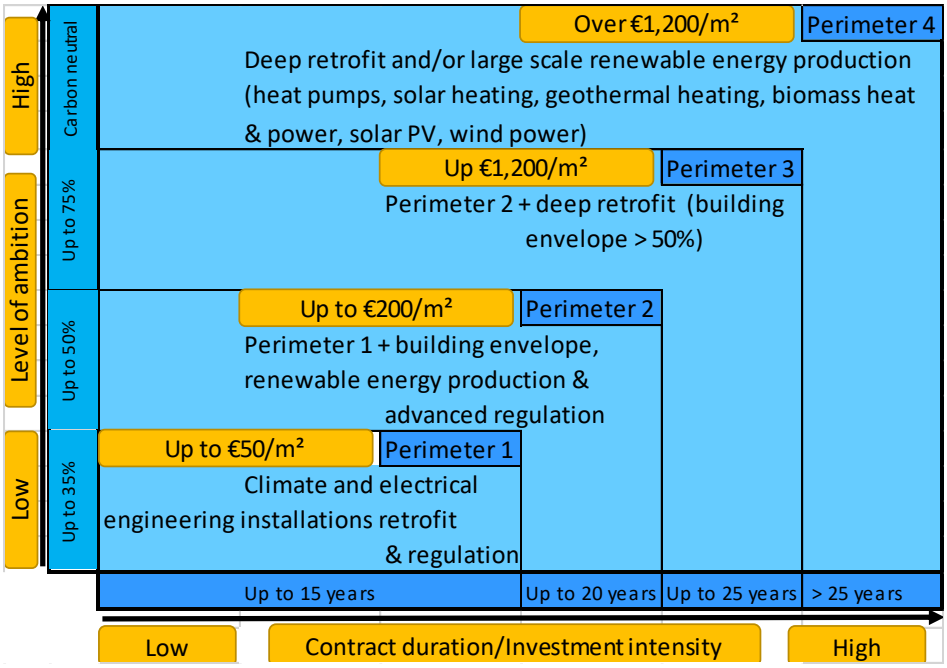

Figure 3: Energy renovation costs and pay-back time based on the quality of the renovation. Source [6]

Achieving this objective necessitates "industrialising" the development of energy renovation kits for each climate zone, building type and construction period and the automation of renovation tasks [10]. Large-scale projects should make the industrialisation of energy renovation cost-effective and more attractive to the industry [7]. Unfortunately, it is unlikely that the SFSB would lead to the industrialisation and the modernisation of energy renovation given the identified weaknesses of the initiative (Figure 4). The SFSB proposal also suffers from the uncertainties about the availability of EU funds for the period 2021-2030. This may increase the perceived risk by investors and put the overall "Winter package" at risk of failure.

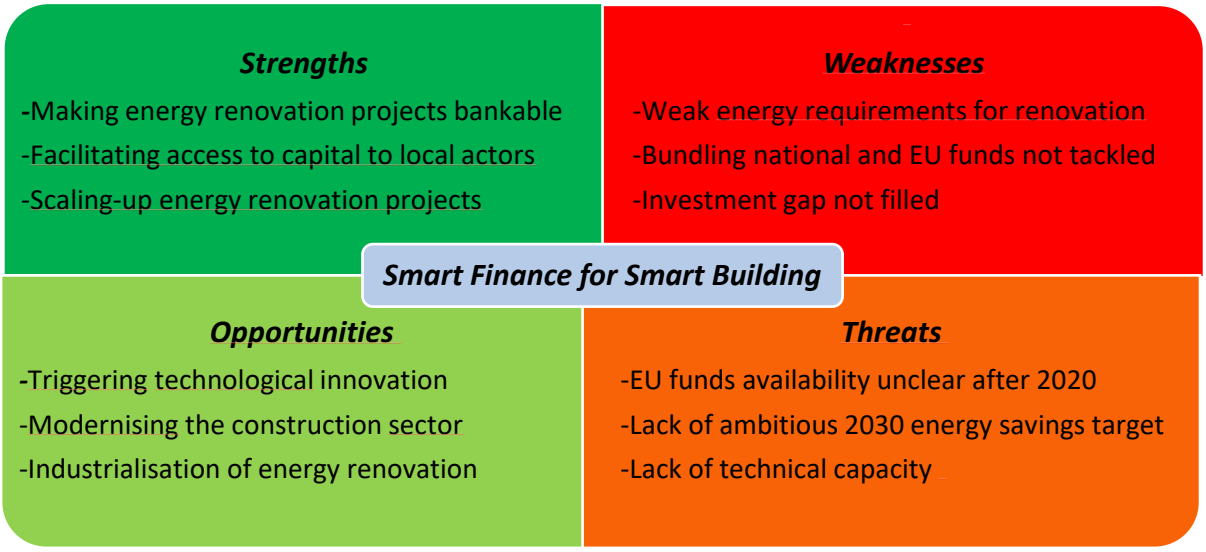

Figure 4: SWOT analysis of the SFSB initiative. Source [1]

Impacts of the SFSB and the proposed changes to the EPBD and the EED on the French energy renovation market

The impacts of the SFSB and the proposed changes to the EPBD and the EED on the energy renovation market are assessed for France. The French energy renovation market is the third largest in Europe after the German and the Italian markets. The French energy renovation market was estimated at €13 billion in 2015 [7]. The same year, the French government adopted an energy transition law for green growth [16] which sets a target to make the French building stock low energy consumption by 2050. The government must report annually to the parliament on the progress made on the implementation of the renovation plan as set in the energy transition law.

The French energy renovation plan aims at renovating, starting from 2017 and every year, 500,000 homes out of which half should be homes occupied by low-income households. Several decrees have been adopted to ensure a smooth implementation of the energy transition law. A decree which requires setting minimum energy performance requirements for buildings undergoing renovation of the façades (which is required by law in France since the 19th century) and/or extension was adopted a year later [17]. This decree goes beyond the current definition of major renovation included in the EPBD (see section on EPBD changes) to include all buildings undergoing renovation and/or extension.

The French building energy code for existing buildings, however, is not as ambitious as the one for new buildings [18]. In fact, while for new buildings, energy consumption for regulated loads (heating, cooling, ventilation, lighting and hot water) is set on average at maximum 50 kWh/m²/yr of primary energy for all buildings, for existing building, requirements are set based on the size and the construction period of each building. Energy consumption for existing buildings, with more than 1,000m² and/or built after 1948, is set on average at a maximum ranging from 80 to 195 kWh/m²/yr of primary energy for residential buildings and for non-residential buildings, the requirement is to reduce energy consumption by 30% compared to the current consumption. Furthermore, the energy consumption to consider under this requirement relates only to heating, cooling and hot water contrary to the regulated energy consumption for new buildings which includes also electricity consumption due to lighting and ventilation. For existing buildings with less than 1,000 m² and/or those built before 1948 requirements are not set for the overall consumption. Instead the French building energy code includes minimum energy performance for each component and energy system which could be renovated separately. In practice, this means that residential buildings do not have to be fully renovated which increases the lock-in effect risk.

From a financing perspective, France could be considered as a champion in the use of all existing funding mechanisms for energy renovation (Table 1). France used 100% of its ETS revenues, which is equivalent to €215 million[1], for energy renovation of buildings occupied by low-income households [19]. Regarding EEOSs, the share of energy savings from energy renovation out of the total savings is estimated, in 2015, at 67% which is equivalent to €480 million of public investment through EEOs in energy renovation [15]. By assuming a leverage factor of 1.37 for EEOSs [13], this leads us to a total investment in energy renovation of €657 million through EEOSs in 2015 [15].

The same year, total energy taxes paid by households reached € 14,282 million [20]. The breakdown of the use of the taxes is not reported by the French government. However, the updated National Energy Efficiency Action Plan (NEEAP), submitted in 2017 to the European Commission, shows that i) €1600 million were spent through tax credits used for energy renovation with a leverage factor of 5, ii) €1,100 million were spent on reduced VAT related to energy renovation work and iii) €110 million were spent for the eco-loans scheme [21]. The French survey OPEN 2015 about energy

1 In the absence of the French figures for the use of ETS revenues in 2015, we assumed for the purpose of this paper the figure reported for 2014.

renovation shows that tax credit and reduced VAT for energy renovation work are the two most used measures by households [21]. The funding mechanism related to these governmental expenditures is not mentioned in the NEEAP. However, if we assume that energy taxes paid by households is the funding mechanism used by the French government for these incentives, this would imply that around 20% of energy taxes paid by households were used in 2015 for the renovation of their homes. Similarly, if we consider a leverage factor of 5 for tax credit as reported in the NEEAP and assume a leverage factor of 2 for reduced VAT and eco loans, total investment generated by 20% of energy taxes paid by households, in 2015, would have been €10,420 million.

Regarding EU funds, the French projects signed, so far by the EIB for the use of EFSI for energy efficiency investments, are all related to financing the existing French one-stop-shops and funds dedicated to energy renovation such as Energie Positif and EIFFEL Energy Transition Fund [22]. The total support provided to France by EFSI is €194 million and the leverage factor considered by EIB is 4 [22]. Similarly, the reporting available on the use of ESIF shows a financial support to energy renovation in France of €464.5 million over the period 2014-2020 [23]. This is equivalent to €66.4 million per year if it is equally distributed over the seven-year period. Considering the leverage factor of 4 for EFSI as suggested by the EiB and a leverage factor of 2 for ESIF, this would lead to a total investment in energy renovation in France of €909 million that would have been triggered by the bundled EU funds, in 2014. Summing all the investments made in France in 2015 for energy renovation leads us to €12,201 million (Table 1).

The French government reported that 388,000[2] homes had been renovated annually with approximately 100,000 occupied by low-income households [21]. If the calculated total investment in energy renovation would have been distributed equally among the renovated homes, this would mean an investment of €31,400 per renovated home (Table 1). Given that energy renovation costs range from €50/m² for shallow renovation to over €1,200/m² for zero energy renovation (Figure 3), it will be impossible for France to achieve its target of making all its building stock low energy consumption without drastic reduction of energy renovation costs.

EU instrument	Funding mechanism	Total amount (€ million)	Public investment in energy renovation (€ million)	Leverage factor	Total investment in energy renovation (€ million)
ETS directive	ETS	215	215	1	215
EED	EEOSs	713	480	1.4	657
Electricity and gas directives	Energy taxes	14282	1600 (Tax credits)	5	8000
			1100 (Reduced VAT)	2	2200
			110 (Eco-loans)	2	220
Multi-annual Financial Framework	ESIF		66.4	2	133
European Investment Plan	EFSI	194	194	4	776
Total			3765.4	NA	12201

Table 1: Investment in energy renovation in France in 2015

2 In the absence of the French figures for the number of renovated homes in 2015, we assumed for the purpose of this paper the figure reported for 2014.

The way forward

The French example should be a wake-up call for the way forward. The analyses of the SFSB and the proposed changes to the EPBD and the EED show a very low impact of the "winter package'' on the energy transition of the EU building stock. The proposed bundling of EU funds within the investment platforms, to be set by member states, would be equivalent in the case of France to 6.9% of total public funding allocated to energy renovation or 7.5% of total investments in energy renovation in 2014. France is one of the leaders and yet we see the difficulties that lie ahead given the prohibitive cost of energy renovation. Beyond France, the EU is at serious risk of not meeting its energy and climate targets and consequently its obligations under the Paris Agreement without a serious cut in energy renovation costs which should go beyond the €40,000 per home targeted by Energiesprong. The existing legislative and non-legislative proposals still on the table should be complemented with a proposal to accelerate the industrialisation of energy renovation.

References

[1] Clean Energy for All Europeans Package: Do the Commission's Impact Assessments Assign the Right role to Energy Efficiency? Y. Saheb, OpenExp, 2017
[2] Directive 2010/31/EC on the energy performance of buildings, European Commission, 2010
[3] Directive 2012/27/EC on energy efficiency, amending Directives 2009/125/EC and 2010/30/EU and repealing Directives 2004/8/EC and 2006/32/EC, European Commission, 2012
[4] Annex to the communication on the Clean Energy for All Europeans Package entitled "Accelerating Clean Energy in Buildings'' known as ''Smart Finance for Smart Buildings'' initiative, European Commission, 2016
[5] Commission Delegated Regulation No 244/2012 on supplementing Directive 2010/31/EU of the European Parliament and of the Council on the energy performance of buildings by establishing a comparative methodology framework for calculating cost-optimal levels of minimum energy performance requirements for buildings and building elements, European Commission, 2012
[6] Increasing capacities in cities for innovating financing in energy efficiency, L. Vanstraelen and al,City Invest, 2015
[7] Energy Transition of the EU Building Stock: Unleashing the 4th Industrial Revolution in Europe, Y. Saheb, OpenExp, 2016
[8] http://www.observatoirebbc.org/[9] Energy Technology Perspectives, IEA/OECD, 2008
[10] Energy Renovation, the Trump Card for the New Start for Europe, Joint Research Centre, 2016
[11] The Member State's plans and achievements towards the implementation of Article 7 of the Energy Efficiency Directive, Report to the European Parliament by T. Fawcett & J. Rosenow, 2016
[12] Costs and benefits of Energy Efficiency Obligations: A review of European programmes. J. Rosenow, J & E. Bayer, Energy Policy 107, pp. 53-62, 2017
[13] EEOs in Europe: what's new in France since 2015, E. Trauchessec, Presentation at 4th European Workshop Meeting of the White Certificates Club, June 2017.
[14] EEOS in Slovenia, M. Suhadolc, Presentation at 4th European Workshop Meeting of the White Certificates Club, June 2017.
[15] Estimates made by J. Rosenow for this paper based on various sources
[16] Loi n° 2015-992 du 17 août 2015 relative à la transition énergétique pour la croissance verte, Journal Officiel de la République Française n°0189 du 18 août 2015, page 14263.
[17] Décret n° 2016-711 du 30 mai 2016 relatif aux travaux d'isolation en cas de travaux de ravalement de façade, de réfection de toiture ou d'aménagement de locaux en vue de les rendre habitables, Journal Officiel de la République Française n°0125 du 31 mai 2016.
[18] Modernising Building Energy Codes to Secure our Global Energy Future, Y. Saheb & al, IEA, 2013
[19] Eionet, Reporting Obligations Database (ROD), Environment Energy Agency, 2017
[20] Environmental taxes by economic activity (NACE Rev. 2), Eurostat database, 2017
[21] Rapport de la France en application des articles 24.1 et 24.2 de la directive 2012/27/UE du Parlement Européen et du Conseil du 25 octobre 2012 relative à l'efficacité énergétique. Actualisation 2017
[22] EFSI project list, EiB, 2017
[23] ESIF, 2014-2020 financing plan, DG Regio, European Commission, 2017.

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