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STACCATO

Sustainable Technologies And Combined Community Approaches Take Off

Integrated project

Concerto

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"STACCATO stands for Sustainable Technologies And Combined Community Approaches Take Off. With the Staccato project three European capital districts: Amsterdam-Noord (Amsterdam), Óbuda (Budapest) and Oborishte (Sofia), demonstrate sustainable energy concepts in representative existing residential areas. The urban areas all face technical arrears and a lack of social cohesion.

These large-scale demonstration sites in combination with research and development aimed at innovative and reproducible renovation concepts and approaches, serve the purpose to accelerate the transition to a sustainable energy supply in existing housing areas in Western and Eastern Europe.

Redevelopment is a unique opportunity to implement EE measures and sustainable energy sources. The three city districts jointed in Staccato will integrate large solar thermal systems in their energy supply. The heat distribution based energy infrastructure will be modernised and the building envelopes will be improved drastically resulting in healthy indoor climates and low energy bills.

The Staccato project started on 8 November 2007 and is an example for other renovation projects in Europe. Staccato is carried out under the European Concerto initiative" [1].

1 http://www.concerto-staccato.eu/about-staccato.html

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Abbreviations

EE	Energy Efficiency
EED	Energy Efficiency Directive
EPBD	Energy Performance in Buildings Directive
EPCo	Energy Performance Coefficient
EPC	Energy Performance Certificate
EPN	The Energy Performance Norm
ETS	(EU) Emissions Trading System
GDP	Gross Domestic Product
MS	Member State (of the European Union)
MEPS	Minimum Energy Performance Standard
NEEAP	National Energy Efficiency Actions and Plans
NZEB	Nearly Zero-Energy Building
RES	Renewable Energy Source(s)

Report Summary

- STACCATO projects were implemented in countries with different economic and political backgrounds, with legislative systems based on different approaches, political processes and particularities of their real estate markets. Thus, many different types of barriers had to be dealt with during the projects' realization: financial, institutional and administrative, connected to lack of awareness, skills and other issues. Based on the STACCATO experience and the analysis of relevant policies, the barriers hindering development of energy efficiency projects in the three STACCATO countries are summarized and related recommendations for their elimination are given in the report.

- All three countries participating in the STACCATO initiative are obliged as EU member states to follow certain requirements on adoption of community directives, such as the Energy Performance in Buildings Directive (EPBD). The Netherlands is the country with the most comprehensive and stable national policy framework in the field of energy efficiency in buildings among the three states, with a framework which was developed long before the EPBD. At the same time, implementation of the EU Directives helps newer member states such as Hungary and Bulgaria to establish a solid legislative and regulatory framework in the field of energy efficiency.

- The EU has obliged all member states to set energy efficiency targets incorporating the goal for substantially increasing the share of 'Nearly Zero-Energy Buildings' by 2020. It is, however, questionable if these targets can be achieved. By incorporating a renewable energy component into the large-scale retrofit, STACCATO delivered higher levels of performance in comparison to a typical energy efficiency project: the achieved emissions reductions are around 50%. This is, however, still not a 'nearly zero' result, especially in contrast to such projects as SOLANOVA which had an emissions reduction of 80-90%. From this perspective, a policy choice should be made: achieving the 'nearly zero' target at a slower pace or establishing an immediate renovation standard like STACCATO, which can deliver faster results but may lock-in suboptimal energy performance of buildings for decades.

- It is important to avoid realization of inconsistent policies (such as the Bulgarian Condominium Law, Hungarian 'utilities reduction policy'), which prove to be barriers rather than drivers in implementation of energy efficiency projects. Supportive policy (e.g. EPC requirements, government-sponsored awareness raising programmes and direct financial support for refurbishments) should be encouraged instead.

- Municipal authorities played an important role (organizational, informational, and in Budapest also financial) at all the three sites. Particularly in multiple owner-occupier structures they can greatly help develop capacity in their locality. NGOs can also play an important awareness-raising role, as was demonstrated during the project by EnergiaKlub in Hungary.

- The Amsterdam model of housing corporations is efficient and creates actors with knowledge, motivation and access to capital to implement large-scale renovations. However, the problem of split incentives needs to be overcome, especially as residents have strong rights under Dutch law. By contrast, low-income owner-occupiers in Budapest and Sofia lack organizational capacity and capital. Therefore, developing such capacity should be a major policy objective in Hungary and Bulgaria.

- The STACCATO project experience has indicated that effective associations of homeowners are an important piece in the jigsaw, acting as a driver where present (as in Hungary) and a barrier where absent (as in Bulgaria).

1. Introduction

This report focusses on a comprehensive review of Energy Efficiency (EE) related policy in the three STACCATO countries – the Netherlands, Hungary and Bulgaria – and separate chapters are devoted to each of these countries, looking at the main relevant actions currently taken at all levels of government as well as analyzing strengths and weaknesses of the current policy regimes for promoting or hindering large-scale take up of EE retrofit in residential buildings in the countries involved (details of the main issues to be covered in the individual country chapters and the chapter structure is provided in section 1.4 below). However, since all three countries are governed and guided by EU-level energy policy it is important to clarify at the outset the major features of EE policy at the EU level, as this frames the national-level discussion and recommendations for EU-level policy are also included at the end of the report based on the experience of the three countries in focus, and of the STACCATO project. Consideration of EU-level policy in this chapter prefaces the national-level analyses with some general considerations about the major costs, benefits and barriers related to EE which policy makers need to bear in mind.

1.1. EU energy efficiency policy

Reduction of energy consumption and improvement of EE stand among the key objectives of the European Union. Increasing EE is a major element in the Community's energy policy regarded by the European Commission (EC) as the most effective way to reduce carbon emissions, reduce dependence on energy imports, increase competitiveness and stimulate development of energy markets introducing new sustainable energy efficient technologies, and boost the Community's innovativeness and competitiveness (EC 2006).

Implementation of EE measures in the Member States (MSs), including enhanced energy demand management, is thus viewed as one of the high-priority climate change measures to be taken at the Community level. This is especially important in the view of the "20-20-20" EU commitment of a 20% share of renewable energies in total EU energy consumption and a 20% reduction of greenhouse gas emissions by 2020, determined in 2007 and affirmed in 2008.

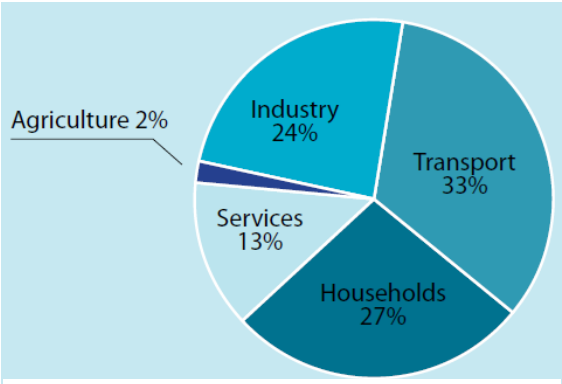


Figure 1. *Final energy consumption by sector*

Among other measures, the EU continues its work on establishment of a solid legislative and policy base for improvement of EE in the buildings sector, which accounts for 40% of total energy consumption of the EU. Energy use in the EU buildings sector represents the biggest share of total energy consumption by the Community, standing above industry and transport figures (Anisimova 2011; see Figure 1). And while only a certain number of new buildings benefit from model energy performance, most of the saving potential will have to be realized in the existing building stock (BPIE 2010).

The EC reports that by 2020 the household sector is expected to constitute 27% of the EU-wide energy savings potential (EC 2006), though the MSs have different energy saving potentials depending on the condition and the size of their housing stock. According to IEA (2008), if the 20% efficiency target is

achieved, the EU would use approximately 13% less energy in comparison to the late 2000s, reducing CO2 emissions by 780 million tonnes each year by 2020 and saving 100 billion € (Kanellakis et al. 2013).

However, as the October 2014 European Council Summit showed, not all EU MSs are yet ready for ambitious energy targets (Euractiv 2014). Although the European Commission called for an efficiency goal of at least 30% in 2030, the target was reduced to an indicative 27% across the EU. The target is legally binding neither at the EU level, nor at national level and is expected to be reviewed by 2020 "…having in mind an EU level of 30%" (EC 2014a). The only currently existing binding target is set by Article 7 of the Energy Efficiency Directive (EED); it is an energy end-use savings target for MSs of 1.5% cumulative annual energy end-use savings.

In recent decades the EU has implemented a variety of EE policies and directives towards sustainable energy development in MSs. In 2006 the Directive on Energy End-Use and Energy Services (ESD) was adopted, which set an indicative target for energy saving of 9% by 2016, requiring the MSs to submit three National Energy Efficiency Action Plans (NEEAPs) in 2007, 2011 and 2014. ESD also put an obligation on national authorities regarding energy saving, promotion and procurement of EE and services. Currently, the new EED and the EPBD stand among the energy policy cornerstones of the Union.

Directive on Energy Performance in Buildings

A key part of the existing EE legislation is the Directive on Energy Performance in Buildings (EPBD, 2002/91/EC) of the European Parliament and Council of the European Union. It came into force in January 2003 and had to be implemented by the EU MSs by January 2006. The Directive required the states to enhance their building regulations, introduce energy certification schemes for buildings, to carry out inspections of all boilers and air-conditioners, while new buildings were expected to "… meet minimum energy performance requirements tailored to the local climate" (EP and CEU 2003). Successful implementation of the EPBD, not taking into account the later recasts, is expected to save 6.5% of the EU's final energy demand (EC 2013a).

As a result of political agreement between the EU MSs, a new amended version of the EPBD was presented in 2009 and the new text of the convention came into force on the 19th of May 2010. Along with a number of other provisions the document introduced a new mechanism of determining and adapting new requirements in the field of EE in buildings, the main goal of the novella being to define the most cost efficient level of fulfillment of the set requirements. The effectiveness of new editions of the EPBD depends on how fully the countries have now complied with the requirements of previous editions. All of the EU MSs are expected to modify their legislation on energy performance of buildings towards reaching the passive house level in existing buildings.

The system of requirements for EE in buildings is reviewed every five years and the next full-scale recast of the EPBD is expected in 2016. It is assumed that the new version will include requirements for active solar and PV systems, as well as on building a life-cycle energy balance, and that the requirements will be based on the most energy-efficient method (EC 2013b).

Energy Efficiency Directive

In order to achieve the EU's 20% headline target on EE, a new EU directive focusing on promotion of EE within the EU MSs came into force in December 2012. According to the EED, all the EU-28 states made a

commitment to more efficient use of energy at all stages: from primary energy transformation to its distribution and final consumption. A common framework of measures established by the Directive includes:

- ✓ setting an indicative national EE target in a preferred form by each of the MSs;
- ✓ undertaking an obligation to achieve the indicated amount of final energy savings over the obligation period (1 January 2014 – 31 December 2020) by using EE obligation schemes or other policy measures;
- ✓ establishing a long-term strategy for mobilizing investment in the renovation of the national stock of residential and commercial buildings;
- ✓ major energy savings for consumers through easy and free access to energy consumption data, individual energy metering etc.;
- ✓ other measures in the energy generation, public and private sectors[2].

Since the national EE targets could be set by the countries in any form they prefer (such as primary or final energy savings, energy intensity or consumption), there is some variation in the EE goals set by the three STACCATO countries, which are shown in the table below. Achieving these targets, including the binding energy end-use 1.5% target by 2020, would require a whole set of measures to be taken, including improvement of energy performance in buildings and specifically in the residential sector.

Table 1. *Energy efficiency reporting targets under the European Commission Energy Efficiency Directive*

Country	Article 3 indicative national EE target for 2020	Absolute levels of primary/ final energy consumption to be reached in 2020 [Mtoe]
The Netherlands	1.5% energy savings per year(partial)	60.7/52.2
Hungary	1113 PJ primary energy consumption in 2020 (236 PJ savings compared to business-as-usual), resulting in 760 PJ final energy consumption	26.6/18.2
Bulgaria	Increase of EE by 25% until 2020 (5 Mtoe primary energy savings in 2020) and 50% energy intensity reduction by 2020 compared to 2005 levels	15.8/9.16

Source: EC 2014a

1.2. Benefits and costs from energy saving

Increasing energy efficiency (EE) of the residential building stock contributes to positive changes in many sectors of the economy: it facilitates improvements in energy security, extends the job market, creates unique business opportunities and improves quality of life (BPIE 2010). For households decrease in energy demand as a result of energy efficiency improvement reduces their energy expenditure and, according to IEA (2012),

[2] Source: Directive 2012/27/EU (EP and CEU 2012)

measures for improving EE provide multiple indirect benefits related to life quality aspects (see Figure 2 below).

On the national level, reduction of energy use significantly contributes to reduction of dependence on imported fossil fuels. In addition, implementation of a large-scale strategy on EE retrofit of residential houses directly and indirectly contributes to growth of employment possibilities which is especially important in such countries as Hungary and Bulgaria where the employment rate is among the lowest in the EU (Eurostat 2014). Other benefits also include positive macroeconomic impacts, uncluding increased GDP and improved trade balance for fuel importing countries (IEA 2012a; Sauter and Volkery 2013). On the EU level, the World Energy Outlook (IEA 2012b) estimated that under 'Efficient World Scenario'[3] the EU could reduce its energy demand by 13% in 2035 as compared to 2010. This, however, would require significant investments and implementation of efficient EE policy measures at both the EU and national levels.

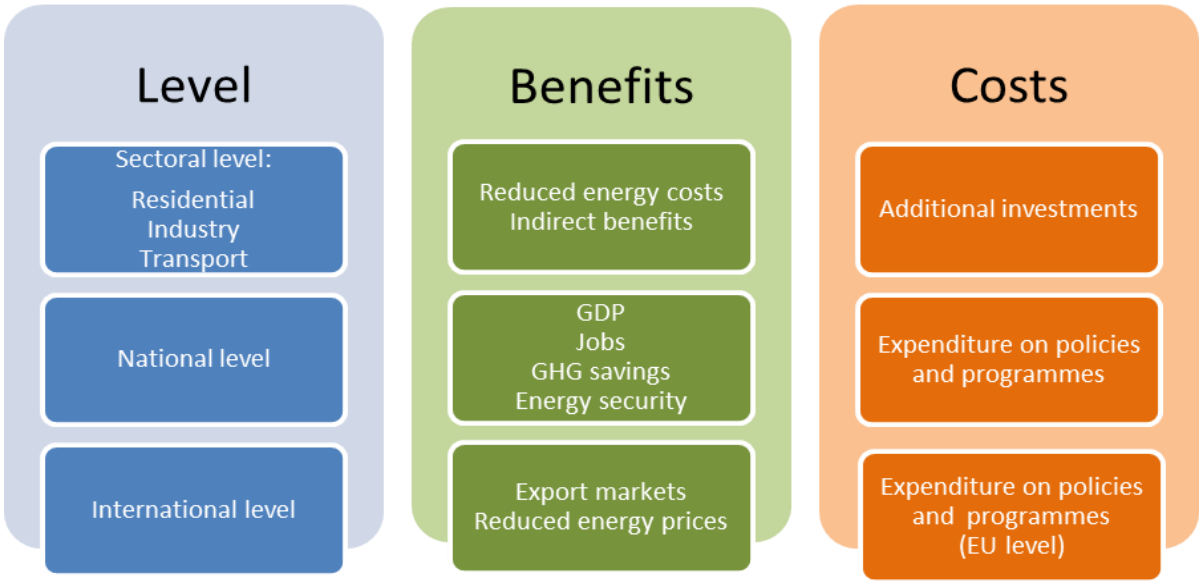


Figure 2. *Different levels of benefits and costs from energy savings*

Source: Sauter and Volkery 2013

1.3. Barriers

On the one hand, all the mentioned benefits provide a strong justification for implementation of energy renovations in buildings. However, various studies (Burman *et al.* 2014; Filippini *et al.* 2014; Guertler and Smith 2006; Popescu *et al.* 2012; Sarkar and Singh 2010; Tuominen *et al.* 2012), as well as the STACCATO experience, show that significant improvement of EE in residential buildings sector has been impeded by numerous barriers. Many of these barriers reflect or result from a lack of information, awareness, capacity, motivation, trust or conviction by either property owner or investor or by key service providers (EPBD 2013).

[3] The scenario implies that all investments capable of improving EE are made so long as they are economically viable and any market barriers obstructing their realisation are remmoved.

In particular, with the adoption of the EPBD Recast in 2010 (Directive 2010/31/EU), the EU MSs faced a range of new challenges: moving towards new and retrofitted nearly-zero energy buildings (NZEB)[4] by 2020 (in case of public buildings, by 2018), as well as application of a cost-optimal methodology for setting minimum requirements for technical systems and building envelopes. The MSs themselves reported a number of commonly encountered barriers hindering improvements in EE (EPBD 2013), notably:

- insufficient/weak regulation, lack of supervision and enforcement;
- low awareness about labelling, technologies, etc.;
- lack of coordination and information flow between housing market actors;
- low priority for EE improvements among the consumers;
- lack of information on EE, lack of trusted information;
- poor training or lack of skills of people implementing EE measures.

In addition, one of the main obstacles for EE improvement is of a purely financial nature. Homeowners face serious challenges in accumulating funds and attracting investments for energy saving measures (EPBD 2013). Even in the Netherlands, where financial instruments and schemes are available for housing corporations (e.g. the Green Fund), potential participants are put off because of complications related to issuing of green certificates and communication with tenants. In addition, there is a perception that EE requires significant sacrifices and investments (EC JRC 2012). Such prejudice leads to misunderstandings between the owners and tenants, and makes it difficult to discuss and identify the most profitable financial schemes. The availability of such information and its transparency for the average consumer is a significant obstacle (Bertoldi *et al.* 2014).

In Hungary the financing mechanisms for EE investments remain limited; the available subsidy programmes can usually be obtained only at a short notice and for a short period. However, while the Hungarian and the Dutch governments do offer various funding opportunities for organizations developing projects and directly to tenants/residents, including soft-loans, fiscal incentives and tax exemptions, in Bulgaria the system of economic incentives for EE is still in its initial stages (Bertoldi *et al.* 2014). The budget of state financial initiatives in the related field is limited, complicated with bureaucratic procedures and mostly available in the form of co-financing, thus state funding in Bulgaria cannot yet be considered a strong supportive tool for EE improvements.

More detailed information on the EE financial aspects in STACCATO countries can be found in the project's Financing Report, while the current report will focus primarily on other policy issues and the barriers listed above.

1.4. Report structure

Policy and legislation in the area of EE renovation represents a complex system of measures, regulations and complementary acts. It involves legislation in such fields as construction, environmental protection, finance and social interactions. And as STACCATO demonstration projects have been implemented in countries with very different economic and political backgrounds, it was of great importance to identify at an early stage

[4] A ***Nearly Zero-Energy Building*** is defined in Article 2 of the EPBD recast as "a building that has a very high energy performance. The nearly zero or very low amount of energy required should be covered to a very significant extent by energy from renewable sources, including energy from renewable sources produced on-site or nearby".

of realization what are the possible barriers for implementation of EE projects and understand national-level peculiarities.

Thus, the remainder of the report aims to set out the current status of the national policies that may influence further replication of the STACCATO experience. Through the analysis and evaluation of the experience gained during the projects' implementation, possible ways of overcoming the identified barriers and recommendations for policy development in the field of energy efficient renovation in Hungary, Bulgaria and the Netherlands will be presented.

The STACCATO project, since its launch in 2007, aimed to show through practice how large-scale and ambitious projects could take place despite these barriers and develop more widely applicable sustainable concepts and approaches for other parties to start new renovation projects. Having different starting points for implementation of the EU energy policy measures, the STACCATO countries' policy and legislative bases have also undergone various changes and improvements in the last few years. These changes will be discussed further in Chapters 2 – 4 of the report according to the following scheme:

1) Definition of the most important national energy efficiency policies, strategies, initiatives and legislation; national and local government support for EE programmes
2) Implementation of EPBD in the country
3) Legislation and implementation of energy performance certification
4) Role of housing and/or homeowners' associations
5) STACCATO experience and its policy aspects

The structure is based in a way that each of the sections will discuss in more detail how the existing barriers mentioned previously show up in circumstances of a particular STACCATO country. Thus, the section on the national energy policies and legislation will identify the existing weak points or gaps in the national regulation. In addition, official support (from national to local government level) in implementation of EE policies and measures is to be discussed in the first section, including the main financial incentives. The section on EPBD implementation will reveal more country-specific peculiarities, including those related to the existing difficulties with implementation of EU energy efficiency regulations. The third section will focus on the state of energy performance certification in the countries, revealing the reasons for low awareness about energy certification and labelling. The fourth section will focus on the role of condominiums and house owner associations. This section considers the reasons for the barriers related to the lack of coordination and information flow between stakeholders participating in EE projects, as well as the issue of the generally low priority EE improvements have for end-users. And finally, the fifth section will discuss policy-related implications and barriers which appeared during implementation of STACCATO in the Netherlands, Hungary and Bulgaria.

The report is compiled based on a range of materials including:

- academic literature sources on EE policy;
- official EU and national EE policy documents (e.g., programmes, decrees, reports);
- EE policy analyses and reviews by specialized international agencies, organizations and institutes;
- press releases and newspaper articles for latest news on EE;
- STACCATO internal data and reports.

In the end, based on the analyses of the countries' policies, legislation and related issues encountered during STACCATO implementation, conclusions will be drawn and recommendations made both for the EU to national level. For the latter both general and country-specific suggestions will also be made.

2. The Netherlands. Policy on energy efficiency in residential buildings and Staccato experience

In the last decade, notwithstanding the global financial and economic crisis and energy market changes, Dutch energy policy has emerged reinforced to leverage economic growth and a sustainable energy economy. The Netherlands can well be called one of Europe's largest hubs in energy trade and energy security support: the country is actively investing in its energy infrastructure facilities, is a major producer of natural gas and is supporting an open market approach, which results in innovative energy-efficient industrial processes and high levels of innovation throughout the energy sector.

The EE policy of the Netherlands in particular has been closely connected to the Dutch climate change policy, which the country has been active in for more than 20 years (EI and Eclareon 2013). The natural characteristics of the Netherlands, such as its location below the sea level and its flatness, resulted in high awareness of climate change issues and subsequent development of climate mitigation and adaptation policies. In 2012 Dutch GHG emissions were 8.8% lower than in 1990, while gross domestic product (GDP) had increased by 50% in the same period (IEA 2014). However, while the country is on its way to meet its non-ETS emissions goal[5], according to the Climate Change Performance Index published in 2012 Dutch climate change policy was reported to have become less ambitious (CCPI 2013). Compared to most G20 countries, the Dutch economy remains highly carbon intensive with a vast share of energy being produced from fossil fuels (Dutch Government 2013). In 2013 the share of renewable energy in gross final energy consumption was 4.5%, though new ambitious targets of 14% of renewables by 2020 and 16% by 2023 were recently set (IEA 2014).

No explicit national targets for EE policy existed before 2012, since the targets for renewable energy and reduction of CO2 emissions had been considered as the leading ones and those which would subsequently result in improvement of EE. The data somewhat bears this view out, as between 2000 and 2010 the combined EE index had improved by 16% for industry, household and transport combined (EE in industry improved by 21%, in households by 20% and in transport by 7%) (IEA 2014). After the EE Directive had come into force, the Netherlands outlined their EE target as aiming to achieve 1.5% of energy savings per year until 2020 (see Table 1).

The next sections of the report will show what stage the Netherlands has currently reached in development of EE policies, legislation and implementation of corresponding measures and projects. The last section is dedicated to policy implications of the implementation of STACCATO in the Netherlands, including the main barriers encountered, solutions found, as well as recommendations for further policy improvements based on the project's experience.

2.1. National policy strategies, initiatives and national and local government support

The Dutch EE policy in the housing sector is characterized by a combination of policy tools that focus on different aspects of energy consumption in households. This combination of measures aims at raising

[5] 16% reduction of emissions from non-ETS sectors in comparison to 2005 level (EI and Eclareon 2013)

awareness about energy conservation, stimulates house owners to take appropriate measures and offers a variety of financial schemes to promote EE in buildings. The important policy initiatives are briefly described in Table 2 below.

Table 2. *Chronological introduction of energy policy initiatives and measures related to EE and promotion of green energy in the Netherlands*

Introduction date	Name of the initiative	Short description
1995	Green Funds Scheme (*Groen Beleggen*)	- Tax incentive scheme enabling individual investors to put money into green projects that benefit nature and environment; - green investments financed with special loans with lower interest rates
1996	Regulatory Energy Tax	- Introduced for household and small/medium enterprises in 1996, for large commercial users in 2004; - goal: to encourage renewable energy use and energy conservation by making fossil energy (gas, electricity) more expensive
1996	The Energy Performance Norm	- The Building Decree and the Energy Performance Standard (EPN, first introduced in 1996) relies on the calculation of the EPC of a building (residential or non-residential), including all energy features of the building and efficiency of its installation
1997	The Energy Investment Allowance	- Tax deduction for investments in energy-saving equipment and renewable energy
2000	Milieu Centraal, COEN (Consumer & Energy) and HIER campaign	- The programme focused on information campaigns and helps consumer and intermediary organizations to change their consumer behaviors and help choose energy-saving appliances.
2001	Fourth Dutch National Environmental Policy Plan till 2030	- Introduced for the energy system, the policy plan aimed at a 40–60% cut in carbon dioxide emissions by 2030 compared with 1990 levels
2002	TELI subsidy scheme	- The scheme subsidized projects carried out by local authorities, (energy) companies and housing corporations that give advice and information to low income households and carry out/ provide technical measures, e.g. water saving shower heads, CFL's, piping insulation
2004	KOMPAS (energy awareness in living and working)	- Aimed to facilitate and encourage parties to take sustainable measures through intervention strategy; - a mix of instruments used, appropriate for specific features and natural motivation of target groups, to guarantee energy-saving behaviour by establishing regulations and guidelines.
2006	Temporary Subsidy Scheme: CO_2 reduction in Buildinsg	- A temporary subsidy scheme, aimed to reduce energy consumption through provision of a subsidy up to 15 % of the investment costs (with a maximum of € 1 million per project) for technical measures in existing buildings.
2007	'Clean and Efficient' policy programme	- The programme aims for achievement of 2020 goals, including 20% reduction of GHG emissions, 2% annual energy savings and increased share of renewable energy sources to 20%.
2008	The Covenant of housing corporations	- Led to introduction of energy labels as one of the parameters of the regulated rents in social housing.
2008	More with Less (Meer met Minder) plan	- The objective to make 3.2 million of existing buildings 20-30% more energy efficient by 2020; - joint initiative of the Central Government, housing corporations,

Introduction date	Name of the initiative	Short description
		construction companies, installation sector and energy companies.
2008	Spring Agreement (*Lente-akkoord*)	- The objective is improvement of energy performance of new construction by 25% in 2011 and by 50% in 2015 (in comparison to 2007 requirements); creating conditions for energy neutral new construction in 2020 - agreement between the Central Government and the market parties
2008	Long-Term EE Agreements (MJA3)	- Objective: to achieve energy-efficiency within the chain and company's operating processes, to promote use of renewable energy; - where appropriate, participating industries carry out strategic studies based on 50% reduction in CO2 by 2030.
2008	Voluntary Agreement on Energy Savings in the Social Rental Sector	- The aim is to secure engagement of corporations[6] in realizing energy-saving objectives between 2014 and 2017; - the parties to the agreement have committed themselves to the agreed objectives of ensuring an average Label B for corporations and a minimum of Label C for 80% of private landlords by 2020; - funding from central government (400 million EUR) for landlords in the subsidized rented housing sector
2009	The "UKP NESK" scheme (zero energy school buildings and offices)	- The aim was to stimulate innovation for energy neutral buildings (Naar Energieneutrale Scholen en Kantoren); - 15 projects received funding
2009	The Scheme for improvement of interior climate of primary education buildings	- Made € 165 million (budget Ministry of Education, Culture and Sciences) available for primary and secondary schools to improve the interior climate and take energy saving measures.
2009	Subsidy scheme for glass insulation	- Provision of owner-occupiers and associations with grants for the purchase of glass insulation for properties built before 1995; - €50 million available in total, including execution costs: €30 was available for 2009-2010 as an additional post for crisis measures, €20 was available from the "More with less" budget; - almost 100,000 households applied for a voucher for subsidy of glass insulation.
2011	Plan of Action for Energy Saving in Built Environment	- Objectives: contributing to the European 20% CO2 reduction target by means of energy saving in the built environment; - using energy savings as a means to allow people better management of their living expenses, including energy expenditures.
2011	The Green Deal	- The objective is to provide initial backstopping support for initiatives that will have positive effects on the Dutch economy or generate cost savings for companies and individuals; - stimulates support for local sustainable projects specifically dealing with sustainable energy or energy-saving projects.
2013	The 2013 Energy Agreement for Sustainable Growth	- The objective is to align the interests of industry, civil society and government towards the key objectives of sustainable and secure energy supply, industrial competitiveness and affordability for the consumers; - laid out actions for 2020 horizon and established a target of energy savings of 1.5% (or 100 PJ) from final energy consumption by 2020 and deploying more RES (14% by 2020 and 16% by 2023); - promotion of sustainable energy at local level, network investment and strong EU Emissions Trading Scheme, stimulation of employment (planned creation of 15,000 extra jobs).

[6] In the Netherlands corporations own approximately 2.3 million homes

To summarise, Dutch energy policy came through a period of intensification during the mid-1990s slowing down at the beginning of the 2000s. The past 30 years saw a wide use of fiscal incentives and subsidies in the field of EE in buildings. Since the mid-1990s a diversification of policy instruments took place with introduction of the Energy Tax and the Energy Performance Standard for Buildings (both introduced in 1996).

The latest (2013) **Energy Agreement for Sustainable Growth** set out key actions for 2020 in the area of renewable energies and energy efficiency, which is expected to maintain stability and predictability of energy investment in these areas within the upcoming years (SER 2013). However, according to IEA (2014), it is necessary for the Netherlands to develop a long-term (up to 2030 and 2050) cost-effective policy framework, in order to ensure success of future Dutch energy and climate policies.

The contribution of local and regional authorities[7] to the realisation of the Dutch EU 2020 agenda and energy efficiency goals is significant (EC 2011). Local and regional authorities are initiating policies and implement European policies, are responsible for a large part of the economic structures in their cities and regions. A study conducted by Buck Consultants International, commissioned by the local and regional government umbrella organisations, IPO and VNG, shows that innovative power in the Netherlands is firmly established, especially in the regions (BCI 2009). The use of instruments is attuned to the potential of local and regional markets that operate in an international, national and regional context. (OECD 2010).

According to the National Reform Programme (2011 and 2014), provinces and municipalities in the Netherlands are expected to be working on a transition to sustainable energy management (energy savings, making maximum use of renewable energy, efficient use of fossil fuels and other measures) within the framework of the European goals regarding the reduction of CO_2 emissions (MEA 2014). The EE policy measures are expected to be implemented at the local level and local authorities to work on development of additional instruments tailored to the specific local conditions. Local and regional authorities are reported to be investing in intelligent decentralized heat and energy systems and energy storages, while municipalities and provinces to be using new forms of financing, including European instruments such as EIB and ELENA and their own instruments, such as revolving funds (EC 2011). The Dutch social corporations also act as a revolving fund and have access to government-guaranteed, long-term and low-interest loans (see more in Paragraph 2.4).

Figure 3. *NEEAP assessment of the Dutch energy efficiency policy in residential buildings sector*

(EEW 2013)

As municipalities also manage the local and regional labour market in the Netherlands, they bring relevant parties in the region together (governments, businesses, education) to create a favourable economic environment and effective cooperation for the proper functioning of the labour market (EC 2011). In this way, municipalities ensure that

[7] The Netherlands is constituted by 12 provinces, which include 418 municipalities (eGovernment 2011)

employers, including those operating in EE and renewable energy related fields, have sufficient and qualified personnel at their disposal.

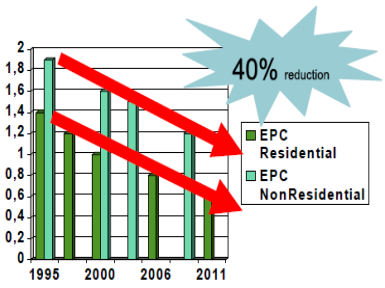
The current EE policy in the Dutch residential sector is characterized by a high level of economic incentives and funding, sophisticated legislation and a generally comprehensive policy package for implementation of EE projects. The favourable market conditions and only a few barriers from the regulatory framework create an auspicious ground for realization of EE projects with involvement of energy services companies (ESCOs)[8] (Bertoldi *et al.* 2014). A minimum energy performance standard (MEPS) is in place and is regularly tightened (see next section); however, there is currently no enforcement mechanism to ensure adherence to it. Among the general policy regulations, there is an innovative approach linking maximum rent to energy performance certification (energy label).

At the same time, assessment of the Dutch NEEAP (EEW 2013; see Figure 3) highlighted a lack of customised energy advice and audit, information tools to provide independent and practical information on EE/RES/environmental issues, and education and training of building contractors. According to one recent study reviewing Dutch energy policy initiatives, the large number of different policy programmes, frequent changes of policy and constant revision of instruments "… might affect the stability and continuity of the [country's] policy framework" (Noailly and Batrakova 2010).

2.2. EPBD implementation

The first EE regulations for buildings were introduced in the Netherlands in 1995. Since then, the Energy Performance Coefficient (EPCo) has been constantly decreasing and by 2011 the reduction level reached 40% (see Figure 4). Before the implementation of the original EPBD directive, a Decree (BEG) and Regulation (REG) on the energy performance of buildings were published in 2006 and are still regulating the conditions of issuing EPCs.

Currently, the Ministry of the Interior and Kingdom Relations is responsible for the actualization of the EPBD, while the NL Agency (the Dutch energy agency) is the executive body for the implementation process. The country's building legislation has fully transposed all requirements of the EPBD recast and sets minimum requirements[9] for building components. Dutch policy also contains a wide range of incentives in the field of taxation, including subsidies for advisory support on energy conservation, sustainable energy technologies and EE improvement up to level 4 or 5 of energy labelling. In September 2012, the Dutch government planned that the level of NZEB will be reached for all new buildings by 2020, which may not be a difficult task taking into consideration that during the last decade energy performance requirements in the Netherlands have been regularly revised and improved.



Year	EPN - energy performance coefficient
1995	1.4
1998	1.2
2000	1.0
2006	0.8
2011	0.6
2015	0.4
2020	Zero energy

Figure 4. *Development of the EPN (EPCo number) in the Netherlands*

[8] For more details on the Dutch ESCO market see STACCATO Final Report on Economic Aspects

[9] The current minimum requirement for all building envelop parts is Rc = 3.5 $m^2 \cdot K/W$. For windows (including framework) a maximum U-value of 1.65 $W/m^2 \cdot K$ currently applies. The requirements apply to new buildings and major renovations of existing buildings.

2.3. Energy performance certification

Regulations regarding the EE Certification of buildings entered into force in January 2008 (EPBD 2013), so energy labelling in the housing sector has been an EE policy cornerstone among Housing Corporations and authorities for a number of years. Since 2008 sellers operating on the real estate market and landlords require energy labels to become a part of the rental and sale market. Since 2009 the system of EE certification has been amended: methodology, software and certification procedures were updated and quality assurance scheme was recently approved. In January 2010 there were additional amendments and improvements introduced to the energy labelling legislation. In particular, after a number of discussions and criticisms were expressed, it was proposed that building information about renewable energy used in the house should be included in energy certificates.

Figure 5. *Front layout of the EPC with A++ indicator, the Netherlands (EPBD 2013)*

Currently, legal provisions related to issuing energy labels for residential buildings provide for mandatory inclusion of energy certificates in practically all real estate cases[10]. Nevertheless, this measure is still more of a stimulatory one since it is not secured with any penalties or sanctions (such as fines).

The regulation related to energy performance certification obliges all buildings that are subject to rent or sale to have a corresponding energy performance certificate (EPC), which can be issued by an accredited licensed advisor, of which there are currently a few hundred. In case of new buildings the certificate is usually provided, as it is considered to be equivalent to a building permit, but for existing buildings that are to be sold or rented the certificate is rarely issued. Although energy labels are currently obligatory, a rather small number of homes are sold with an energy certificate (Energyclaim 2014), which can be explained by the absence of corresponding sanctions if no certificate is presented.

The EPC represents the most evident part of the EPBD, allocating an Energy Performance Indicator (EPI) to both residential and commercial buildings, while suggesting individual cost-effective measures for improving their energy performance (EPBD 2013). The EPC should comprise at least three pages, the first one of which designates the EP class indicator for the building, determined by calculating the building's EPI (stated on the third page). The currently existing scale of indicators varies from *A*++[11], where many energy saving measures have already been taken, to *G*, where many energy saving measures are still possible (figure 5 shows an EPC front layout with an A++ indicator). Energy performance of the class A is equal to the performance level of new buildings from the year 2000 and later. The first page of the EPC also shows the building type for which the certificate is issued; the assessor of the certificate and its expiration date (maximum validity is 10 years); standardized annual primary energy use in the building (in MJ), which is subdivided into electricity use (in

[10] Exceptions are: dwellings that have been constructed affter 1999, and transactions in which the seller and buyer together decide not to apply for an EPC.

[11] In order to display the low EP levels of new buildings in a more distinguished manner, it is expected that soon the current energy label classes will be extended from A++ to A++++ (EPBD 2013)

kWh), gas (in m³) and heat (in GJ) consumption. EPC for non-residential buildings additionally displays annual CO_2 emissions. On the other side of the energy certificate there are proposals and recommendations on improving EE in the building, such as insulation upgrade or replacement of a boiler.

As far as the future of energy labelling is concerned, it is planned that homeowners will be able to submit data through the internet and attain online an energy certificate validated remotely by an independent expert. It is also expected that starting from 1st January 2015 there will be punitive measures if a valid EPC is not presented in case of selling or renting a property. Homeowners can additionally opt for a voluntary EPC, which can be used to receive a subsidy or for property evaluation (NEA 2014).

2.4. Role of housing and tenants' associations and information support

The practice of social housing in the Netherlands started over a century ago. A significant number of dwellings were built with governmental support provided in the form of subsidies and loans to housing associations. Currently, the share of social housing in the country represents about 30% of total dwellings and more than three-quarters of all tenants rent a dwelling from social housing corporations[12] (JRC 2014; Vandevyvere and Zenthöfer 2012). In 2011 the average energy index of the Dutch social dwellings was equal to label D according to the Dutch energy labelling system and has somewhat improved in recent years (see Figure 6). Most Dutch homes are heated by natural gas, while estimates show that social tenants collectively pay 4 billion EUR for heating and electricity costs every year (JRC 2014).

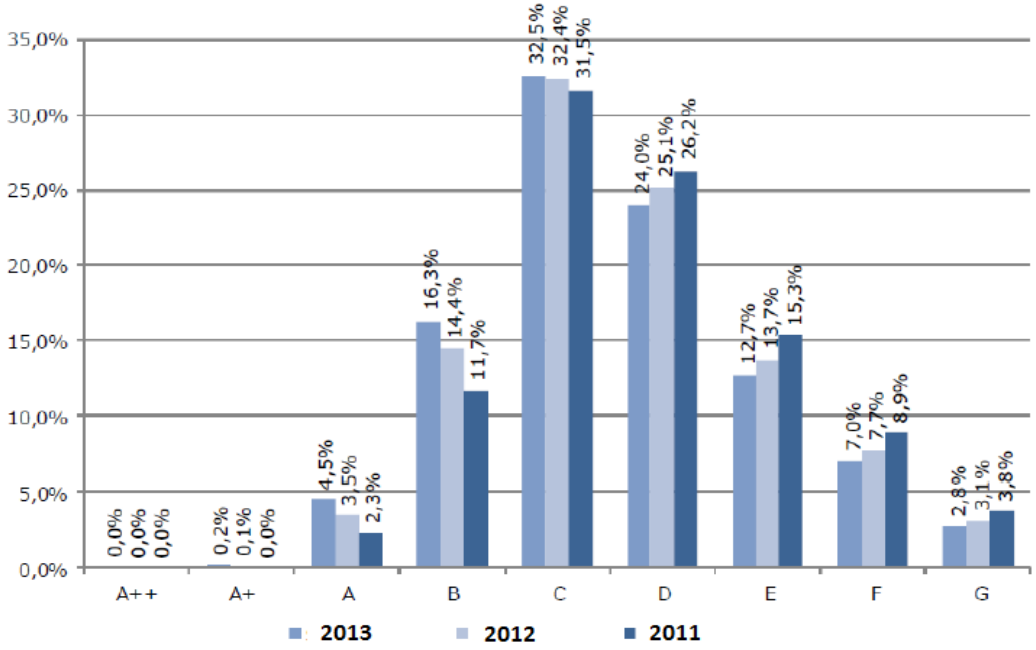


Figure 6. *Monitored energy performance of the social housing stock in the Netherlands based on SHAERE[13] data (JRC 2014)*

Social housing institutions (corporations) are legally independent entities with a right to implement financial operations. The Dutch government intentionally transferred its responsibilities to the housing corporations in order to make them active entrepreneurs on the market and encouraging them to invest in their own

[12] Of the remaining 25% of rented housing, a small proportion is owned by pension funds and insurance companies

[13] SHAERE (Social Rented Sector Audit and Evaluation of Energy Conservation Results) is a database collecting and monitoring the total energy consumption, CO2 emissions and average energy index of social housing

activities; given that they now bear all the risks related to self-financing the changes have also encouraged housing corporations to enlarge their entrepreneurship skills. At the same time, relationships between landlord and tenants, including rental prices, major actions related to living conditions such as renovation, rights and responsibilities of both sides, are strictly regulated by national legislation. Energy saving measures that require serious changes – including naturally EE retrofit - can be executed only by the corporations. At the same time, in case of the major renovation 70% of the residents of the block which is to be renovated have to agree on the renovation workunder Dutch legislation (a provision which, as we will see, proved highly significant for the STACCATO project in the Netherlands).

One of the latest state-supported EE funding opportunities is a revolving fund for energy conservation and the built environment, which according to the National Reform Programme (2014) creates an investment pool up to 740 million EUR "… making it easier for both homeowners and renters to finance energy saving measures" (MEA 2014), of which 400 million EUR was made available for landlords in the social housing sector to make energy-saving improvements to their properties. In addition, the Dutch social housing corporations have a possibility to obtain relatively easy upfront financing through guaranteed, long-term commercial bank loans with low (below 3%) interest rates. By attracting long-term loans, it is possible to maintain a low rise of the rent, which in turn ensures a reduction in the total housing costs after any intervention, such as the EE renovation, is carried out (JRC 2014). In this way, house owners, housing associations and tenants are encouraged to invest in energy saving measures in newly built areas as well as in existing buildings.

To provide external supervision and intermediary assistance for tenants and housing corporations in conflict resolution there are associations of house tenants. In order to become a part of such an association, the housing corporation ought to be officially registered as a legal entity with a right to rent houses and implement maintenance. The association takes responsibility to monitor the level of rent and prevent its random increase, foster reduction of security deposits and improve maintenance and renovation in supervised houses. From the point of view of STACCATO replication, existence of these organizations is of great importance for successful implementation of EE retrofits, as in recent years many housing corporations have taken a course towards EE improvement of buildings under their supervision.

Ensuring participation and support of all stakeholders in social housing was one of major goals of the "More with Less" initiative (see Table 2). As part of the programme, the Dutch government signed voluntary agreements with key players within the Dutch housing, energy and construction sector with an aim to reduce energy consumption by 2020. Through the programme's actions it is planned to overcome the barriers to energy saving in each target group. "More with Less" offers a scheme where EE measures and programme support are applied to the regular renovation cycle and enables house owners to save energy with the least possible effort (MMM 2014). Project implementation is coordinated through the contact person assigned by the house community.

The key actors in the Dutch housing sector include Aedes (association of housing corporations) and Woonbond (national union of tenants), which together with Vastgoed Belang (property interest association) united in the Platform of Residents and Sustainable Construction with a goal to "…promote demand for and enthusiasm for energy-saving measures" (MIKR *et al.* 2012). The energy-saving target for Aedes and Woonbond according to the Covenant is an average of energy label B for the total available rental housing of housing corporations in 2020, which corresponds to a 33% saving in the building-related consumption of existing housing corporation homes in the period 2008 to 2020. Vastgoed Belang aims to achieve an

improvement in the housing stock of its members, leading to 80% of the stock corresponding to label C in 2020 (MIRK *et al.* 2012).

Preliminary to this, within the "More with Less" framework, Aedes and Woonbond had signed an agreement (Aedes and Woonbond 2008) aiming for ambitious targets in energy saving for the social housing sector. Among them were the following:

- 20% increase energy savings through gas inventories by 2018 compared to 2008
- Improving energy savings in housing by B level or introducing at least a two step increase
- Creating conditions for tenants to be major actors in implementation of energy saving measures in the house
- Aedes and Woonbond gave an obligation to provide housing deposits for tenants to increase EE in dwellings
- Aedes and Woonbond were to take actions to encourage residents to establish tenant associations and organizations
- Including EE indicators in House Evaluation System (WWS)
- Providing local consultation for tenants on their role in improving EE.

The Aedes experience showed that a number of housing corporations in the Netherlands already function as active participants in implementation of EE retrofits. Using favourable conditions created by the existing legislative and regulative system with all administrative powers and financial capacities, the corporations may be an important moving force in the replication of STACCATO-like retrofit projects in the Netherlands. In the future, in case of implementation of such initiatives, the corporations may be able to be an administrative force, as well as to act as independent investors. The associations which recognize the importance of regular motivation tend to support improving EE among tenants, as a way to achieve monthly reductions in energy use. This approach enlists the support of tenants' associations and encourages more houses to realize EE retrofits.

At the same time, according to JRC (2014) the present rate and depth of energy renovations are not sufficient to meet the above mentioned 2020 EE targets, as more investments are required. In addition, the tax for landlords[14] introduced in the Netherlands in 2013 became a new barrier for investment in regulated rental dwellings (Boer and Bitetti 2014), and consequently in EE renovations. The tax puts a significant pressure on yields of landlords, as the tax equals the value of 1.5 months of rent, and its introduction has been received very critically by landlords, tenants and experts (van Genugten 2013; Priemus 2014).

Split incentives issue

Very often, despite awareness of benefits of EE, it is not easy for tenants to change their daily habits. This problem is aggravated by the legal status of property in the Netherlands, i.e. shared responsibility between owners and tenants. In the Netherlands, where property rights belong to housing corporations, tenants do not have a direct financial responsibility for service and maintenance including energy supply. Thus, tenants have no direct material interest in improving EE in the building and, what is equally important, they are likely to be unaware of the associated benefits for them. This causes the so-called 'split incentives' problem, which can be a significant barrier to EE improvements. In the absence of dialogue and/or co-operation between the owner and the tenant landlords may be inclined to choose to install initially expensive and inefficient

[14] In order to offset the higher rent increases for regulated dwellings and make a contribution to reducing the budgetary deficit, the Dutch central government levies a tax on all landlords with more than 10 dwellings (revenue EUR 1.7 billion per year in 2017, on the basis of the value of the dwelling, as estimated for the local property tax) (Boer and Bitetti 2014)

equipment, so the dwelling occupant would use more energy than he would if he had chosen the appliances/equipment himself (IEA 2007). As a result, as much as 40% of the energy consumption for space heating in the residential sector could be affected by the landlord-tenant problem (IEA 2007). Similarly with proposed retrofits, very often tenants do not agree to be a part of an investment plan being uninterested in paying for "goods" that they will not possess. As a result, the owners are trying to solve their problems through investment while residents are trying to avoid financial responsibility. There is thus a lack of motivation for both sides to improve EE.

2.5. STACCATO experience and its policy aspects

In the Netherlands the renovation did not go as the original plans had envisaged. Housing corporations found it difficult to create support for the plans in a large-scale area of over 1,100 residents. The project was complex because it had to deal with many stakeholders and individuals with various cultural backgrounds, and in addition, many building works were to be executed while residents were in their dwellings, causing inconvenience and disruption to their lives.

In autumn 2008 the project came to a standstill due to discontent among residents of Het Breed. As discussed in section 2.4, according to Dutch regulations at least 70% of the tenants must give their approval for implementation of dwelling-related measures. Unfortunately, the first survey conducted at Het Breed was declared legally invalid and the second ended with approximately 50% support of the residents (see Figure 7). This caused a number of legal wrangles for the upcoming three years.

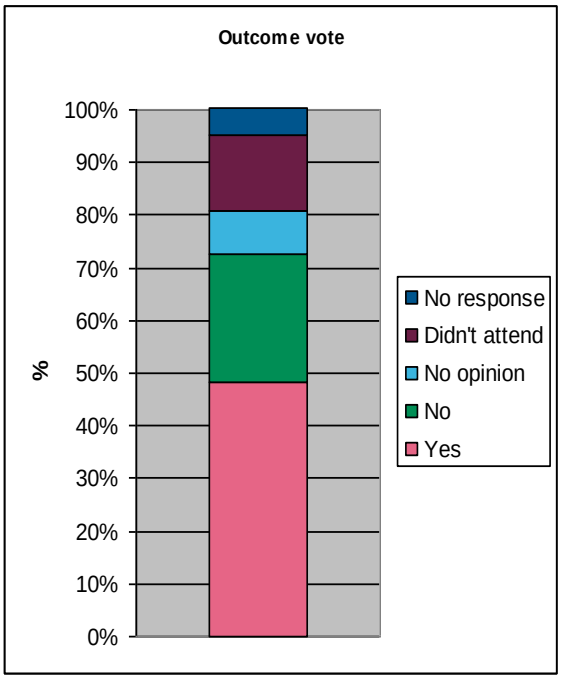


Figure 7. *Outcome of 2008 vote in Het Breed, Amsterdam, regarding STACCATO retrofit*

Moreover, residents complained about poor conduct of builders and damage to the interior of their dwellings. As many tenants did not always allow timely entrance to their dwellings[15], building activities were often conducted out of schedule. Thus, the plan of the project had to be revised, an active communication effort was conducted to inform and consult with the tenants about all the retrofit details, after which the third vote carried out in 2011 showed more than 70% approval of Het Breed residents in favour of the refurbishments.

The renovation fully re-commenced only in 2013 and consisted of insulation of façades, roofs and floors, double glazing of windows, modernization of heat distribution nets, improvements of the ventilation system, application of individual (smart) metering and improvements of the outer space of the apartment blocks, including galleries, entrances and staircases. Space heating for the 11 buildings participating in the renovation was provided by four newly constructed boiler houses with high efficiency boilers, which replaced the old heating equipment. One important feature of the renovation was integration of a sustainable energy supply system, used in order to achieve an additional energy reduction in the domestic hot water supply system.

[15] For the time of inner renovation residents were asked to leave their dwellings leaving their furniture and belongings inside. A special guesthouse was proposed for their use.

The Het Breed retrofit project was financed through different sources: the EU grant, governmental programmes, active participation of the two housing corporations, the support of local authorities and a variety of economic incentives. Based on the project experience and the well-advanced scheme applied for the project's implementation, it can be stated that there is a big potential for replication of STACCATO-type projects in the Netherlands.

However, during the project's implementation many additional costs arose and some partners expressed their negative opinion on the financial outcome of the Het Breed retrofit (IVAM 2014). As the renovation project experienced a number of financial setbacks, part of the property of the corporations had to be put on sale to cover the costs. As a result of the freeze of some of the building activities after the 2008 stand-still, builders issued claims for compensation, the level of which is currently being negotiated (as of autumn 2014). The total renovation price is therefore expected to rise significantly because of the building freeze and the cost indexation caused by the prolongued building period. In addition, because of the substantial delay in renovation, housing associations may lose up to half of the European subsidy.

As socio-economic analysis carried out by Dutch partners (IVAM 2014) has shown, the project can be viewed as successful, as far as general satisfaction with results of the renovation is concerned. According to the social survey conducted among the residents, as about a half of respondents said that renovation went better/much better than they expected and more than 80% found the retrofit useful/very useful. However, for 37% of respondents the renovation went worse/much worse than they'd thought it would be. Additionally, some of interviewees complained about the financial aspects, amount of time required for a European project to be accomplished and a number of other issues. Consequently, a number of respondents[16] said they would not participate in a similar project again.

Thus, overcoming the existing barriers for implementation of STACCATO-like projects can be a difficult task, even in a country with well-developed EE policy and legislation like the Netherlands.

Initial resistance of the tenants towards refurbishment and their lack of enthusiasm can be explained by a number of factors. First of all, it is the split incentives issue, which stays a major barrier to investing in energy saving measures for rented homes, as it was discussed in the previous section. The 2008 pre-renovation survey conducted among the Het Breed residents showed that although 80% of respondents found the planned renovation useful, as much as 73% didn't look forward for the renovation (IVAM 2014). Additionally, tenants' initiatives are often hindered by the existing policies. Wernsen and Pauwels (2014) argue that when tenants propose a plan themselves, it usually has to fit within corporation policy. In 2011 the Dutch parliament rejected a bill which would give tenants the right of initiative to improve their house (Woonbond 2011), despite strong support from the House of Representatives. The discussion on this right still continues.

The split incentives barrier, which caused most of the wrangles and the substantial delay of the renovation, can be dealt with by using different policy instruments. In the UK, for example, the following instruments were designed to overcome the landlord-tenant issues: a law under which all properties of energy label F or below cannot be let out after 2018; a law allowing tenants to demand EE upgrades on their properties from 2016 onward; tax break scheme supporting residential landlords in the transitional period 2014-2017 (JRC

[16] Respondents included: residents of renovated buildings and key Dutch actors in Staccato (e.g., project managers of Eneco, the Amsterdam District North, of Ecofys and of housing corporations Eigen Haard and Ymere)

2014). Such measures, adjusted to the Dutch realities, could help to improve the situation, especially in the view of the recently introduced tax for landlords (see Section 2.4).

It should be noted that implementation of EE measures in the Netherlands takes place in a political context that is dominated by policies entailing a shift of responsibilities from government to market (Nieboer *et al.* 2010; see Section 2.1). The shift away from government control and towards market forces is coupled with reduced levels of government support, transfer greater responsibilities to local governments, and greater independence of housing corporations from the government (see Sections 2.1 and 2.4). Housing corporations have signed various energy covenants in the last few years, in one of which they made a commitment to improve the whole housing stock to energy label B by 2020 (see Sections 2.3 and 2.4). And as communication with tenants proved to be an important issue in achieving the energy saving goal, having the tenants involved in making any renovation plans is becoming a regular practice for the Dutch housing corporations (IVAM 2014). As can be seen from the STACCATO experience, it becomes crucially important to adopt regulatory measures (e.g., mandatory dissemination activities) which would make sure that housing corporations provide the residents with a good quantity and quality information about renovation plans in advance and that a consensus on a renovation plan is reached. And only then, as the current legislation demands, after 70% of tenants approve the plan can it be labelled 'acceptable'.

STACCATO also implied that all the parties involved in the project had to actively cooperate. Due to the favourable regulatory framework and market conditions, the cooperation proved to be efficient and successful. For example, the Dutch utility company Eneco and housing corporations within the project's framework learned together and collaborated well showing a forward-thinking model of cooperation. Involvement of municipality in the project was a good opportunity for it to participate in practical implementation of such a large-scale retrofit. Various Dutch partners positively responded to the collaboration, and even during the standstill there was a good agreement between the partners. The independent role of the government showed its added value in facilitating the discussion between the housing corporations and the residents, which became a key for overcoming the bottlenecks for continuing the project. During the delay in renovation, however, two partners left the project, as they didn't see a fast enough progress and had their specific perceptions of the project. According to one respondent, working with all these parties was extremely difficult due to the fact that everyone still had their own interests involved, even if there was also a common goal and interest. As the parties have been working together for seven years showing a high level of commitment to the project, "bringing parties together" was indicated as a major added value of STACCATO (IVAM 2014).

As the STACCATO project aimed to achieve 'only' a 50% reduction of CO_2 emissions post- renovation, it was not an extremely deep retrofit, and approaching NZEB level is not anticipated. Thus, the most cost-optimal solutions should be found, in order to reach the national EE target, which can include either deep retrofitting with long-term results and higher investments required, or with a focus on partial retrofits such as STACCATO. Also when viewed from the perspective of replication of STACCATO in the Netherlands, the project's results may provide additional motivation to include renewable energy sources (RES) in the retrofitting plan. This would not only affect EE indicators but also increase the attractiveness of buildings on the real estate market.

3. Hungary. Policy on energy efficiency in residential buildings and Staccato experience

After the post-socialist transition, several support programmes for the EE refurbishment of buildings were initiated in Hungary. Along with large-scale national initiatives, local authorities provided additional funds and ran smaller local EE programmes. Technical assistance and loan guarantee programmes by the International Finance Corporation (IFC) were crucial in establishing the ESCO market, while EU funds have been playing a substantial role in the buildings sector in general (Czako, 2012).

3.1. National policy strategies, initiatives and state support

After accession to the EU in 2004, Hungary indicated a positive policy change in terms of setting EE as a top priority for national development. At the same time, housing policy in Hungary has not been the main priority of the government. Long-term national strategies missed clear policy objectives and actions. Due to the 2008-2009 crisis and a consequent shortage of substantive resources, the residential building sector was not receiving regular targeted support from the state and in 2009 annual aid was cut to one twentieth of the previous amount. At the same time, the residential sector is the largest final energy consumer responsible for about 30% of total national CO2 emissions (Czako 2012), as well as the most fragile and demanding segment after the food sector from the social perspective.

Currently, there are a number of national strategic documents in force that directly or indirectly influence EE development in the country's residential sector. The important policy initiatives adopted in Hungary are briefly described in Table 3.

Table 3. *Chronological introduction of energy policy initiatives and measures related to EE and promotion of green energy in Hungary*

Introduction date	Name of the initiative	Short description
1995	National Energy Saving and Energy Efficiency Improvement Strategy	- The strategy established the framework of the national Energy Policy Concept; - objectives included: cost-based energy pricing to motivate EE, development of a new energy statistics and information system, introduction of individual metering and regulation in new apartment blocks, EE labelling of appliances, energy saving awareness raising and education, increasing the use of RES, prioritizing EE in state financed R&D programmes.
1997	Energy Efficiency Co-financing Programme (HEECP)	- Funded by the Global Environment Facility, IFC provided partial guarantess on loans for EE project investments implemented by 11 financial intermediaries around the country; - among the supported projects were reconstructions of block house heating, small-scale pilot schemes for leasing of natural gas furnaces in residential sector.
1999	Energy Efficiency and Renewable Energy Programme and Action Plan	- Promoted environmental protection and EE; - set quantitative targets with a 2010 deadline for preserving primary energy resources, reducing emissions and increasing production from RES.
2000	National Energy Saving Programme (until 2008)	- Focused on individual flats and buildings constructed with conventional technology; - provided support through direct subsidies and credits with preferential interest given to implementation of energy saving investments of

Introduction date	Name of the initiative	Short description
		consumers and the district-heating sector.
2001	Panel Programme (until 2008)	- Original aim: reduction of energy costs; - focus on whole buildings constructed with industrial technology; eligible applicants: condominiums, housing associations; - was largest programme in terms of participation and available state funding (210,000 flats were been refurbished).
2001	Energy Efficient Renovation of Residential Buildings Built with Industrialised Technology	- The programme set out thermal renovation and building engineering modernization of pre-fabricated flats[17]; - a maximum 30% of the investment cost with a maximum EUR 2,050 was financed by the state fund.
2001	Residential energy saving programme "For Successful Hungary"	- The programme supported renovation of traditional household buildings.
2003	Environmental Protection and Infrastructure Operational Programme	- Environment friendly energy management with a goal to increase the use of RES and EE, decrease CO_2 emissions and support respective development of rural regions.
2004	Energy Tax	Introduction of energy taxes on energy products.
2007	New Hungary Development Plan	- Focused on consolidation and expansion of existing programmes - target: to attain 1% of annual energy use savings; - among the measures: extension of state aid to replace household installations with efficient ones, state aid for development of energy saving awareness activities.
2007	National Energy Efficiency Action Plan (2007-2013)	Objectives: alignment of energy policy initiatives with those of the EU, finding cost-effective solutions for utilizing energy saving potential, shaping consumer awareness and influencing the market to achieve long-term EE.
2007	Environment and Energy Operational Programme (KEOP, 2007-2013)	- Focus on bigger ratio of RES in the national energy mix and increase of EE; - EU funded, possibility of completion of the credit with preferential interest supporting energy savings and increase of EE from the Energy Efficiency Credit Fund.
2008	National Energy Conservation Programme	- Grants for households to improve EE; - supported measures on insulation, improvement of heating and hot water supply, complex EE improvements, use of RES in renovation.
2008	National Strategy on Climate Change	Formulates goals on energy policy, highlighting the need to decouple GDP and energy use to promote EE practices and revise fiscal policies considering environmental aspects.
2009	Green Investment Scheme (GIS)	- Carbon finance mechanism providing an alternative way of funding programmes and projects for GHG emission reductions, use of revenues from the sale of Kyoto units; - supports programmes including deep refurbishment of multi-apartment buildings, deep refurbishment of individual family houses, a loan guarantee fund for self-financing element of the programmes.
2009	Climate Fiendly Home Programme	- Comprised earlier programmes, financed by GIS; - supported EE renovation of residential buildings constructed with industrialized technologies.

[17] Dwellings made of pre-fabricated blocks with weak heat insulation characteristics constitute 19% of the total number of dwellings in Hungary

Introduction date	Name of the initiative	Short description
2011	New Széchényi Plan: The Development Strategy for Recovery and Progress	A strategic document defining main goals, principles and directions of the state economic policy until 2020 prioritizing increasing energy security, diversification of energy resources, utilization of renewables, nuclear energy and climate change protection, setting up a business-friendly governmental institution network responsible for energy policy.
2011	National Energy Efficiency Action Plan until 2016	- Lays down a final energy savings target of 9% between 2008 and 2016, i.e. 1.4 Mtoe., out of which 37% should be achieved in the residential sector.
2011	National Energy Strategy 2030	- Objectives: EE measures spanning the entire supply and consumption chain, increasing share of RES, promoting renewable and alternative methods of heat generation; - outlines energy mix scenarios, recommends Nuclear-Coal-Green scenario.
2014	National Reform Programme (until 2020)	- Presentation of measures that have been and should be taken in accordance with the country-specific recommendations of the European Council and the actions defined to implement the top priorities set out in the Europe 2020 Strategy in several fields , including energy policy
Foreseen **2014** (December)	National Building Energy Strategy	- A detailed, complex assessment of the energy state of the Hungarian building stock - could provide a stable base for launching a large-scale building renovation programme, and defining its strategic objectives.

Each of the listed programmes and measures played its role in developing Hungary's EE and RES potential. The national **Energy Efficiency Co-financing Programme** (HEECP) promoted the ESCO market in the country by providing guarantees and technical assistance through introducing the concept of EE financing to banks. However HEECP does not function anymore, leaving a gap in lending for EE investments, as banks do not have a loan guarantee. The possibility of setting up a credit programme for households as part of the Green Investment Scheme has been under discussion (Czako 2012).

Starting from the beginning of the 2000s, several residential EE support programmes were initiated: a number of large-scale programmes financed by the national government, as well as local EE support programmes initiated by some municipalities. These included the **Panel Programme, the National Energy Saving Programme** and **Eco Programm**e, which focused on modernization of separate energy systems or EE renovation with a package of measures and covered different building types of the residential sector.

Since January 2011 the **New Szechenyi Plan (NSzP)** has come into force in Hungary. This strategic document defined the main goals, principles and directions of the national economic policy. Among the main priorities of the NSzP is boosting economic growth and employment, increasing supply security and diversifying resources, decreasing dependence on energy imports, promoting the production and utilization of renewable energies, climate change protection, and setting up a stable and business-friendly governmental institution network responsible for energy policy (MNEH 2010). Within the plan an Environment and Energy Operative Programme was launched in 2007 (until 2013), which was specifically dedicated to funding of environmental projects with the main beneficiaries being local authorities rather than companies.

In October 2011 the Hungarian Parliament introduced a new **National Energy Strategy** until 2030. The Strategy focuses on energy savings, guaranteeing of security of energy supply for Hungary, development of economy's competitiveness and ensuring sustainable cost-effective economic development. The document sets

a total primary energy savings target of 4.5 Mtoe by 2030, 59% of which should be achieved through the building energy program and 41% in the power sector. Among the main priorities of the Strategy are: state regulatory prevalence, development of local energy sources, protection of consumer's rights. Support of EE measures throughout the entire supply and consumption chain stands as a priority objective of the document.

It is identified as a fundamental problem by the Strategy that almost 70% of the Hungarian building stock does not meet up-to-date technical and thermal requirements. As the consequence of the EE programmes implemented during recent years the situation has improved; nevertheless, the household EE index holds the last position in the EU ranking. The Energy Strategy envisages a 30% reduction of the current heating demand of the building stock by 2030, which is intended to be achieved by development and implementation of energy programmes. Awareness raising among the population in regard to energy saving behaviour and attitudes also stands among the important factors in achieving the target (Elek 2012).

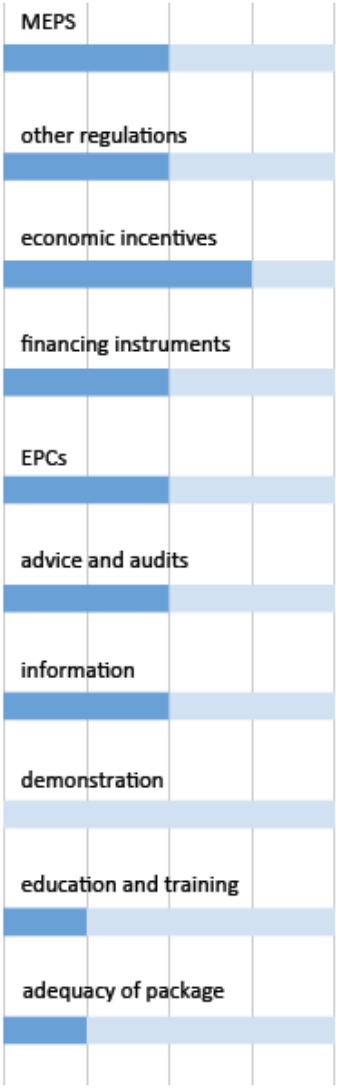


Figure 8. *NEEAP assessment of the Hungarian EE policy in residential buildings sector (EEW*

Hungary prepared the first **National Energy Efficiency Action Plan** (NEEAP) in 2007 and reviewed it in 2010. The Action Plan is based on the principles of the national energy policy for the period of 2008-2020 and supports provisions of the National Climate Change Strategy for the period of 2008-2025, establishing targets for the final energy use in 2016 on the way to achieve 10% of total energy savings in 2020. However, as can be seen from Figure 8, the national EE policy, specifically in the residential sector, lacks many important driving features, notably demonstration activities, as well as related education and training. One of the latest assessments of the Hungarian EE policy (EEW 2013) pointed out that while features like EE funding in the sector, energy audits and qualification, accreditation and certification schemes are perceived as at least partially effective by a majority of experts, the overall EE policy package and current framework is not considered very ambitious.

Notwithstanding the fact that many of the above mentioned policy documents stress the importance of EE, experts highlight that this has been translated into only a few actual policies and real actions, and many of these are deemed to lack long-term stability. The situation is aggravated by the fact that EE policy competence is split between three ministries whose cooperation and communication are often insufficient (EEW 2013).

As another study by Bertoldi *et al.* (2014) argues, the Hungarian regulatory framework of EE and especially of the ESCO market is weak. Although the two NEEAPs indicate a significant role for the ESCO market, no implementing or secondary legislation has been established in this respect, though there have been plans to make targeted ESCO grants available and to establish a revolving fund and/or a guarantee fund, which could be used as a support mechanism to market-based involvement of bank portfolios in ESCO projects (Bertoldi

et al. 2014; EC JRC 2012). More details on current barriers and drivers for ESCO market development in Hungary can be found in the Final Report on Economic Aspects of STACCATO.

Many of the barriers to successful implementation of EE policies in the country relate to the issue of financing, e.g. a lack of coordination of financing instruments[18]. Throughout the history of EE programmes financial pressure experienced by the state led to delays in announcement and uncertainty regarding continuation of the programmes. Since it is difficult to plan retrofits under conditions of uncertainty about the availability of state support, and households and businesses were negatively affected.

It should also be noted that while conventional retrofitting programmes funded by the government, as well as the recent 'utilities reduction' policy described in more detail below, achieve a maximum reduction of 6% to 36% of energy bills, other state-of-the-art retrofitting projects, such as SOLANOVA[19] and STACCATO may deliver reductions of 50% to 90% (Pájer 2009; Herrero and Ürge-Vorsatz 2012; Ürge-Vorsatz *et al.* 2010). Implementation of such retrofits may reduce fuel poverty or even practically eliminate it, even among the lowest income households. This raises the question of the viability of the often oversized district heating systems[20] and shows that there is a risk of locking-in of the substantial energy saving potential of Hungary's building stock for decades, if the nationwide state-supported programmes keep on applying sub-optimal technologies instead of cost-optimal solutions (Herrero and Ürge-Vorsatz 2012).

"Utilities reduction" policy

The majority of Hungarian citizens are experiencing difficulties with covering their housing expenses which have been steadily rising. In 2008 households spent twice as much as in 2000 on housing, maintenance and household energy of their dwellings (red line on Figure 9) [21] and by 2010 ago these expenditures reached the level of nearly 25% of total monthly costs per household. In 2012 the ruling centre-right Hungarian government reacted to the issue by decreeing a compulsory 10% reduction in household utility prices for natural gas, district heating and electricity. The measure was accompanied by the restructuring of the energy regulator (the Hungarian Energy Office - HEO) and putting legislative measures in place to ensure that energy companies complied with the required cuts. On March 2013 a new state office was established to replace the HEO – the Hungarian Energy and Public Utility Regulatory Authority, which was granted a considerably wider range of powers than its predecessor. The authority became a legislative body entitled to adopt decrees regarding energy prices that can be contested only before the Constitutional Court (Pásztor 2014).

As a result of the new energy policy, since the beginning of 2013 utility costs were cut by 20% in two steps: as of January 2013 the price of household gas, district heating and electricity were reduced by 10%, while as of November 2013 the energy bill was further cut by 11.1% (Pásztor 2014). The third step followed as a new cost cut for natural gas was introduced in April 2014 making it 6.5% cheaper for private households. New reductions for electricity (5.7%) and central heating (3.3%) were also introduced in autumn 2014 (BT 2014).

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[18] See STACCATO Financing Report for more information

[19] SOLANOVA – the project of "Solar-supported, intergrated eco-efficient renovation of large residential buildings and heat-supply systems" in the Hungarian town of Dunaújváros, which started in 2003 as "the best practice example for implementation of EPBD" (more information available at www.solanova.org). See STACCATO Financing Report for SOLANOVA/STACCATO comparison.

[20] According to Herrero and Ürge-Vorsatz (2012), district heat is one of the root causes of a new variant of fuel poverty prevalent in dwellings served by district heating. This situation often translates into payment arrears, indebtedness, risk of disconnection

[21] The figure shows only the major expenditures

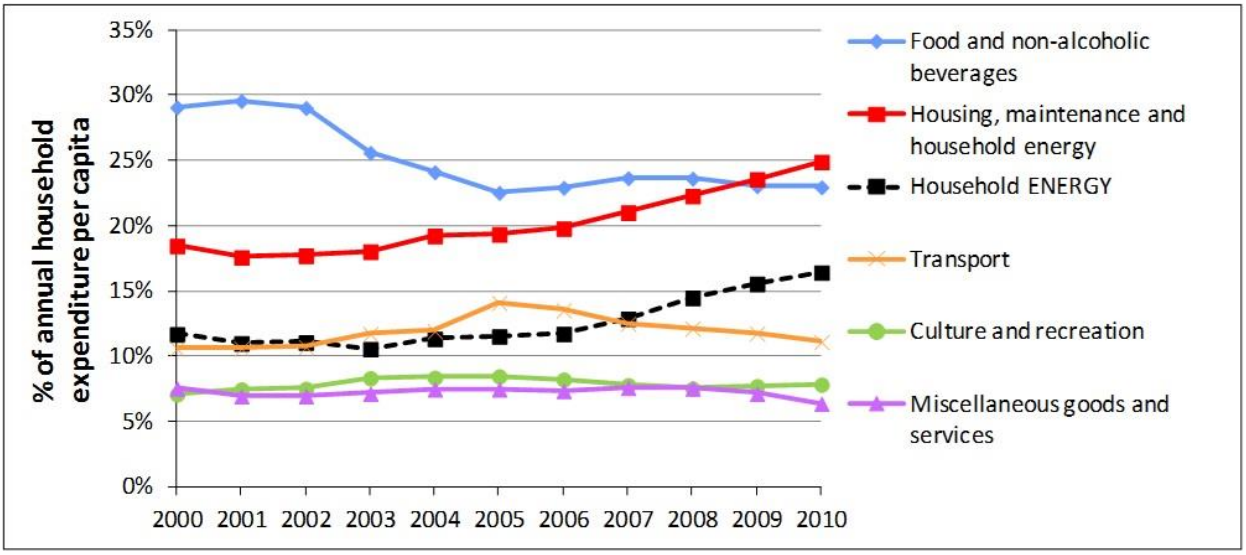

Figure 9. *Evolution of the composition of consumption patterns in an average Hungarian household*

The compulsory energy cuts raised many questions among specialists in the field and the appropriateness of the decision has been questioned in the complex energy vulnerability situation (BT 2014; Herrero 2013). First of all, not all the households equally benefit from the reduction of utility costs. Since all residential consumers receive the same bill reductions, those households with high energy consumption (higher spenders who are less likely to be in fuel poverty) appear to be more benefitted. Moreover, it is uncertain if this measure is suitable and sustainable as a long-term solution for domestic energy deprivation in Hungary. The important issues, such as the EE of Hungary's residential stock and the country's dependency on imported Russian gas, are left unresolved and may indeed be exacerbated as the measures create a disincentive to reduce energy demand (Herrero 2013). Meanwhile, utility companies attempt to resist the utility reduction policy stressing the need for legal certainty and a stable regulatory framework for energy infrastructure investments (Pásztor 2014), which may lead to the risk of interruptions in supply. In addition, investment in EE measures by energy and utility companies is highly discouraged by this policy.

3.2. EPBD implementation

In Hungary, prior to 2004, the Ministry of the Interior was responsible for implementation of EPBD through the National Office for Housing and Building. During this time a set of regulations and rules was outlined, and relevant software for energy certification developed. All necessary preparatory steps for implementation of EPBD were completed between 2006 and 2008, though some of the procedures became binding only in January 2012. The Ministerial Decree TNM 7/2006, which came into force in September 2006, included provisions related to realization of Articles 3, 4, 5 and 6 of the Directive. These implied energy requirements to renovation of old and construction of new buildings, design input data, maximum U values[22] for building elements (see Figure 10) and a calculation methodology. Fulfillment of the energy performance requirements became a precondition for obtaining a building permit. The l regulation of certification procedures (articles 7-10 of EPBD) was delayed due to administrative changes and implemented only in 2008. As a result, certification of new buildings and the display campaign for public buildings started in 2009, whilst

[22] Application of elements with the permitted U values does not necessarily guarantee fulfillment of the specific heating energy need requirement, since depending on the ratio of roof, wall and window area stricter insulation requirements must be applied (EPBD 2013)

certification of existing buildings (in case of sale or rental) was voluntary before 2012. However, once certification had started, the presence of an energy performance certificate became a precondition for receiving a subsidy for energy retrofit as early as 2008.

Implementation of the 2010 EPBD recast is still in progress. The first version of the cost-optimal procedure for setting energy performance requirements is available and the action plan for progression to NZEBs was reported to the Commission in November 2012. In addition, a revision of the EPBD-related acts was carried out, although requirements related to building envelopes and to the total energy performance for new buildings have not changed. Significant improvements have been made in relation to the registration and quality control of the Energy Performance Certificates (EPCs), as well as major changes regarding advertising activities and public buildings (EPBD 2013).

Building element	U W/m²K
Exposed wall	0.45
Flat roof	0.25
Attic floor slab	0.30
Heated attic	0.25
Floor slab over arcade	0.25
Floor slab over basement	0.50
Window, non metal frame	1.60
Window, metal frame	2.00
Non openable glazing	1.50
Toplit	2.50
Entrance door	3.00
Door	1.80
Partition wall heated-unheated	0.50
Partition wall heated-heated	1.50

Figure 10. *Maximum U-values of building elements from 2006 (Hungary)*

3.3. Energy performance certification

In Hungary, obtaining an EPC has been compulsory for new buildings since 2009. Starting from January 2012, and according to EU Directive 2002/91/EK, all properties in Hungary, including the existing buildings, must obtain a valid EPC when properties are either rented out or sold, a requirement that applies both to buildings and to apartments/units within them. The directive introduced a common approach to the evaluation process in order to contribute to energy conservation in the building sector and to ensure transparency for owners and users. The evaluation scheme focuses on new buildings and major renovations of existing buildings in order to assess the energy performance of the buildings as precisely as possible and to facilitate further measures that can enhance EE.


Energetikai Tanúsítvány

ET1-0900539

Épület: Családiház — Postacím szerinti bejárat
Az ingatlan címe: 4615 Füzesabrány, Nefelejcs u. 24/b — GPS koordináták: É.sz.: N:47°21'32,1" K.h.: E:16°42'50,4"
Hrsz: Füzesabrány 5796/4

Megrendelő:
Név / cégnév: Téko Zoltán
Cím / telephely: 4615 Füzesabrány, Nefelejcs u. 24/b

Az ingatlan / ingatlanrész: fajlagos primer energia fogyasztása: 98 kWh/m²a
követelmény (viszonyítási alap) értéke: 94 kWh/m²a
fajlagos hőveszteség tényező a követelményérték százalékában: 94,00 %
az épület összesített energetikai jellemzője a követelmény érték: 104,20 %-a,
ez alapján az épület besorolása: D

A+ A B C D E F G H I — 104
<55 56-75 76-95 96-120 121-150 151-190 191-250 251-340 341<

Az ingatlanról készült fénykép

Nyári túlmelegedés veszélye fennáll: igen X nem
A javasolt konszolidációk megvalósítása esetén elérhető minősítés: B
Az Energetikai konszolidációs javaslatok a számítási jegyzőkönyvben találhatók.

Tanúsító neve, címe, (regisztrációs száma): Dátum: 2009.01.01
Tanúsító Kálmán P.H.
1051 Budapest, Hercag u. 13.
01-11046 EG-08-10077
aláírás

Figure 11. *EPC front layout, Hungary (EPBD 2013)*

In Hungary, the detailed rules governing the EPC system are stipulated in Government Decree 105/2012, according to which the energy performance of a building must be certified for newly constructed buildings, existing buildings that are sold for an offset, existing buildings that are rented out, and state-owned buildings with a total useful floor area of more than 500 m² that are occupied by public authorities. The decree prescribes that when acquiring or leasing an existing building that is subject to the certification requirement, the sale and purchase/lease agreement must contain the identification number of the EPC and a declaration of the purchaser/lessee regarding the receipt of the certification.

The evaluation process can be carried out and an EPC issued only by qualified and accredited experts whose

independence is guaranteed. According to the Act on the Formation and Protection of the Built Environment (78/1997), EE certification may be conducted by any person who is not banned from practising in the EE certification profession and has professional qualifications and experience prescribed by the government decree. Any person who wishes to engage in EE certification activities must first notify the body operating the trade register (which is the administrative organisation of the Hungarian Chamber of Engineers or the Chamber of Hungarian Architects). In addition, an independent inspection system of the building energy audits was introduced in 2013 which allows uploading of relevant information, such as data on EPCs, to the central electronic database. The e-system provides an opportunity to consult a complete list of EPCs, and certify professionals to record the certificates.

The certificate covers both the energy performance and the EE of the building (see Figure 10) and the evaluation is primarily carried out on a comparative basis. Therefore, the certificate must contain reference values – first, the energy performance of a comparable building that fully complies with the efficiency requirements prescribed by law. The certificate is rated based on a scale from *A+* to *I* (from highest to lowest degree of EE correspondingly). The other important section of the certification is the certifier's recommendation for the cost-effective improvement of energy performance. The energy certificate is valid for 10 years.

There are no existing legal consequences of non-compliance with the decree's requirements, nor are there consequences for low EE ratings (below *D* level). The actual aim of the law is to enable owners and lessees to obtain up-to-date information regarding the energy performance of their buildings, thus encouraging investment in improving EE and enhancing energy awareness. The EPC is sometimes used as a bargaining chip for the buyer in negotiating the purchase price of the apartment as the price of an apartment with a poor EE performance can be brought down in price. And although there is no obligation for compliance, most buyers require this certificate from an economic point of view, as it is valid for 10 years, therefore, if they would like to sell it later, they do not need to require one again when they become sellers.

3.4. Role of homeowners' associations and informational support

As a result of privatization of the housing sector in Hungary, as well as in Bulgaria, responsibility for repair and maintenance of buildings was handed over to homeowners. Thus, property previously operated by state-owned municipal companies fell into the hands of people who usually do not possess the necessary information and resources to perform the related tasks. In case of mixed ownership, when in one building there are privatized and municipal flats, the situation is complicated by uncertainty over sharing responsibilities for maintenance, renovation and allocation of funds. Thus, if in a panel block building there are dwellings owned by the local authorities, the latter have a direct interest in reducing costs and improving the quality of management, as well as living comfort in the controlled dwellings. In this case it may be easier for the residents to request the help of the municipality in organizational matters or financial issues related to deep retrofit.

From the legislative point of view, in Hungary all relationships between the residents of multi-apartment buildings and their house association are defined under the Act on Condominiums adopted in 2003. Article 1 of the Act states that all buildings with "at least two independent units for residential or non-residential purposes or at least one independent unit for residential or non-residential purposes" should be regulated as a condominium. The condominium owners association bears all responsibilities in relation to house maintenance and renovation, has a right to represent the house community and is required to handle all

matters related to common property. There is a practice in the country to hire a common representative for property management, a role that is usually performed by a private company which is selected by the residents. The company is assigned to service and maintenance of the building and is involved in communication with the municipality. Currently there are over 1.5 million registered condominium units in the country, most of which is former state- and now privately-owned property.

At the same time, taking into consideration that responsibility for the privatization process has usually been entrusted to local authorities, the municipality is the first institution where residents appeal for assistance in property management, and communication with the local authorities is generally the most accessible way for residents to reach public institutions. The municipality as an authoritative body has a right to request comprehensive information from banks about the existence of specialized loans for reconstruction, while relevant employees of the local authorities can provide organized consultations for residents on available credits and subsidy programmes. Taking into account that the municipality is the closest authority that has access to all data on the financial state of condominium/housing association, it would be logical to enhance the credibility of projects by providing municipal guarantees for loans. An example of such collaboration was introduced in Hungary where the Obuda municipality guaranteed financial support to cover interest rates of the loan for STACCATO's project site. Apart from the fiscal value, the municipality's assistance reassured residents about the project's reliability.

3.5. STACCATO experience and its policy aspects

The STACCATO demonstration project in Budapest, the Faluház renovation site, was supported by state and local authorities. A clear financial scheme involving the Obuda municipality, tenants and credit organizations was provided with relevant informational and organizational support. Soft loan conditions[23] such as long pay-back period and low-interest rates granted by the participating banks meant that the project was cost-neutral for residents. As most of the residents of Faluház were people with low income, the issue of project funding was a major one. In the case of STACCATO the EU made a direct financial contribution which greatly aided in the project's implementation.

It should be noted, however, that in case of STACCATO replication, the costs undertaken by the EU have to be paid by residents, local governments or the state, and without state subsidy these retrofits are usually not possible. This becomes a crucial issue in the view of the current lack and instability of the available financial state support (see Section 3.1). Thus, re-introduction of the Panel Programme, under which STACCATO received state financing, or a similar financing mechanism could stimulate further investments in comprehensive EE projects.

The situation in Hungary is even more complicated and creates additional challenge for future projects because of the lack of support coming from the banking sector and the lack of popularity of ESCOs (see Sections 3.1 and 3.4). ESCOs should be provided with the appropriate legislation and administrative support, as they have a strong potential to play an important role in energy efficient renovations (Bertoldi *et al.* 2014; see also STACCATO Final Report on Economic Aspects). And as STACCATO may have to be replicated in the absence of the large EU contribution, development of a variety of well-functioning funding mechanisms could enhance the number of successful projects.

[23] Financial support from the state through Panel Plus Programme (see Section 3.1)

Faluház residents appeared to realistically assess the physical depreciation of their buildings and recognize the need for refurbishment, which could be seen as one of the reasons for the high level of support from the homeowners' association and the residents in general. As STACCATO's pre-renovation survey (2009) showed, the vast majority of Faluház respondents (94%) thought of the upcoming renovation as 'useful' or 'very useful' and the majority was looking forward to the renovation. At the same time, the residents appeared not to possess specialized information about EE renovation (funding sources, technical solutions, possible partners etc.)[24] and there was a lack of organizational capacity among the residents.

Thus, communication with residents and informational support became a major focus point of the project from the beginning and an information office was established and operated by the Energia Klub, the consortium member responsible for communication. Tenants and residents had to be regularly informed and updated on the renovation activities via newsletters, notice boards, telephone and e-mail. Close and continuous cooperation of owners, tenants, the municipality, contractors, installers and state officials, was organized by a project manager. STACCATO served as an excellent example of good communication and dissemination, supported by the local government and NGOs. As a result of an efficient communication campaign, the project generated great attention and its progress was followed by local and national press. Consequently, the project was suggested for the Sustainable Energy Europe Award (Faluhaz 2011).

In addition to the effective dissemination activities carried out within the project, the "demonstration" effect of the project should be taken into account: as every day many people see Faluház, they may feel curious and inspired about the necessity of EE renovations, which may consequently have an indirect effect on the retrofit investments. The informational support also helped to raise awareness about environmental and energy-saving issues among the residents. For example, the post-renovation survey showed that nearly half of all respondents started setting their thermostat to lower temperature levels than before the renovation[25].

One of the important benefits of the project is that its effects could be measured, monitored, and the public informed about these continuously, which is usually not the case in Hungarian tenders. Similar obligations made it possible for other building owners, local governments and state decision-makers to receive information on the experiences of this STACCATO, allowing them to draw conclusions and plan investments and shape tender systems accordingly. Another positive effect of the project for the economy was creation of jobs. STACCATO results had substantial employment benefits, while deep retrofits such as SOLANOVA's are much more work intensive (Herrero and Ürge-Vorsatz 2012).

For Faluház residents the investment in the renovation project resulted in an overall improvement of level of comfort beyond the specific financial benefits, such as significantly decreased heating bills and increased value of their apartments on the Hungarian real estate market[26]. The post-renovation survey (conducted in 2011) showed that 86% of respondents started paying less/much less for heating after the renovation and 21% stated they were paying less/much less for electricity. It is worth noticing that real savings of the retrofit may be overestimated by the residents due to the utility cost reduction policy, plus 15% basic fee discount given to the Faluház by the district heating provider. The 'utilities reduction' policy may have a negative impact in

[24] STACCATO pre-renovation survey showed that more than 40% of respondents required additional information on energy costs, smart meters and solar boilers, and 30% on energy consumption.

[25] More information about projects results can be found in STACCATO Financial and Social Reports

[26] See final reports on financial and social aspects of the project for more details

terms of investment in EE measures by consumers, who may be satisfied with the reduced energy bills and thus reject the necessity of energy saving.

From the perspective of participation of various stakeholders, Faluház is a positive and definitely motivating example. STACCATO experience showed an example of a well-functioning condominium, which helped to reach an agreement between and with the owners relatively easily. The system of homeowners' associations proved to work well under the current regulatory framework significantly improving the process of implementation of the large-scale EE project. Another notable aspect of Faluhaz retrofit was the active involvement of the Obuda municipality throughout the process. It shows the need for the national policy to recognize and encourage direct involvement of municipalities in implementation of EE policies and measures. In addition, the local district heating company (Főtáv) was also supporting and cooperating within the process. Although, as it is discussed in more detail in the Economic Report, the company was motivated by both fear to lose its customers and a good chance to upgrade the system and try to decrease the loss by improving the system's efficiency. Thus, the policy should ensure either support of EE projects by the local energy companies or at least to make sure that the companies do not play an obstructive role in such renovations.

Before taking a decision on replication of STACCATO-like retrofits and corresponding policy measures, it is important to keep in mind the most cost-effective solution, as well as a long-term EE target (beyond 2020). As Herrero and Ürge-Vorsatz (2012) argue, large-scale implementation of partial renovations (such as STACCATO) may help to reduce fuel poverty, while passive-house based retrofits (deep renovations like the SOLANOVA project) would practically eliminate fuel poverty, even among the lowest income households. Advanced retrofits may thus deliver additional energy and carbon savings, gas import reductions, create more employment and avoid locking-in a substantial fraction of Hungary's buildings potential to reduce emissions and energy use.

4. Bulgaria. Policy on energy efficiency in residential buildings and Staccato implications

In recent years Bulgaria has made a significant effort to develop its EE policy framework. Through the EU accession process and after becoming an EU MS Bulgaria has actively participated in the EU actions and programmes with a major focus on EE. A number of Bulgarian organizations on different levels, including municipal and regional energy agencies, NGOs and educational institutions have been involved in a number of EU funded projects. The main national law transposing the EU directives on EE is the Energy Efficiency Act approved in 2008. This Act provides improvements for the energy certification process and is supported with necessary regulative documents (Decrees and Ordinances). The institution responsible for implementation of EE policy in the country is the Energy Efficiency Agency.

4.1. National policy strategies, initiatives and state support

In recent years Bulgaria has been highly prioritizing the development of the legal framework in relation to EE. Several important measures to improve EE in buildings were put into place including subsidies and tax deductions, measures on energy performance in buildings and obligatory measures related to EU accession. A number of regulatory and legislative acts form the basis of the Bulgarian policy framework in the field of EE in buildings, such as:

- Energy Efficiency Act (2004)
- Regulation on order and conditions for entering of persons to perform building certification and investigation for energy efficiency and obtaining information (2004)
- Ordinance № 200 RD-16-932 of 23 October 2009 on terms and conditions for the inspection of the EE of boilers and air-conditioning systems
- Ordinance № RD 16-1058 of 10 December 2009 on indicators of energy cost and energy performance of buildings
- Ordinance № 16-1594 of the Minister of Economy and Energy of 13 November 2013 for energy efficiency audit, certification and evaluation of energy savings in buildings.

The country's most important relevant policy initiatives are briefly described in Table 4.

Table 4. *Chronological introduction of energy policy initiatives and measures related to EE and promotion of green energy in Bulgaria*

Introduction date	Name of the initiative	Short description
2005	National Long-Term Programme for Energy Efficiency Until 2015	Renovation of residential buildings, gasification, modern lighting, incentives for purchase of energy efficient appliances
2005	National Programme for Renovation of Multi-family Buildings (2005-2020)	- Targeted renovation of 105 000 panel block flats in Sofia, Plovdiv, Varna and Burgas (Bulgaria's four largest cities) in the period 2005-2015; Expected costs: BGN 670 million (EUR 344 million); -Targeted renovation of approx. 580 000 panel block flats in all towns and cities in the period 2008-2020; Expected costs: BGN 3.45 billion (EUR 1.79 billion); -Direct state subsidy of 20% of renovation costs for each flat + tax breaks.
2005	National Strategy for	Three priority building types which should be financed by the national

Introduction date	Name of the initiative	Short description
	Financing of Buildings Insulation for Energy Efficiency Improvement (2005 – 2020)	budget: residential panel blocks (20% subsidy), state (all costs covered by the national budget) and municipal buildings (national budget only covers costs related to energy audits and certifications); Expected 40% drop in energy-related spending in buildings.
2007	First National Energy Efficiency Action Plan (2008-2010)	Indicative target for 3% fuel and energy savings of the final inland energy consumption (based on average for the period 2001 – 2005) by 2010, increasing to 9% by the end of 2016. The residential sector is expected to cover for 29% of the targets as this is its share in the final energy consumption.
2011	Second National Energy Efficiency Action Plan (2011- 2013)	Indicative target of 6 % fuel and energy savings for the period 2011-2013
2011	National Energy Strategy 2020	-By 2020 energy intensity of Bulgaria's economy should drop by 50%; -Adoption and implementation of the near-to-zero energy demand policy for public sector buildings; -Natural gas distribution network to cover 30% of Bulgarian households (up from 1.5-3% in 2011-2012). - Support for renewable sources which can cut transmission losses and improve EE
2013	Energy Efficiency Act (amended)	-The government should prepare a National Action Plan on increasing the number of near-zero energy buildings -As of 2014 all public service buildings with total area of 500 sq m or more should be certified for EE; -As of 9 July 2015 all public buildings with total area of 250 sq or more should be certified for EE; -Expected results from the implementation of this law: energy audit and certification of nearly 11 000 buildings
2014	National Energy Efficiency Action Plan (2014-2020)	National target for 2020 - energy savings of the final energy consumption amounting to 716 ktoe per year

In 2011 the Bulgarian Energy Efficiency Agency introduced the **New Energy Efficiency Strategy** for the period up to 2020. In terms of improvement of EE in existing residential buildings the strategy foresees securing funds for retrofits by providing low interest loans; introducing local tax exemptions related to energy performance indicators, establishing new financial instruments and schemes to facilitate accumulation of initial capital for renovation; improving the system of EE audit and combining it with other types of control activities (fire control, labour safety control); reducing energy consumption in energy supply systems and conducting large-scale educational and informational campaigns.

In June 2011 the National Assembly, Bulgaria's Parliament, adopted the country's **Energy Strategy until 2020** entitled *For Reliable, Efficient and Cleaner Energy*. According to the section on EE improvement, by the year 2020 the energy intensity of Bulgaria's economy should drop by 50% compared to 2005, reaching 456 toe per 1 million EUR of GDP (MEERB 2011). Along with retrofits in power generation and industrial sectors, the strategy recommends measures related to buildings and households. The measures include improvement of the energy characteristics of buildings by adoption and implementation of the near-to-zero

energy demand policy for public sector buildings and support for decentralized energy generation from renewable sources. According to the strategy, public procurement of construction works, products and services conducted by central authorities and municipalities should adhere to energy criteria with regard to efficiency and the integration of renewables.

Moreover, it is planned to expand the natural gas distribution network in order to cover 30% of Bulgarian households by 2020 (up from 1.5 - 3% in 2011-2012), as using natural gas for heating is considered much more efficient than heating with electric heaters. The strategy aimed to produce a **Programme for Accelerated Gasification of the Republic of Bulgaria** by the end of 2011 but drafting of this programme was delayed on several occasions. The latest publicly available information shows that a draft of this document was approved at an intra-departmental meeting at the Ministry of Economy and Energy (MFRB 2013).

Independent experts and environmental groups, however, criticized the strategy because it was not seen as having a step-by-step set of measures for accomplishing the outlined targets. Some went so far as to call the document "a list of promises, not a realistically achievable project" (Katanska 2011). WWF, the environmental NGO, suggested that the strategy is too focused on constructing new power plants and lacks sufficient focus on the so-called 'negawatts', i.e. energy savings (Yenchev 2011). The Socialist-led government, formed in May 2013, promised to develop a new, comprehensive and more detailed energy strategy. A draft of this new document was never officially presented to the public as the government stepped down in July 2014, after which a care-taker government took office.

With 50 mln. leva (circa 25 million EUR) of EU funding, the **Energy Renovation of Bulgarian Homes** project aims to facilitate the renovation for EE in multi-family panel blocks. At the state level the project is run by the Ministry of Regional Development and will continue in the period 2011-2015. As of October 2013, homeowners can get a grant equal to 75% of the value of the renovation project (MRDRB 2014) and private panel blocks or other dwellings designed and built before 1999 in one of the participating 36 Bulgarian cities[27] are eligible to apply for funding. An amendment to the terms and conditions was adopted by the Council of Ministers and as of September 2014 homeowners whose participation in the project has been approved and whose monthly income is up to 310 leva (ca. 155 euro) and have no other dwelling can apply for a grant that covers 100% of the costs associated with the renovation of the building. The grants are provided by the budget of the Ministry of Regional Development and the fund has 9.5 mln. leva from Regional Development Operational Programme and 1 mln. leva given by Corporate Commercial Bank (more commonly known in Bulgaria as KTB), which was selected in 2011 to be the manager of this fund. This money could be used as low-interest loans by the homeowners participating in the renovation project.

Unfortunately, in June 2014 KTB was temporarily closed due to liquidity problems and it is now under the special supervision of the central bank. In this situation about 13 million leva for energy renovation which were provided from the EU funds remain blocked in the bank. Currently, the central bank is working on a solution of the banking problem and at this point it is unclear when all funds will be available again. In the meantime, the Ministry of Regional Development claims that it spares no efforts to push forward the Energy Renovation of Bulgarian Homes project. Currently, the Ministry is trying to reach a form of cooperation with other commercial banks.

[27] Blagoevgrad, Burgas, Varna, Veliko Tarnovo, Velingrad, Vidin, Vratsa, Gabrovo, Gotse Delchev, Dobrich, Dupnitsa, Kazanlak, Karlovo, Kardzhali, Kyustendil, Lovech, Lom, Montana, Pazardhzik, Panagyurishte, Pernik, Petrich, Pleven, Plovdiv, Razgrad, Ruse, Svishtov, Silistra, Sliven, Smolyan, Sofia, Stara Zagora, Targovishte, Haskovo, Shumen and Yambol.

Nevertheless, as of September 2014, two buildings have been renovated under the project and they are about to be officially commissioned. Another four investment proposals were approved and three construction permits issued. A total of 417 expressions of interest for participation in the project have been submitted, and the Ministry has so far approved 393 of them.

Other important initiatives are the **National Programme for Renovation of Multi-family Buildings 2005-2020** (Decision of the Council of Ministers from January 2005; MEERB 2005a) and the **National Strategy for Financing of Building Insulation for Energy Efficiency Improvement 2005-2020** (adopted by the Government in May 2004; MEERB 2005b). The former implies a subsidy of up to 20% from the state budget for expenditure related to the implementation of EE measures in a block of flats. Today the programme is in its primary stages; its implementation is expected to start after the strengthening of the Condominium-Project Building Act (2009) and the founding of associations of building owners under the provisions of that law, which is discussed at in more detail in Section 4.4. In addition, Bulgaria has introduced a number of important EE measures in buildings, such as measures linked to EU accession, measures in support of thermal performances of homes, subsidies, and fiscal measures (UN ECE 2013).

A Demonstration Project for the Renovation of Multi-family Buildings 2007-2012, as a part of the above mentioned national programme, conducted jointly by the Ministry of Regional Development and UNDP in 13 Bulgarian cities, led to a successful renovation of 1093 homes (50 buildings), including the blocks renovated under STACCATO. A follow-up survey showed that over 90% of the respondents were 'satisfied' or 'very satisfied' with the project and that over 60% of the respondents gave high and very high marks on the organizational aspect of the project and the quality of the renovation works. Moreover, for 75% of the respondents of the survey proved that the establishment of an association for the purpose of the joint management of the building has more pros than cons (MRDPW 2012). In general, one of the largest obstacles confronting renovation of multi-family panel blocks seems to be the inability of homeowners to form associations which are necessary to apply for financing and conduct common renovation projects[28].

There has been a significant development of financing sources for EE projects in recent years. Largely, this process is supported and promoted within the framework of EU accession. Between 2004 and 2013 a total of 1.5 billion EUR was spent on programmes targeted at EE improvements (EPEC 2013). Previously, the main funding was coming from foreign donor programmes and grants. However, recently the government started paying greater attention to state financial resources and their availability for implementing local energy saving initiatives (Bertoldi *et al.* 2014). Apart from EU structural and cohesion funds and the state budget there are interesting funding schemes based on public-private partnerships, such as the Bulgarian Energy Efficiency Fund. Currently Bulgarian policy supports investment in sustainable energy at the national and regional levels, but preference is given to projects aiming to improve energy supply, facilitate competitiveness of the energy market and which are consistent with the goals of environmental protection.

It should be noted that in accordance with the requirements of Bulgarian legislation, municipal authorities have to be actively involved in renovation processes. Through the municipal association with participation of municipalities, condominiums, energy service companies and other stakeholders, technical and methodical support has to be provided for the renovation of residential buildings.

[28] See Paragraph 4.4 on the role of condominiums in Bulgaria

However, in spite of the fairly favourable regulatory and financial environment, procedural problems make the Bulgarian market almost impermeable for ESCOs. ESCO projects do not yet prove to be profitable without extra grants, while commercial banks are not open to alternative financing mechanisms (EC JRC 2012). The problem with profitability originates from the generally obsolete and delapidated condition of buildings and sites, which means that investments are diluted by the necessary improvement of basic conditions. Consequently, this becomes detrimental to the profitability/payback time of an ESCO project and a guaranteed savings agreement cannot be drawn up between the ESCO and the client, since there might be no cost savings in the end (Bertoldi *et al.* 2014)[29].

A major barrier to significant energy conservation in the household sector is the relatively low price of electricity in Bulgaria which stimulates the increasing use of electricity (including electricity for heating purposes) and also enables the penetration of air conditioning systems. Bulgarian households pay the lowest electricity tariffs among EU consumers - on average, the electricity rates in Denmark in 2013 were 3.2 times as high as in Bulgaria (Eurostat 2014). Thus no matter how favourable the government policy documents may be or how salient awareness campaigns strive to be, most residents are unlikely to change their behaviour on energy consumption as long as their pockets can afford not to.

This low price of electricity is sustained by both the government and the quasi-independent regulator the State Energy and Water Regulatory Commission (SEWRC). The regulated price of electricity is seen as an instrument to lure voters (household energy consumers) and fight political battles. The political course of suppressing household tariffs is often criticized by industrial and other business associations, such as the Bulgarian Industrial Association, which claim that cheap energy cannot be part of the government's social assistance policy because low tariffs benefit both poor and rich consumers, while also hampering EE efforts (BPVA 2014).

At the same time, households in Bulgaria pay the highest retail price for natural gas in the EU (EC 2014b), which is one of the reasons for the low penetration of gas grids in Bulgarian cities. This also represents a barrier for further gasification of the household sector and, possibly, a barrier to more energy efficient heating, as required by Bulgaria's Energy Strategy of 2011.

The overall EE policy of Bulgaria can be described as 'not overly ambitious'. EE in buildings is not a priority, as preference is given to investment projects in the field of energy infrastructure. There are high investment related risks and low awareness of potential project partners[30]. As a recent Energy Efficiency Watch assessment suggests, not enough attention is paid to the provision of impartial energy advice and audits in the residential sector, or to development of information tools and mandatory display of EPCs (EEW 2013).

4.2. EPBD implementation

Most of the EPBD requirements were transposed in the Bulgarian legislation in 2004 when the Energy Efficiency Act was established. In the same year several regulations related to the act were published, covering energy characteristics of buildings, energy audits, eligibility of auditors and energy certification. During the next years legislation and regulations related to EPBD were continuously updated and as a result harmonized with EPBD requirements.

[29] For more details on ESCOs in Bulgaria see STACCATO Final Report on Economic Aspects

[30] See Final report on economic aspects of STACCATO for more details

The first Act on energy efficiency provided a legal framework for establishment of the so-called Energy Efficiency and Renewable Sources Fund: a financial vehicle, a type of a public-private partnership, providing loans to companies, municipalities and private individuals for EE investments. In 2008 a new Energy Efficiency Act was adopted and subsequently amended on a number of occasions with the latest amendment made in July 2013 (SEDA 2013), in order to reflect requirements of the EPBD Recast 2010. Thus, according to the latest amendments:

- the Government shall prepare a National Action Plan on increasing the number of NZEB;
- as of 9 July 2015 all public buildings with a total area of 250 m² or more should be certified for EE;
- implementation of the law is expected to lead to energy audit and certification of nearly 11,000 buildings.

With the adoption of the Energy from Renewable Sources Act in 2011, the Energy Efficiency Agency (EEA) was transformed into the Sustainable Energy Development Agency (SEDA). Under the new renewable energy law, EEA/ SEDA's responsibilities were expanded and now the agency is tasked with issuing guarantees of origin for electricity generated from renewable sources and with maintaining the national register for these documents. Previously, they were issued by the State Energy and Water Regulatory Commission.

As far as the current compliance with the EPBD is concerned, Bulgarian legislation set up requirements for issuing buildings certificates for new, reconstructed and existing buildings. National requirements in Bulgaria for the heat conduction coefficient U were significantly tightened during the last 50 years (see the table below). Compared to the Hungarian system, the Bulgarian requirements are less detailed, not as carefully categorized, but in general stricter.

Table 5. *National requirements for the heat conduction coefficient in buildings in Bulgaria: 1964 - 2012*

Year	1964	1977	1980	1987	1999	2005	2009	2012
U (walls), W/m²·K	1.75	1.75	1.36	1.11	0.50	0.50	0.35	0.35
U (windows), W/m²·K	2.65	2.65	2.65	2.65	2.65	2.0	1.7	1.7
U (roof), W/m²·K	1.23	1.23	1.087	0.603	0.30	0.25	0.28	0.28
U (floor), W/m²·K	1.15	1.15	0.725	0.503	0.50	0.40	0.40	0.40

Sources: EPBD 2010; EPBD 2013

In summer 2014 the Ministry of Economy published Bulgaria's new National Energy Efficiency Action Plan for the period of 2014 – 2020 (MEERB 2014b). The plan, which was supposed to be prepared in accordance with the EU EE Directive and the EPBD Recast of 2010, has not yet been assessed by the European Commission. At the same time, in July 2014 the European Commission announced that Bulgaria had not informed the Commission on the adoption of national legislation/ policies that transpose the EE Directive. In August 2014 the recently-appointed caretaker government of Bulgaria announced that a whole new Energy Efficiency Act had been prepared (presumably, by the previous government) and it would transpose the Directive once it is adopted. According to the Ministry of Economy and Energy, the draft of the new law has successfully undergone the procedures of public consultation and interdepartmental coordination. On 18 July 2014 the draft was submitted to the Council of Ministers, however, it was not discussed on any subsequent

session of the caretaker Council since the parliament had been dissolved and the draft could not be voted for. It is expected that the new government and the parliament will approve the draft after the October 2014 elections and after the new governmental bodies are formed (MEERB 2014a).

4.3. Energy performance certification

The current Bulgarian legislation, specifically the Energy Efficiency Act specifically, requires that for each rented or sold building or part thereof an EPC and/or Energy Passport[31] should be made available for the new tenant/owner. However, as in Hungary and the Netherlands the compliance with this requirement is frequently neglected. There is no supervision and administration system requiring EE certification on rental/sale of housing, and no provision of sanctions or fines for failing to deliver an EPC in such cases (EPBD 2013).

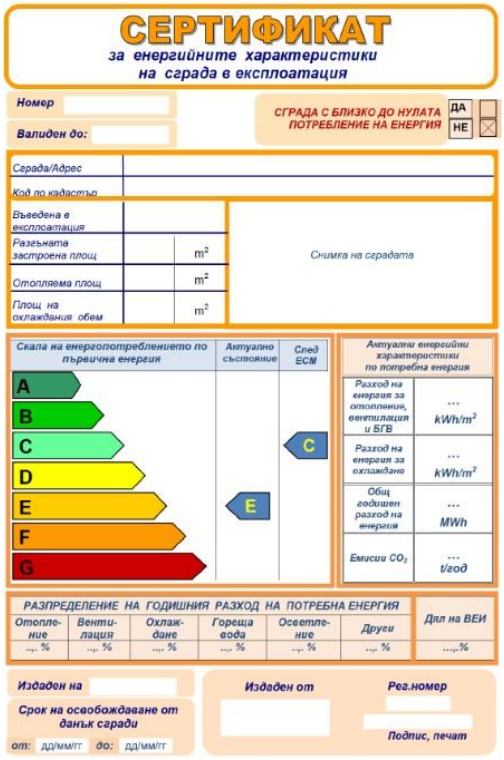

Figure 11. *EPC front layout, Bulgaria (EPBD 2013)*

For an existing building which has undergone a renovation the EPC is issued by physical or legal entities registered in the SEDA after a detailed audit of the construction. SEDA is responsible for the maintenance of a public register of all the companies operating in the country and carrying out audits for EE and certification. As of 2012, there were 328 officially registered companies.

The current legislation for EE audit in existing buildings aims at identification of building envelope construction and systems responsible for microclimate management, measurement and calculation of energy performance and characteristics, analysis of potential energy savings, outlining measures for EE improvement, cost-benefit analysis of these measures and analysis of potential for the use of RES. Energy audit covers such technical equipment and systems as measurement and control equipment for energy flows in the building; fuel burners and systems for conversion of input energy streams; electrical, hot water and lighting systems; envelope construction elements and others.

Figure 11 shows an EPC front layout, which includes the following data: general information about the building (address, year of commissioning, heated area etc.); values of the building's integrated energy preformance (total annual energy consumption in MWh, annual generated CO2 emissions in t/year, category of the certificate); distribution of the annual energy consumption expressed as a share of total energy consumption; recommended groups of EE measures leading to the achievement of minimum requirements. The energy consumption scale consists of classes from *A* to *G* based on the integrated energy performance characteristic.

Since November 2013, there is a possibility of obtaining an EPC for projected energy performance for existing and new buildings even before the beginning of (re)construction, provided there is an investment

[31] Energy Passport if required for each new building after completion of its construction

plan[32]. Each EPC for projected energy performance is valid for 10 years for existing buildings and 6 years for new ones. However, a certificate that defines the category of a building is issued only after the building has been in use for one year from the date of implementation of energy saving measures.

For existing buildings constructed before 2005 the Bulgarian legislation defines two categories of certification - "A" and "B". Possession of a certificate ranking the building in a particular category provides the owner with a right to have a property tax exemption for a period of from 3 to 10 years[33]. According to the amended Local Taxes and Fees Act, there is a complex system of tax bonuses available for house owners depending on the certificate category obtained. For example, a building tax exemption is to be granted for the duration of 10 years in case a certificate category A has been obtained and RES are additionally used for energy supply of the building.

This measure facilitates the certification process and contributes to improvement of EE in buildings, thereby demonstrating the government's willingness to cooperate in the field of energy conservation. However, although most apartments in panel blocks are privately owned, condominiums in these houses (unlike in Hungary) are usually not established. This raises the question of who is the building owner and who is in this matter eligible for tax benefits. It also brings us to the problem of condominiums in Bulgaria (see Paragraph 4.4), which is of great significance in relation to EE retrofit.

4.4. Role of homeowners' associations and informational support

As of 2008 less than 20% of multi-family housing in Bulgaria had homeowners' associations acting as legal entities (Tsenkova 2009). The lack of funding and experience to deal with the complicated tasks of asset management and financial planning had aggravated the housing conditions across the country and in addition, the level of housing-related services (water, energy, district heating, waste management etc.) had declined because of subsidy cuts, rapidly escalating costs and massive arrears with respect to utility costs. As a result of these processes not only had the public services deteriorated, but also the normal maintenance of the housing stock had accumulated a huge backlog (Tsenkova 2009).

In Bulgaria, where apartments have mostly been privatized, owners face a coordination problem because many upgrades affect the entire building and everyone needs to participate. Since often households of different means live in the same building, some of them may simply not be able to afford investments in a large-scale EE retrofit or even a smaller renovation. In addition, homeowners tend to focus more on the short-term costs of EE upgrading rather than on long-term savings. Economists call these problems 'behavioural failures' (similar to market failures) that often require some form of public sector involvement to resolve the above mentioned issues. In order to get more homeowners to invest in EE, a combination of financial incentives, strong regulations and information dissemination is required (Deichmann and Zhang 2013). However, the Bulgarian regulations providing a legal basis for activities of condominiums/house associations and their cooperation with home owners and authorities are not yet well developed.

The main legal act in this field is the Condominium Ownership Management Act (COMA) which was adopted in 2009. The COMA provides that management of the common parts of the building may be

[32] Excerpts from Ordinance № RD-16-1594, 13 November 2013, of the Republic of Bulgaria for energy efficiency audits, certification and assessment of energy savings in buildings

[33] Category B certificate with validity 3-5 years is issued for the buildings of energy classes C (built in 1990-2005) and D (built before 1990). Category A certificate with validity 7-10 years is issued for the buildings of energy classes B (built in 1991-2005) and C (built before 1990).

performed either by the general assembly of the owners of separate units in the building or through an association of the owners. And unlike the general assembly of owners, the association of owners is a legal entity, which shall be established in accordance with the procedures set out in the COMA. For the purposes of maintenance of the common parts of a building a special Repairs and Renewal Fund should be created. The general assembly of owners/the association of owners adopts a plan for performance of repair works, reconstructions, reorganizations and other works in the building. In case the competent authorities give instructions related to such activities, the repair works/renovations/reorganizations should be complied with them (IBA 2012). By virtue of the Act, municipal administrations shall create and maintain public registers of buildings or separate entrances under condominium ownership arrangement located at their territory.

COMA was significantly amended in 2011. Some of the main provisions and improvements of the revised act are as follows

1. The appointees of properties in condominium ownerships are now accorded the same powers with regards to their participation of the management of the building as the owners of separate units. In most cases those appointees are older people who have delegated their property rights to younger relatives who do not have interest in real estate management. This measure may facilitate establishment of condominiums since it allows residents with modern thinking to become involved in the process.
2. Organizational procedure of the general assembly were simplified. Previously the announcement of a meeting had to be delivered in writing personally to each resident, which significantly complicated the whole process. Now the general assembly should be called a minimum of 7 days prior to the meeting through an invitation which should be put in generally accessible and prominent places in the building.
3. In the past one of the main obstacles for establishment of a Condominium was the absence of some home owners. Mostly it was not possible to gather the 100% quorum of residents which was necessary to establish it. Now, in case of absence of an owner, he can be represented by a lawyer authorized by a Power of Attorney and what is more one lawyer may represent up to 3 owners. The law also allows the opportunity to delegate the owner's rights to his relative by providing an official letter.
4. Another important amendment is directly related to refurbishment initiatives. The Law states that major decisions[34] regarding the building have to be agreed by 67% of owners. The quorum for holding a general assembly is also 67% of owners or their representatives. In addition, the association can assign a common representative who will have the right to apply for co-financing.
5. The registration procedure for condominiums was simplified by cutting down the volume of the data on building that had to be delivered to the local authority. Some of the data is already filled in automatically.

In theory, the COMA its amendments can be characterized as a positive change enhancing possibilities for EE renovation as they facilitate the condominium management process. However, as the STACCATO experience has shown, obtaining an agreement on EE renovation in case of multiple house owners and establishment of a formal homeowners' association for management of the building remain difficult in

[34] When renovation, major reconstruction and utilization of funds from EU, state and/or municipal budget, grants and subsidies and/ or personal funds or other sources of funding are to be decided upon

Bulgaria, often causing wrangles and impeding the planned renovation. While large-scale renovations require involvement of all residents and their official association, there is a lack of tradition in the joint management of common property through associations of owners, and thus professional management of residential buildings is almost an unknown practice. This becomes evident as EE renovations require a complex technical intervention, application of technical norms and achievement of high standards (MRDPW 2007). The secondary legislation in this field has also not been fully developed yet. It will require some time to create the necessary regulatory background to make the system function effectively.

4.5. STACCATO experience and its policy aspects

The STACCATO project was a rather novel one for Bulgaria, particularly with the inclusion of RES in improving the building's energy self-sufficiency. Moreover, STACCATO as a showcase project demonstrated how contemporary EE improvements in buildings should look like. In policy terms it also showed how a variety of legislative acts and regulations are applied in real-world conditions. One major innovation is that the project allowed for the installation of solar water heaters as part of the renovation of several buildings at the Oborishte site (until now most energy renovation projects in Bulgaria focused only on external wall insulation and new windows). Although roof-top solar water heaters are not something new to many Bulgarians (especially those having vacation and countryside properties), the project proved useful in combining this type of installation with the large central heating systems existing in urban areas. The idea of relying primarily on the solar systems in summertime and using the existing central heating in wintertime could be disseminated and scaled-up with the adoption of appropriate policy measures. Incentives, such as additional tax breaks or an easier process to get construction permit for such hybrid installations, are some of the policy initiatives that should be considered.

Under the Demonstration Project for the Renovation of Multifamily Buildings (2007-2012, part of the National Renovation Programme, an initiative under the Ministry of Regional Development and UNDP) 50 buildings in 13 cities were renovated across Bulgaria. Of the 50 renovated buildings, 13 are located in Sofia and 4 in the Oborishte district, all of them using STACCATO co-funding. Thus, STACCATO retrofits as yet remain the only large-scale renovations in the Oborishte district.

In comparison to Hungary, the Bulgarian financial scheme used for the demonstration project was more complex and underwent various revisions. The initial idea of involving an ESCO in the project finance turned out not to be viable in practice, while the shifting and unpredictable policy landscape led to a necessity for major revision of the project. As a result, funding which was attracted to the project was more complex and strongly dependent on state finance provided by the National Renovation Programme, as well as on the EU funding. The project experience clearly showed that there is a large need for systematic support for financing and management of projects, which was delivered by the collaboration in the STACCATO project. The Bulgarian project team noted that without major interventions and additional financing, low-income households would never participate.

As the STACCATO experience has shown, although the requirement to establish a condominium was officially reduced from 100% to 67% during the project period (see Section 4.4), still in practice the full support of owners was required to agree on the retrofit. In one of the project houses a question was raised about conversion of an unused attic space for new apartments to fund the project costs. While almost the whole house agreed on the conversion, one resident objected and the scheme was unable to proceed. The difficulty in establishing a formal homeowner's association and motivating all the owners to reach a common

agreement became a real obstacle for the project's implementation. Only in the Cherkovna project site, a residential block with a rather small set of apartments, was there strong cohesiveness among the residents, unlike in the other three pilot blocks, and even these were dramatically scaled down from the original panel blocks envisaged in the project plan, as the greater the number of owners the harder it is to secure the necessary agreement.

Moreover, unlike in Hungary where house representatives are often professional companies conducting the role for multiple houses, in Bulgaria it is usually one of the residents who voluntarily acts as a representative and who is usually not paid for this. As a result, there is a much greater chance that such a person may not do a good job, creating significant issues over the common trust. Occasionally this "amateur" status can have its positive side though, as demonstrated in one of the STACCATO sites where two of the owners actively promoted the project and persuaded the other residents to take it up, approaching each apartment and family individually focusing on and emphasizing the advantages of the renovation and the specific situation of each resident. In the end, a common agreement was reached and the retrofit successfully launched.

It thus became evident that currently in Bulgaria only strong communities (either with strong leaders or smaller buildings with a strong social coherence) can unite to renovate the whole building/block (understood as all apartments and all common areas). In case of a weak support within the building, owners often prefer to renovate only their own apartment, which results in the so-called 'patchwork' renovation that can be observed around Sofia. In order to avoid this, a stricter legislation and various initiatives supporting creation and operation of homeowners' associations should be established.

Education and awareness-raising campaigns were also carried out within STACCATO with the residents in the retrofitted blocks, in order to encourage energy-saving behaviour and technical assistance was provided to the residents, e.g., monitoring of "energy vampire" appliances and support in reducing standby power loss. As the post-renovation surveys showed, more than half of respondents started setting their thermostatic control to lower temperatures than they used to prior to the renovation. Other energy behaviour changes were also observed and are described in more detail in the project's Social Report.

Government involvement in such awareness-raising and education is generally limited and was not forthcoming in STACCATO, while there was much more interest from the utility companies, many of which are currently actively promoting energy-saving measures. And while in the Netherlands utility companies are required to provide smart meters to all new customers, much less action on smart metering can be observed in Bulgaria. This may be due to the fact that there is as yet little economic incentive for this as the absolute costs of energy in Bulgaria are relatively low (see Section 4.1).

5. Conclusions and recommendations

5.1. Findings and conclusions

In all the three STACCATO countries there is a solid legislative base for the implementation of EE retrofitting in the residential sector. While in the Netherlands this is longstanding, in Hungary and Bulgaria major policy development in the field is more recent and was largely influenced by the EU accession process. Adoption of various EU Directives supported with national complementary legislation has indicated a positive policy change in terms of setting EE as a top priority for national development. Both countries have enacted strategic documents on EE that contain provisions on measures for increasing of energy savings in buildings. By now, all substantial provisions of the Directive were transposed into national legislations, including buildings standards and EPC. Under the EPBD Recast 2010 the countries are making efforts to adopt new requirements in the field of EE in buildings that would lead towards the most cost-efficient level of fulfillment of the set requirements.

Among the project countries, **the Netherlands** can be characterized as the country with the most comprehensive and stable national policy framework in the field of EE in buildings. The country has long and successful experience in legislation on energy performance, which had already been constructed in line with the EPBD regulations before the Directive came into force. At the moment, the Dutch residential sector can be characterized as one of the most successful sectors in terms of realization of EE measures compared to other European countries. A comprehensive approach which includes a complex legislative system supported by regulatory and fiscal instruments has led to a substantial decrease of energy consumption in new and existing dwellings, especially in the area of district heating. Often based on public-private partnerships, the Dutch system involves and considers interests of all stakeholders.

The Dutch legal system covers various issues of residential energy use, such as: information support, stimulative mechanisms and providing conditions for self-regulation on the level of particular dwellings. In order to increase EE concern on the level of house associations and constructing companies, legislation has provision for energy performance standards, energy management, energy taxes, long term voluntary agreements and state financial support. Energy performance requirements were adopted as long ago as 1995 and contained product oriented technical measures aiming to improve energy performance in buildings. During the last decade the requirements were gradually tightened with the main focus on heating and overall indoor climate including air quality. With the already achieved 40% reduction of Energy Performance Coefficient the Netherlands has a high potential to reach the targeted level of NZEB by 2020.

An additional motivating measure for implementation of EE projects has been introduced with theinclusion of information about renewable energy in energy certificates. This will not only motivate local authorities and housing corporations to develop the renewable energy market but will also help improve the status and value of energy efficient and RES real estate.

Based on the experience of the STACCATO implementation, the existing Dutch legislation regulating interrelation of landlords and tenants makes tenants essential actors in the large-scale reconstruction projects. This is a vital issue in the Netherlands given that the scale of rented social housing and lack of consensus between the parties in this matter may cause serious harm to any energy-saving initiative. In order to strengthen communication, such organizations as the Woonsbond Dutch Housing Association (a national association of tenants and home seekers) exist, supporting the new energy retrofitting efforts and encouraging

the tenants to actively participate in the process. The policy pursued by Woonbond and Aedes should help to eliminate and prevent controversies of the type witnessed in the STACCATO project in the future.

Typically in the Netherlands the municipality provides full support for housing corporations. In case of implementing large-scale reconstruction projects, local authorities are often ready to allocate a part of the municipal budget to provide financial guarantees. All this creates favourable conditions for implementing EE projects in the country and steps for initiating, funding and implementation of a retrofit project are well-structured by the national legislation. In addition, there are regular information campaigns for raising awareness in the field of energy saving measures. To sum up, the Dutch experience very much suggests that from a long-term perspective a complex approach to EE policy is more effective than a single point measure.

After the EU accession in 2004 **Hungary** has seen a positive policy change in terms of setting EE as a priority for national development, and successive Hungarian governments have made significant efforts to overcome the barriers in this area. Major regulations related to refurbishment are provided by acts that came into force in compliance with the EPBD and EPBD Recast. Since then Hungary has developed a solid legislative framework for the energy certification of buildings, subsidiary support of the latter and introduced relevant amendments to building codes. According to the current policy framework and the new strategies through the development of EE sector the Hungarian government in the first place pursues economic stability of the country. This refers to reducing dependence on imported fuels, improving the competitiveness of Hungarian private companies, creating viable self-financing schemes and social sector development. At the same time, the analysis shows that there is a lack of a long-term EE policy (beyond 2020) and a corresponding financing framework in the country.

Within the period of Staccato project implementation, as it coincided with the financial crisis, Hungarian policy was characterized with a lack of subsidy funds for modernization of existing buildings. In 2010-2014 this situation was improved with introduction of new state strategies providing financial support for EE projects. However, taking into account that subsidies are offered on the condition of co-financing, the housing sector still requires significant investment. The influx of investment could be much greater in the presence of a greater variety of legal and economically viable financial instruments. For example, participation of ESCOs in energy efficient retrofit could considerably increase the number of initiated projects. Improving EE in the residential housing sector, where estimated potential is about 75% reduction of heating costs, will be beneficial not only for residents, but also municipalities and energy suppliers. In order to enhance the impact of public tools it is also necessary to develop national informational programmes to raise awareness of citizens and relevant stakeholders.

In **Bulgaria** there are certain barriers that impede rapid development of energy saving in the country. First of all, there are institutional barriers determined by the limited experience of authorities in elaborating and implementing EE policies. Performing control and supervisory functions requires a considerable number of qualified personnel with expertise in EE and even with a favourable regulatory environment, local authorities have limited power and experience to perform all tasks required by law. The institutional barrier is frequently exacerbated by a lack of political will.

In terms of development of energy saving policies in recent years, the country's government has used the EU accession process efficiently. There has been considerable progress in developing medium- and long-term strategies, special legislation and action plans. The most essential task at the moment is to implement the declared programmes and ensure coordinated efforts of all relevant stakeholders.

It is important to note that the price of energy use in the country is still pretty low in comparison to other EU MSs and the low energy costs do not stimulate investments in energy-saving measures. At the same time, the costs are high for a significant portion of the population if compared to the level of income, so fuel poverty remains an important issue for Bulgaria.

Due to perception of high project-related risks it is difficult to obtain initial capital for project implementation in Bulgaria. Sometimes potential investors and banks are not fully aware of all the financial benefits of energy saving projects that are usually considered only as "environmental" and "social" initiatives and this ignorance also limits the motivation of investors to implement EE projects. Moreover, there is a strong lack of qualified human resources in the market due to the lack of experience in realization of EE projects. These barriers are often exacerbated by the lack of information regarding available technologies and funding opportunities.

Additionally, there is a lack of legally registered homeowners' associations, ambiguity of ownership rights and following responsibilities during the reconstruction process. The STACCATO experience has shown that a functioning condominium of owners is one of the most important preconditions for a successful large-scale EE retrofit in Bulgaria.

Turning to consider the STACCATO experience directly, it turned out to be highly instructive for policy as a whole range of barriers arose during the project's implementation: the partners faced social, financial, administrative and other issues in the participating countries, which had to be dealt with according to the realities and possibilities existing in each specific case. It is important to point out that the STACCATO experience is valuable not only in terms of general lessons learnt, but also in respect to the distinctive features and problems faced by both Eastern and Western EU states in their intentions to achieve the national and union EE targets, and the final recommendations offered here will distinguish specific country-level issues where appropriate.

When the project was about to launch, STACCATO promised a more than 50% reduction in emissions from the renovated buildings, which is considerably less than the deep-renovation within the SOLANOVA project where an 80-90% reduction was achieved. Notwithstanding the wide range of methods and technologies used to reach the set STACCATO target, including application of renewable energy technologies and long-term educational campaigns of residents, the promised CO_2 reduction level was not yet fully reached[35]. This leads to certain discrepancies between what can be achieved in a long-planned EE project and the EU aspirations stated in EPBD and EED, such as transformation of refurbished buildings into low-energy ones and achievement of the national EE targets. Thus, a certain range of issues may occur in regard to "ideal" renovations of panel blocks over the next years: if the 50% emissions reduction of the existing residential blocks is achieved, is this still "better than nothing" or "less than should be"? This lock-in effect is an important issue, to which policy-makers of the EU MSs and the EU itself need to pay attention.

[35] The available data and preliminary calculations showed 48% of CO_2 reductions at Het Breed (with upward potential expected to be above 50%) and 47% CO_2 reduction at Obuda.

5.2. Recommendations

EU Level

In order to overcome the existing barriers slowing down implementation of energy efficiency retrofits in the residential sector of EU Member States, the following policy measures should be taken:

- **Strengthening the existing legislation**. Renovation of the existing EU building stock is not sufficiently covered by the existing legislation. It is necessary that the EU requires creation of consistent and clear legal frameworks in Member States (*MS*s), in order to remove the existing barriers for both private investors and house owners. The EU should require that MSs pay more attention to the legislative measures directed to improvement of financial incentives and energy performance standards[36], while keeping support of Energy Labelling and Eco-design schemes.

- To attract more private capital, it is necessary to **develop long-term renovation programmes with clear targets and monitoring**, **providing appropriate financial instruments and public financial leverage**. This is critical for establishment of a long term energy efficiency (*EE*) market. To have long-term programmes and associated financing is a must for transforming deep renovation strategies into common practice. This could be done through identification of EE retrofits as a priority area for the European Investment Bank, and establishment of a special building renovations fund. The current national targets set in accord with the Energy Efficiency Directive are not required to go beyond 2020, and are merely 'indicative'; thus, the current requirements should be strengthened and longer time-frames asserted (until 2030 and 2050).

- **Binding measures and targets** should be developed to establish a long-term roadmap for renovation of the EU residential building stock. Different phases, from voluntary to binding measures (the latter should be constantly re-valued and improved), can be defined by tailor-made roadmaps. Binding EU-level targets for energy efficient retrofits in the residential sector should be set, taking into consideration national financial and technical potentials, as well as support potential for cooperation between MSs. Having a predictable long-term deep renovation roadmap will provide the business sector with confidence, opportunities and avoid the risk of falling short after 2020.

- Support of the **harmonization of national EE data collection systems and respective monitoring programmes** in respect to energy performance of residential buildings, ensuring sufficient availability of high quality data for design of properly working policies and incentive schemes. The STACCATO project provided a methodology for calculation of planning timeframes for retrofit projects, which can be advised for further use in future projects within the EU MSs. This may allow shortening implementation time of retrofits while providing high-quality construction.

- **Establishing minimum requirements for renovation depth at cost-optimal levels**[37]. The current EPBD recast does not specify the depth and speed of renovation of residential buildings. In addition, financing instruments need to be available for deep-level renovations in the existing residential buildings

[36] As one the latest studies has shown, putting effort into improving financial incentives and energy performance standards has a more significant effect on fostering energy efficiency improvements in comparison to such measures as eco-labelling and educational campaigns (Filippini *et al.* 2014).
[37] Cost-optimal levels as specified under EPBD.

stock, which would lead to low-energy standards and provide private investors with more financial flexibility and additional confidence.

- **Facilitation of the development of innovative financial instruments at MS level**, in order to trigger private investment. This can be done by elaborating EU level guidelines for financing, by promoting best practice and by stimulating the cooperation between MSs for sharing experience and development of common measures for **deep renovation** (e.g. through joint EE/RES renovation projects, joint support schemes etc.).

- **Development of a coherent EE-related qualification system for craftsmen in the field**. It is particularly important to increase the skills of suppliers and manufacturers dealing with EE/RES implementation, in order to ensure appropriate framework conditions in the EU internal market of renovation services. Promotion of skills, innovation and technological development is needed to meet new social needs in residential buildings retrofits and overcome the existing barriers.

National level

It is of great importance to determine the right scale of development for national economic policies and in the best interest of government to focus on long-term complex strategies. Short-term framework programmes demand significant administrative cost and a lot of effort. At the same time, on the scale of a whole country small but regular improvements and long-term investments better satisfy social interests.

Implementation of complex EE retrofit programmes requires direct involvement of the government. Firstly, at the planning stage the type and number of buildings to be renovated in the first place should be defined as well as scale of reconstruction and responsible authorities. Secondly, public authorities should take responsibility for the development of safe, stable and reliable funding schemes which provide for investments and participation of private sources. Thirdly, the state should organize quality assessment of the renovation process in order to ensure reduction of energy consumption and as a result the financial viability of the project.

As financing of energy efficiency projects remains a major issue (especially in Bulgaria and Hungary), subsidy programmes offered in the frame of national strategies should be further developed and aim at achieving the highest level of EE gained through a retrofit, supporting complex, integrated measures. When the programme provides funding for the most accessible and low-cost measures (replacement of doors and windows, partial thermal insulation) which reduces energy consumption in the short term, there is no motivating factor for society to go for the more complex investment schemes that are needed to achieve significant energy reductions for the building as a whole.

The schemes based on public-private partnerships can eventually become an independent driving force for improving the residential sector. The Dutch Green Funding scheme is a successful example of such a partnership: nowadays the scheme is easily accessible and transparent for all stakeholders. Although some measures such as soft loans may seem less accessible than grants and subsidies, a single policy decision cannot completely eliminate the problem. A strategic approach to EE improvement, as well as development and implementation of numerous policy measures affecting the interests of all stakeholders, will always be successful in terms of transformation on the market level. Thus, it is recommended that special attention should be paid to collaboration with the private sector and training of municipal human resources whose

contribution to the implementation of projects cannot be underrated. This is the necessary minimum for establishing the foundations of public-private partnerships in the EE field. Participation of local government at all stages of the project also cannot be underestimated. The municipality is an authority which is the closest to residents in the governmental chain. It has all capacities for effective communication and dissemination of relevant information. With properly developed national legislation the municipality can be not only an intermediate participant but a major sponsor in a project by providing financial guarantees for residential loans. The following are among the actions that can be taken by themunicipality to facilitate implementation of EE retrofit :

- raising awareness of residents on energy saving actions through consultations;
- organizing training on property management and maintenance for home owners and property managers;
- providing information on state subsidies and access to bank loans through qualified personnel;
- taking an active role in organizing and financing renovation projects;
- disseminating information on technical requirements, construction norms and permits in accessible form.

Based on the analysis conducted in this report and summing up the above discussion, the following recommendations for improvement of national EE policies of the three STACCATO countries can be given:

- Development of long-term comprehensive regulatory, financial, educational and promotional packages. Faster identification and adoption of ambitious cost-effective renovation levels.

- As national regulation is periodically discussed and reinforced, all the main stakeholders should be involved in this process (e.g., under the framework of a national consultation platform).Further development of appropriate financing schemes, addressing all categories of private and real estate; introducing measures using appropriate subsidies, low-interest and longer term loan schemes and other financial incentive schemes. It is also important that such schemes remain in place in the long term as frequent and/or radical changes tend to discourage investors.

- Policy should stimulate the most cost-optimal solutions in energy efficiency renovations: either deep retrofitting with long-term results and higher investments required (targeted to eliminate fuel poverty), or a focus on partial retrofits with shorter term results and less initial investments (targeted to significantly reduce fuel poverty).

- Financing packages should propose appropriate market instruments tailored to different needs and able to overcome the main market barriers. Renovation programmes and projects should be based on a preliminary macro-economic analysis, which would help to minimize the costs, secure the programmes' budget and propose more suitable market instruments.

- Removing the market barriers facing ESCOs may facilitate faster and better development of renovation programmes. Regulatory frameworks should encourage set-up and development of a well-functioning energy services market.

- Gradual strengthening/introduction of related building code elements and effective quality control. Enforcing and monitoring compliance with building codes, standards and EPC.

- Better implementation of the buildings energy certification and audit schemes as information and awareness tools, and in order to increase the value of efficient buildings and stimulate the respective real-estate markets towards green investments, e.g. by laying down the rules on penalties for noncompliance and implementation of an independent control system for the energy performance certificates and inspection reports.

- Promotional, awareness-raising and dissemination activities should be a standard part of building renovation programmes.

- (Re)-establishment of confidence of consumers and investors in the quality level of renovation measures, in order to increase the readiness to make the necessary investment. This can for instance be done through development of guarantee systems for the performance of efficiency measures.

- Improvement of skills of the building professionals at the level of both basic professional education and long-life learning activities (construction sector and supply chain industries).

Country-specific

The Netherlands

- Establishment of energy efficiency targets (2020 and beyond) for the residential sector, in order to promote and stimulate implementation of energy efficiency renovation projects.

- One of the ways to fight fuel poverty could be promotion of energy co-operatives generating their own energy from renewable sources, which then would be independent from the current fluctuations in the energy market.

- Adoption of policy instruments to overcome the split incentives barrier and ensure achievement of the nation EE targets, such as a law prohibiting letting out of properties with low energy labels (F and G), a law allowing tenants to demand EE upgrades on their properties, establishment of a corresponding tax break scheme or other financial instruments supporting the landlords in EE renovations

- The split incentives can be also be addressed through a packaged solution consisting of mandatory energy savings, installation of individual metering, revised rent acts, green leases (splitting costs and benefits between the parties in a balanced way), improved energy labels and actions to further facilitate ESCO activities.

- Adoption of regulatory measures (e.g., mandatory dissemination activities) which would make sure that housing corporations provide the residents with a good quantity and quality of information about renovation plans in advance and that a consensus on a renovation plan is reached among all the participating stakeholders.

- Policy should promote participation of district heating/energy companies in energy efficiency and renewable energy retrofits, e.g. through energy efficiency obligation/supplier obligation schemes.

Hungary

- Policy goals should be aggregated to provide a strong pull for adoption of ambitious national energy efficiency targets; energy efficiency targets should be set for the residential sector
- Provision of a variety of financial mechanisms and incentives, and/or support of development of ESCO market to ensure availability of resources needed for investment in energy efficiency projects. Introduction of corresponding regulations as a result of transposition of EPBD and EED and relief of municipal liquidity due to take-over of loans by the state may push the market in a positive growth direction.
- Policy should encourage participation of municipalities in energy efficiency renovations, e.g. by relief of the municipal liquidity.
- Policy should try to promote a positive (e.g., through energy efficiency obligations or white certificates) or at least not obstructive role of energy/district heating companies in energy efficiency renovations.
- Avoidance of realization of inconsistent policies, such as the utilities reduction policy, which create more barriers than drivers for implementation of energy efficiency projects.
- Supportive policy mechanisms to promote energy efficiency projects, such as government-sponsored awareness raising programmes, direct financial support for refurbishments, strengthening EPC requirements etc.

Bulgaria

- Policy goals should be aggregated to provide a strong pull for adoption of the national energy efficiency targets.
- Improving the state of the housing stock of panel apartment blocks and the quality of living conditions for the residents of these homes should be set as priorities of the national policy. Energy efficiency targets for the residential sector should be established.
- Provision of a variety of financial mechanisms and incentives to ensure availability of resources needed for investment in energy efficiency projects.
- State support, national legislation and corresponding policy mechanisms for development of the ESCO market[38], coupled with creation of building statistics, metering system according to EU norms, dedicated programmes for the improvement of the state of buildings.
- Supportive policy mechanisms to promote energy efficiency projects, such as government-sponsored awareness raising programmes, direct financial support for refurbishments, strengthening EPC requirements etc.
- Improvement of regulative provisions and legislation concerning the legal status of condominiums; adoption of policies to ensure creation of a functional condominium system and to provide further support for its operation.

[38] See STACCATO Final Report on Economic Aspects for more details

- Policy should try to promote a positive (e.g., through energy efficiency obligations or white certificates) or at least not obstructive role of DH/energy companies.
- Policy should be encouraged to promote involvement of municipalities in energy efficiency renovation projects, e.g. by relief of the municipal liquidity.
- Development of regulatory documents on energy efficiency must be provided with informational support aiming to raise awareness of the public and professionals about opportunities, benefits and importance of energy saving.

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Appendix

Data on RES and EE policy implementation by local authority administrations in the STACCATO project

As far as post-STACCATO renovations in the Obuda district of Budapest are concerned, the Obuda municipality continues to support EE renovations. Thus, in 2013 736 apartments were renovated, with the financial support coming from the EU and partially covered by the local authority. The renovations mostly included improvement of insulation, installation of energy meters and replacement of doors and windows. The renovated buildings were reported to achieve 30-50% of energy savings on heating (OBUDA 2013), i.e. in a similar range to the STACCATO retrofit.

In Bulgaria, STACCATO retrofits still remain the only large-scale renovations in the Oborishte district. Under the Demonstration Project for the Renovation of Multifamily Buildings (2007-2012, part of the National Renovation Programme, an initiative under the Ministry of Regional Development and UNDP) 50 buildings in 13 cities were renovated across Bulgaria. Of the 50 renovated buildings, 13 are located in Sofia and 4 in the Oborishte district, all of them using STACCATO co-funding (MRDPW 2012; Bulgarian STACCATO partners).