Understanding the link between energy efficiency and energy poverty in Serbia

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1. Introduction

Energy security, climate protection and sustainable economic development are topics that have received growing attention in the last decades. Although energy efficiency is an option to address these issues simultaneously, its link to social aspects, in particular energy poverty, is a topic that has been rarely analyzed, especially in the context of energy sector reforms in transition countries. Energy poverty is "(...) the difficulty or inability to ensure adequate heating in the dwelling and to have access to other essential energy services at a reasonable price" (SANTILLÁN CABEZA / EESC 2011, §1.4), including the capacity to afford hot water, lighting, heating, cooling of food and the use of communication devices (VZBV 2008, n.pag.). IEA (2008, 98) refers to energy poverty in the context of general energy shortage, obsolete or lacking infrastructure, and health consequences due to energy-based pollution. According to IEA (2008, 98): "The link between poverty and energy poverty is particularly evident in terms of seasonal impacts in cold climates. Winter temperatures affect heating demand and energy prices; if poverty results in inadequate provision of heat for a healthy lifestyle, it ultimately affects the health and productivity of the poorest segments of the population." However, there is so far no international definition of energy poverty, since different patterns require a determination of criteria and definitions on a national level. In general, three specific factors influence energy poverty: household income, energy prices and energy efficiency in buildings and household appliances. High energy consumption due to low energy efficiency can have negative financial effects on households, particularly if incomes are low. If these factors are further coupled with high energy prices, a household's ability of paying the energy bills and affording the required energy services is substantially affected.

Measuring and quantifying energy poverty can be a difficult task due to the lack of available and reliable data and statistics. According to SANTILLÁN CABEZA / EESC (2011, §2.4) possible indicators to support estimations of energy poverty are e.g. the percentage of the population in bill arrears, the number of homes with problems affecting the buildings as well as the percentage of households unable to keep the home properly heated. In Europe, it is estimated that 50 - 125 million people live under energy poor conditions (EPEE 2009, 4). A deterioration of the situation will be influenced by rising energy prices (EUROSTAT 2007, 61: 18 % between 2005 and 2007 for one kWh for residential consumers) the percentage of population living in poverty risk (EUROPEAN COMMISSION 2007a, 10: 16 % in 2004) and by the share of the building stock built without any heating standards (EPEE 2009, 5: 60 % in Belgium, France, United Kingdom, Spain and Italy).

To address energy poverty, ECRB (2007, 13) refers to tariff based and non tariff based mechanisms. Tariff based mechanisms such as social tariffs target the effect of increasing energy prices on households but "(…) they allow just to help households in facing the raise of prices through aids and subsidies often disconnected from the more general mechanism to eradicate fuel poverty's main causes." (EPEE n.d., 9). ECRB (2007, 4) also refers to market distortions emphasizing that: "Non tariff based solutions must be preferred as they do not obstruct market forces" since they reach the households directly by covering parts of the expenses (e.g. fixed sum during heating period and do not encourage a higher consumption. KIROV (2011, 2) refers to residential energy efficiency improvements and traditional assistance payments as non-tariff based mechanisms. The latter can improve the household income situation and EPEE (n.d., 11) explains that this approach is the most traditional method but "These practices can't obviously eradicate the causes of fuel poverty. In addition the risk that economic subsidies might unintentionally produce an increase of energy consumptions must be highlighted." In this context, "Energy efficiency policies are considered the best tool to reduce energy consumptions and costs for each kind of user."

(EPEE n.d., 10) In general energy efficiency programs are one time payments and thus on the long-term more cost effective than subsidies while providing various additional benefits such as improvement of living comfort and health benefits, as well as job creation, reduced energy imports and climate change benefits (KIROV 2011, 3; 10). "All these elements confirm that energy efficiency actions allow to reach a complete sustainability (energy, social, economic and environmental sustainability)." (EPEE n.d., 10)
When considering this variety of benefits, energy efficiency programs should be preferential to energy assistance payments and social tariff systems programs. However, energy poverty in Serbia and Southeast-Europe is mainly addressed through tariff subsidies and social support mechanisms and not by energy efficiency improvements. This study aims at analyzing the link between energy efficiency and energy poverty in Serbia. As such, it will provide an overview of the energy situation in Serbia and in South-East Europe and analyze the existing legal framework as well as the daily policy making to tackle energy poverty via energy efficiency.

2. Situation in the Region

Energy production, distribution and consumption (1p.1.5j)

South-East Europe is confronted with a wide range of problems in energy production and supply, which highlight the importance of improving the energy situation in the region. Regarding the technical conditions on the supply side, most of the infrastructure and technology in South-East Europe was built during the 1960s and 1970s with Eastern Block technology (IEA 2008, p.15). The conflicts in the 1990s further deteriorated the conditions through technical damages and inadequate maintenance. The subsequent rebuilding process was time-consuming, energy reforms began to a later point than other European transition economies and nowadays the systems are still characterized as unreliable and inefficient (IEA 2008, 13). These situation causes daily risks of technical failures (e.g. black-outs and electricity rationing) and hinder economic development and investment, but also lead to extremely high network losses, which amount to approximately 22 %[1] of the regional Total Final Consumption (TFC) in the electricity sector (IEA 2008, p.36). While transmission losses do not differ outstandingly from the European average of 1.5 % - 2.5 % (IPA ENERGY + WATER ECONOMICS 2009, 35), distribution losses, meaning both technical losses due to the equipment and distribution systems as well as commercial losses due to e.g. inexact metering or theft, are very high. Only Croatia's distribution losses (10%) are within the European average of 5- 10%; the highest losses can be observed in Kosovo (43% in 2008) (IPA ENERGY + WATER ECONOMICS 2009, 38 ff.).
These energy characteristics influence the energy intensity of the region, which expresses an overall low level of energy efficiency. Most countries in SEE show figures significantly above the average of OECD Europe of 0.15 TPES/GDP. In a regional comparison, Serbia has one of the lowest values of overall energy system efficiency[2] (58 % of TFC/TPES) and one of the highest energy intensity (0,41 TPES/GDP), which is more than twice the average of OECD Europe (0,15 TOES/GDP), and shows one of the highest regional per capita electricity consumption (3930 kWh) as well as high electricity intensity (0,72 kWh/GDP)[3]. According to the IEA (2008, 105), the high energy intensity levels in the region are particularly related to energy-intensive industries, inefficient technologies in households, industry and energy sector as well as poor building insulation.
Additionally, the energy situation in SEE is characterized by a poor energy mix with a high dependence on coal and imported oil in TPES (IEA 2008, 16; 22). Serbia's main fuel type in TPES is coal followed by oil. Gas and RES have a similar share of around 12%. Coal and hydropower dominate within the electricity

[1] As a comparison, transmission and distribution losses in Germany are about 5 % (THE WORLD BANK 2010, 332
[2] overall energy system efficiency defined as the ratio of TFC and total primary energy supply (TPES)
[3] Compare IEA (2008, 125; 162; 197; 241; 278; 309; 349); IEA (2009, 48 ff.); ENERGY COMMUNITY (2011b, n.pag.)

sector in Serbia (around 70% and 28% respectively[4]). Croatia is the only country in the region that has diversified its electricity sources with similar shares of coal, oil, gas and hydropower.
In terms of electricity consumption by sectors, households in most cases amounts to over 50% of the consumption, which is two to three times higher than the ratio in Western Europe (IEA 2008, 36; 105). Causes are low energy efficiency of building and energy equipment, low industrialization and the increasing use of electricity for heating purposes in winter especially in rural areas when the increasing demand for heating cannot be met by the available fuelwood reserves (IEA 2008, 61; 102). Higher energy prices or even black-outs or electricity rationing are a result of this seasonal demand peak, which requires a substantial reserve capacity from the facilities to secure a continued energy service (IEA 2008, 102). In the case of Serbia, electricity imports in winter are needed to cover the growing demand (IEA 2008, 332). This leads to a reduction of the capacity to export energy and thus to increase revenues, i.e. investments in maintenance and improvement of energy services and infrastructure (IEA 2008, p.21). The decreased revenues of electricity companies are also a consequence of low collection rates[5]. In Serbia collection rates for industrial and commercial consumers (both about 89%) are lower than for residential customers (92%) (ECRB n.d., 25).
Apart from electricity and, where available, district heating[6], fuelwood represents an important heating source in SEE. However, fuelwood is also an additional determinant of the increased electricity demand during winter: as explained by IEA (2008, 102) during the winter months, the increased demand for fuelwood pressures its supply and causes an increase of the marginal costs, which can rise above the level of electricity prices. As a consequence, many households turn to electricity as a supplement heating source, since the electricity prices remain relatively flat. Still, fuelwood heating stoves, which are used in 50 – 85% of the households in SEE, have an efficiency of around 20%, and additionally cause indoor pollution (IEA 2008, 105; 338). The figures of share of fuelwood consumption in TFC differ according to supply data (5 % in both Serbia and Montenegro) and household surveys (18 % in both Serbia and Montenegro) (IEA 2008, 103). The differences between official statistics and survey estimations regarding fuelwood consumption indicate a lack of reliable data, which as a consequence hinders the development of detailed and appropriate policies. According to IEA (2008, 107): "The most pressing need is to prioritise the collection of data on the affordability of fuelwood, the most widespread mode of heating in the Western Balkan region."
The situation analysis of the energy context in SEE has illustrated several problems affecting the energy security situation in the region. According to IEA (2008, 21), there is urgent need to introduce "(...) a clear and effective market-based regulatory framework for the energy sector, as well as independent and empowered regulatory bodies".

Energy poverty (2p-4j)
The various factors characterizing the energy market situation in SEE require changes to improve the situation in the countries while introducing separate and targeted programs to address vulnerable consumers. As stressed by the ENERGY COMMUNITY (2011a, n.pag.; emphasis by the author): "As a result of the liberalisation and deregulation process, legal and institutional framework as well as pricing policies undergo substantial changes. **Should no accompanying measures be taken, the reform process might bring about adverse effects on people's everyday life.** Such social implications vary from direct and indirect employment, effect on skills and qualifications, to **energy affordability for households**." In general, it is estimated that around 16 % of the population in SEE lives in an energy poor situation referring to insufficient access to energy services to provide healthy living conditions, and, in specific areas, around 40 % of households are unable to heat sufficiently due to inefficient heating and cooking stoves, which

[4] Compare THE WORLD BANK (2010, 190 ff.); IEA (2008, 17)
[5] The collection rate is the amount received as percentage of the amount billed and represents an efficiency criterion for supply service (ECRB n.d., 25)
[6] District heating systems exist in 55 cities and reach about 27 % of total households, the cities with the highest connection rates being Novi Sad (60 %) and Belgrade (50 %) (SOLUJIC 2010, 6).

additionally can cause indoor air pollution (IEA 2008, 97; 99). To further understand the energy poverty situation in SEE, an analysis of the countries is conducted based on household income, energy performance of buildings and household appliances and energy prices.

Household Income

Comparing the average monthly net wages among the different countries is difficult due to differences in available data (e.g. reference years). Nevertheless, the following figures can provide a general idea of the situation and pattern in SEE: the average monthly wages in SEE show a very low standard (in average around € 420) that corresponds to roughly one fourth of Germany's average monthly wage. Serbia's monthly average wage (€ 370) is considerably lower than the regional average. These low figures of average wage are accompanied by relatively high numbers of household members (in average around 3.3). Croatia and Serbia have the lowest figures of household members in SEE. Concerning household consumption in terms of number of persons per room, 36% of residents in Serbia have a standard consumption (one or less persons per room), 46% a normal consumption (1-2 persons per room) and 18% live in overcrowded accommodations (more than two persons per room) (UNITED NATIONS / ECONOMIC COMMISSION FOR EUROPE 2006, 14ff). Regarding unemployment, high rates can be observed in most countries. Albania and Serbia have similar rates (around 13.5 %) and Croatia has the lowest unemployment rate which is comparable to Germany. According to THE WORLD BANK (2010, 89 ff.), less than 2 % of the population in SEE has less than US$ 2 available per day. These figures, however, change considerably when comparing them to the different national statistics and poverty lines. In Kosovo around 37 % of the population lives below the poverty line of € 40 per month (IEA 2008, 116) and in Serbia around 11 % of households live with less than € 71 per month (IEA 2008, 115).

Energy Efficiency of Buildings and Household Applications

Analyzing the energy efficiency status of the building stock in the region is difficult due to scarce or incomplete available data and information. In general, most of the buildings constructed before the 1990s show low thermal standards caused by low-priced energy and building materials, doors and windows of poor quality and a lack of ventilation systems (UNDP 2004, 33). In Serbia the average age of the housing stock is 34 years (THE WORLD BANK / COUNCIL OF EUROPE DEVELOPMENT BANK 2004, 21; UNDP 2004, 30). The highest share of Serbia's housing stock was built between 1971 and 1980 (about 24 %) and between 1961 and 1970 (20.7 %) (UNITED NATIONS /ECONOMIC COMMISSION FOR EUROPE 2006, 15). However, there are differences in data regarding age of dwellings depending on literature sources: According to SOLUJIC (2010, 5), most buildings in Serbia were built before 1962 (59%) and a high share of the dwellings consists of buildings constructed between 1962 and 1991 (36%), which show a high final energy demand and oversized secondary heating installations: While in Serbia the average annual use of energy for heat and sanitary hot water is 220 kWh/m², new buildings (constructed between 2004 and 2008, representing 2 % of the total building stock) show an average of 100 kWh/m². Moreover, poor building insulation is one of the determinants of high energy consumption in Serbia, where the consumption of energy per square meter is three to four times higher in comparison to Northern Europe (RADOSAVLJEVIC & DJOKOVIC 2007, 10 ff).

Although in Serbia thermal standards for buildings have never been enforced in the past, apartments connected to district heating (DH) show better energy conditions since they were built with higher technical standards but those dwellings were often given to privileged members of society (UNDP 2004, 30). Between 1970 and 1990 employees of socially owned companies were provided with the permanent right to live in socially owned apartments, which showed relatively good constructed standards as well as better infrastructural conditions (water, connections to district heating, electricity) and very low monthly bills (about 5% of monthly income) (UNDP 2004, 47, 76). Meanwhile, private house owners had to pay high prices for infrastructural connections (UNDP 2004, 76) and people with no access to such apartments had the possibility to either rent an apartment or built their own houses. Due to lack of protection of the tenants, high renting rates, high costs of required permits, limited availability of lots with infrastructure

as well as long, complicated and uncertain administrative processes, many people turned to building their houses illegally (UNDP 2004, 48). Today, it is estimated that 600.000 - 1 Million of Serbia's housing units were built illegally (from a total of 2.95 million units) and only about 6 - 8 % of private dwellings are rented to tenants (UNDP 2004, 48). Other literature sources estimate that about 17 % of residential buildings in Serbia were built without permits, thus failing to meet any construction standard (UNITED NATIONS / ECONOMIC COMMISSION FOR EUROPE 2006, 16).

During Serbia's privatization process in the 1990s state owned apartments were sold to the tenants free of tax and transaction costs (UNDP 2004, 76). This process increased the share of privately owned housing to 98 % and today most residents (97.3 %) are living in apartments owned by one of the household members or without charge (GOVERNMENT OF THE REPUBLIC OF SERBIA 2011, 183). Social rented or public buildings are not common. Apartments are usually rented by households living above the poverty line and the majority of households below the poverty line live in (often self-constructed) individual houses (85 %) and 9 % live in residential buildings (GOVERNMENT OF THE REPUBLIC OF SERBIA 2011, 183). UNDP (2004, 73) concludes: "Changes in institutions and ownership in recent years have resulted in the perpetuation and intensification of an uneven distribution of welfare benefits (…). In Serbia, winners include the owners and occupiers of apartments formerly owned by the state, who continue to receive unlimited subsidized district heating and electricity." There are considerable differences between households connected to DH and households not connected to DH. While the former were mostly built by the state sector, meet higher construction standards and are located in cities or towns, the latter were built by the private sector, have lower construction standards and are located in outskirts of towns (UNDP 2004, 49).

Energy poor households in Serbia have developed coping strategies to save energy. UNDP (2004, 87) differentiates between risky saving methods and risk-free saving methods. Risky saving methods to reduce energy expenses include using cheap low-quality fuels, decreasing the use of appliances and reducing the number of heated rooms. In Serbia, an average of less than 10 m² of living space per person is heated in winter (IEA 2008, 115). Risk-free saving methods refer to switching off the lights if not needed, increasing energy use in the night to benefit from lower tariffs, improving insulation and investing in appliances consuming less energy. In Serbia, risk-free methods are used by 66 % of households connected to DH and by only 38 % of households not connected to DH (UNDP 2004, 87). In this regard, "Coping strategies are particularly limited for poor households, whose lack of capital often forces them to adopt dangerous and inefficient strategies." (UNDP 2004, 81)

Regarding energy performance of household devices in Serbia, most household appliances are out-dated and show obsolete characteristics (e.g. average age of freezers and refrigerators is 14 years and of electric cooking stoves 16 years) (UNDP 2004, 33 ff.) About 50 % of households and 75 % of the poor use combined solid fuel heating and cooking appliances, which are usually old and inefficient (UNDP 2004, 34). One third of the households in Serbia use electrical thermal accumulation heaters, 10 % use masonry stoves and only 25 % are connected to the district heating or gas network (UNDP 2004, 34). 90 % of households obtain hot water mainly by electrical heaters (in average 12 years old) which show poor insulation conditions and inadequate control mechanisms (UNDP 2004, 34). There are no energy efficiency labels used in Serbia and no tax incentives to buy efficient models as well as no tax incentives for fluorescent bulbs (UNDP 2004, 34).

Energy Prices

Electricity prices in SEE are generally very low, especially compared to EU-countries, but the region is experiencing general prices increases. In a regional comparison, Serbia has the lowest prices for both residential and industrial consumers (for both around 6 €cent/kWh for the first half of 2011 including VAT and taxes), but experienced, on the other side, the largest price increases with 65 % from 2005 - 2008 (IPA ENERGY + WATER ECONOMICS 2009, 8). Considering residential prices in particular, the region experienced an overall increase between 2007 and 2009 (IPA ENERGY + WATER ECONOMICS 2009, 12). This recent process shows a trend towards introduction of cost-reflecting prices. BOUZAROVSKI ET AL.

(2011, 20) explains that while energy prices increase, the average income level of the population remains the same, causing a process of mass disconnection of the district heating network and increased use of electricity for heating due to low electricity prices. Further increases of electricity prices will negatively affect households that have already invested in systems using electricity for heating (BOUZAROVSKI ET AL. 2011, 27). IEA (2008, 113) stresses that rising energy prices and energy poverty levels can increase the use of biomass for heating purposes.

An important indicator for energy poverty can be the share of household income spent on energy services. In Serbia households spend around 10% of their yearly income on energy services and poor households about 20% (RADOSAVLJEVIC & DJOKOVIC 2007, 9). UNDP (2004, 38) concludes: "Not only does available household capital have to provide energy services as needed, it also has to provide security from fuel price fluctuations and limited choices in periods of shortages."

Steps Taken in South-East Europe to Address Energy Poverty

Most SEE-countries have introduced different efforts to tackle the issues of poverty and energy with e.g. Poverty Reduction Strategy Papers (PRSP), the establishment of committees dealing with poverty reduction and energy efficiency agencies (IEA 2008, 106). Efforts throughout the region to address energy poverty in particular are mainly related to electricity consumption and the state support has mostly been in financial terms, including discounts and social tariffs[7] (ECRB 2009, 7).

Although Serbia has experienced electricity price increases in the last years, the electricity prices are among the lowest in SEE and represent a means to support and subsidize households (RADOSAVLJEVIC & DJOKOVIC 2007, 9; 11). To support vulnerable population groups, concessions were introduced which relieved households from paying the monthly flat fee and provided discounts of 30%; about 200.000 people could benefit from these concessions, but they were only available for several months (RADOSAVLJEVIC & DJOKOVIC 2007, 11). Vulnerable households are also supported with a non tariff based mechanism in the form of social allowances from state budget. Vulnerable customers are defined within the "Decree on energy protected consumers" according to their monthly income and household size[8]. The Decree foresees eligibility for deductions of either electricity, gas or heating bills but not cumulatively (Ministry of Energy, Development and Environmental Protection of Republic of Serbia 2013, n.pag.). According to ECRB (2008, 16) energy vulnerable consumers can receive discounts from the electricity power company EPS under the condition that the bill payment is accurate (35 % discount to consumers under 350 kWh/month), but there are no discounts provided to gas consumers and for district heating only in some municipalities (ECRB 2008, 16). Concerning customer protection and transparency, energy companies' web sites list all rules and procedure acts, call centers for customers have been established by the distribution companies and there have been some activities by energy companies related to awareness of energy efficiency (ECRB 2008, 15 ff). SOLUJIC (2010, 7 ff.) provides an overview of specific energy efficiency measures which will be implemented in Serbia's building sector until 2016:

- Substitution of electrical heating by natural gas, connection to DH and RES utilization through financial stimulation and changes in the electricity tariff system;
- Replacement of conventional bulbs with energy efficient bulbs via public campaigns;
- Facilitation of window replacement and thermal insulation for individual houses and SME through the EE Fund and other financing programs;
- Introduction of new standard design values for heating installations
- Implementation of new tariff systems for heating and of consumption-based billing;

[7] e.g. lower tariffs for the first 220 kWh per month and additional financial support with a proof of bill payment below 220 kWh per month (Albania) (IEA 2008, 107ff); 10-€-refunds of electricity bills of vulnerable households in Macedonia (BOUZAROVSKI ET AL. 2011, 25).

[8] monthly income of up to 13, 222 RSD for single member households, up to 19,251 RSD for households with two or three members, up to 25,276 RSD for households with four or five members and up to 31,786 RSD for households with six or more members (Ministry of Energy, Development and Environmental Protection of Republic of Serbia 2013, n.pag.)

- Energy certifications for new buildings and for buildings subject to major renovations (within the Law on Construction and Planning);
- Adoption of an energy management system for public and commercial buildings;
- Energy efficiency auditing and certification for the existing building stock;
- Support of cost-effective measures through credit lines for EE and RES in residential, public and commercial buildings.

As can be seen, Serbia has launched a process towards considering consumer protection and financial support in the electricity sector and is launching a variety of energy efficiency measures in the building sector. Within these energy efficiency improvements, however, priority actions are directed towards district heating, new buildings and tertiary buildings while low-income households are not particularly mentioned or addressed.

Serbia's Status of EU-Accession in terms of Energy Sector Development

The importance of addressing and improving the energy security situation on national and regional level is crucial for both sustainable development and for meeting the regulations set by the EU. An important step towards energy market reforms in South-East Europe and EU membership was set with the signing of the Athens Memorandum in 2003 for the establishment of a regional electricity market and its integration into the EU's internal energy market. It stressed the need for energy market reforms, common rules and increase of energy efficiency. The Memorandum led to the formulation of the Energy Community Treaty which sets the framework for energy market reforms, regional integration and alignment with EU rules. Serbia's potential candidacy for the EU was marked in April 2008 with the signing of the Stabilization and Association Agreement (COMMISSION FOR THE EUROPEAN COMMUNITIES 2009, 4). After Serbia was granted EU candidate status in March 2012, the European Council opened accession negotiations with Serbia in June 2013 and in December 2013 adopted the negotiating framework. In January 2014, the 1st Intergovernmental Conference took place, signaling the formal start of Serbia's accession negotiations (The Delegation of the European Union to the Republic of Serbia 2014, n.pag.).

In 1993, the European Council declared in Copenhagen that a functioning market economy is an important requirement for EU membership. In the course of market reforms, Serbia started the privatization of socially-owned companies in 2002 and sold a total of 1800 companies for a total of approximately € 2.3 billion while the electricity company Elektroprivreda Srbije (EPS) remains under full government control (COMMISSION FOR THE EUROPEAN COMMUNITIES 2009, 26). In 2013, planned electricity price increases were postponed several times until in August the price was raised by 11.3% in average (10.9% for households) and the (European Commission 2013, 17). Energy efficiency continues to be low and energy infrastructure requires investment (in particular electricity generation and distribution), but steps have been taken to secure foreign financing for big infrastructure projects in the energy sector (European Commission 2013, 20).

According to European Commission (2013, 31), Serbia has made good progress in the development of the internal energy market: the Energy Agency of the Republic of Serbia (AERS) has approved market rules and rules on switching supplier and since 2013, the electricity and gas markets have been liberalized for big consumers connected to the transmission network, which need to buy energy at market prices. The unbundling of distribution and supply functions in the public electricity company EPS, as well as the unbundling of the state-owned gas company Srbijagas have not been finalized (European Commission 2013, 31 ff.). Serbia and Kosovo have reached an agreement on energy, the implementation of which is an important determinant for Serbia to meet its Energy Community obligations (European Commission 2013, 32). Regarding energy efficiency and renewable energy, Serbia has introduced feed-in tariffs and adopted a renewable energy action plan, as well as adopted a new energy efficiency law and made amendments to the law on construction and planning to bring it in line with the directive on energy performance of buildings (European Commission 2013, 32). Amendments were adopted in the Energy

Law to close the Energy Efficiency Agency and merge it within the Ministry of Energy, Development and Environmental Protection.
Still, administrative capacity is in general very limited and further simplification of administrative procedures for issuing necessary permits and network connections is required (European Commission 2013, 32). The European Commission (2013, 32 ff.) concludes: "Additional efforts are needed to achieve further market opening, unbundling and cost-reflective tariffs. By-laws in the field of energy efficiency and legislation on commodity reserves have yet to be adopted. The role and independence of the energy regulator AERS (…) need to be strengthened. (…) Overall, preparations in the area of energy are moderately advanced."

3. Formal institutions addressing energy poverty in Serbia: EU guidelines and national policies

Energy Poverty in EU Documents
The European Union represents a crucial external driver towards energy market reforms since Serbia is making efforts to fulfill the requirements set by the EU in the light of a possible future membership. The Energy Efficiency Action Plan of the European Parliament recognizes the necessity to generally increase energy efficiency in the building stock and to particularly improve the energy performance of dwellings of low income households.
The Energy Community focuses on market reforms in SEE countries but also highlights that market reforms can affect the affordability of energy services of low-income households. As stressed by the Energy Community Treaty (ECS 2005, Title III, Chapter IV, Article 33): "The Energy Community may also make Recommendations to support effective reform of the Network Energy sectors of the Parties, including inter alia to increase the level of payment for energy by all customers, and to foster the affordability of Network Energy prices to consumers." In addition, it has published several documents and recommendations concerning energy vulnerable households and consumer protection:

- The Memorandum of Understanding on Social Issues stresses the need to ensure energy access and involve different stakeholders in the design of action plans (Energy Community 2007).
- Best Practice Guidelines on the Protection of Vulnerable Customers highlight the need for a clear definition of energy vulnerable consumers, for consumers' rights and for payment according to consumption (ECRB 2007).
- ECRB's document for a common understanding of vulnerable household consumers mentions contract issues, disconnection procedures but also education and awareness raising as well as information provision to households concerning rational energy use (ECRB 2009).

Some of these steps have already been introduced in Serbia, including defining energy vulnerable consumers, campaigns for awareness raising and addressing billing issues and payment discipline. In addition, electricity discounts for eligible households have been introduced.

Energy Poverty and Energy Efficiency within the National Legal Framework
Although both the Energy Law 2004 and the Law on Planning and Construction from 2009 are not specifically mentioning residential energy efficiency and vulnerable consumers, these topics are acknowledged in various other policy documents. The link to energy efficiency is however mainly mentioned in documents dealing with social issues, not in energy or construction related ones:

- In 2013, Serbia adopted a decree on energy protected consumers, i.e. vulnerable consumers of thermal energy Ministry of Energy, Development and Environmental Protection of Republic of Serbia (2013). The documents defines vulnerable consumers and criteria, terms, conditions and procedures for determining vulnerable consumers, as well as the monthly deduction of their electricity, gas and heating bills. NEEAP highlights the need for residential EE improvements, for product labeling, construction standards and regulations, for awareness raising and provision of financing instruments and credit lines for EE investments through the EE-Fund, but it does not mention vulnerable households and health issues in particular (Solujic 2010). The Energy Sector Development Strategy

until 2015 mentions the need to improve energy efficiency in the residential sector and the need for social protection of vulnerable population groups through subsidies of energy costs, but it does not recognize the link between both (REPUBLIC OF SERBIA / MINISTRY OF MINING AND ENERGY 2005).

- The Poverty Reduction Strategy mentions the need to grant subsidies to the poor in light of energy price increases (GOVERNMENT OF THE REPUBLIC OF SERBIA 2003). In the attachment to the Strategy, the link between energy poverty and energy efficiency is mentioned and the need for subsidies, direct assistance, awareness raising, building construction standards and micro-credits for EE investments. The National Report on Social Inclusion mentions the establishment of mechanisms for small loans as important to improve housing conditions and reduce costs. EE's role in reducing housing costs of the poor is acknowledged (GOVERNMENT OF THE REPUBLIC OF SERBIA 2011).

Energy efficiency is mostly seen as a means to increase energy security, thus Serbia is focusing on energy efficiency improvements on the energy generation side and in the industry. As such, it is failing to address energy vulnerable households. Yet, energy poverty issues are addressed within social policies which also recognize the need to improve housing conditions and introduce micro-credits to increase investment in residential energy efficiency. Subsidies to the poor are, however, still acknowledged as required approach to address energy vulnerable households.

4. Daily policy making to tackle energy poverty and energy efficiency[9]

Awareness of Energy Poverty and Energy Efficiency is generally affected by a lack of baseline data and indicators and by the fact that it is just recently getting public attention. Households' awareness about the need and benefits of rational energy use seems to depend on their economic status. Poor households are aware of energy costs in their household budgets but they often rely on risky coping strategies due to the limited knowledge and financial possibilities of investing in risk-free coping strategies. Better-off households, often relate energy saving to poverty and thus, saving energy is not very popular and not very common. The opinion that energy is 'cheap' and 'common' and that energy efficiency investments are not profitable is supported by low energy prices. In this context, households need to be informed about benefits of energy efficiency, about possible credits, savings and payback periods. Low energy prices reflect the awareness of decision makers and still constitute the main political approach to address energy poverty. Although awareness about the existence of energy poverty and the necessity to address the issue is not necessarily lacking among decision makers, knowledge is generally limited due to the lack of baseline studies and a clear national definition of energy vulnerable households.

This also affects the level of *commitment of decision makers*, which is also influenced by limited capacities, resources and the political unpopularity of rational energy use. While decision makers claim that they are aware of the challenges but their commitment is not always visible or reflected in official documents, civil society organizations attribute the lack of concrete measures and of financing instruments to the lack of commitment and of long-lasting visions. They claim that there although energy efficiency is mentioned in political documents, there are only declarative commitments and there is a lack of political leadership. Moreover, civil society claims that there are available financial models which are not implemented and this reflects a lack of understanding and knowledge by decision makers. Regarding EU accession and implementation of EU regulations, some actors highlight the differences between commitment towards EU accession due to economic interests and real understanding of strategies and ideas. On a local level, improving energy efficiency depends on the commitment of the corresponding municipalities which differs according to understanding, skills, priorities and economic situation of the community. In general, increasing the commitment of decision makers towards improving energy efficiency is possible if it is recognized as an opportunity for economic development.

The involvement of many different sectors and actors in energy poverty reduction (energy, construction, social, financing) makes a clear *assignment of responsibilities* difficult and the coordination of actions

[9] This chapter is based on interviews conducted in December 2011 with representatives of governmental and non-governmental organizations

challenging. Although all interviewees recognize the need for stronger support of ministries to make self-financing affordable and the need for clear responsibilities, most actors in the energy sector do not feel directly responsible to tackle energy poor households and refer to other organizations as responsible. Civil society sees a responsibility in all stakeholders and stresses the need for an umbrella organization to coordinate the process.

In this context, most interviewees recognize the need to enhance *cooperation and communication* at all steps that address energy poverty and energy efficiency. Effective cooperation and communication is hampered by the fact that different ministries often follow the logic of different political party agendas and do not address energy poverty as a common goal. Cooperation between decision makers and civil society is very rare since NGOs are not seen as potential partners. In addition, NGOs regard themselves as too weak to increase pressure on decision makers whereas political decision makers recognize their lack of capacities and the need to increase cooperation with different stakeholders. On household level, the fact that only few households have applied for electricity discounts indicates an insufficient dissemination of information. Moreover, cooperation in multi-family buildings is generally difficult due different economic situations and thus financial possibilities of households. Civil society organizations call for local funds and propose the creation of an umbrella organization for better coordination.

While there are policies and guidelines for improving energy efficiency, there are important differences between existing strategies and documents and the actual *implementation and realization of actions*. In general, there is a lack of comprehensive and synergized strategies to tackle energy efficiency and energy poverty as well as a lack of control of law implementation. Decision makers identify the vague identification criteria of energy poverty and limited staff capacities of ministries and municipalities as main barriers to address energy poverty by energy efficiency measures. Also, there is insufficient pressure from the Energy Community regarding energy poverty and energy efficiency. Expensive administration procedures as well as lack of funds for national programs and lack of self-financing mechanisms for the poor further hinder the implementation of energy efficiency measures. Low electricity tariffs discourage energy saving and private investment of households connected to district heating is not profitable. New construction standards target public and new buildings and not residential buildings. In general, most programs focus on product labeling and awareness raising of households because they are easier to implement than investing in residential energy efficiency measures.

Projects to improve energy efficiency in residential buildings are facing similar difficulties as mentioned above: lack of baseline data, staff capacities, common goals, clear responsibilities and cooperation amongst actors as well as lack of information of possible financing mechanisms and of main barriers. Concrete actions in existing multi-family buildings are lacking due to difficulties in organizing projects, (e.g. different economic situations of households) and by lacking financing possibilities and motivation of households to invest due to low energy prices and thus longer payback periods. If the state is lacking basic conditions to implement residential energy efficiency programs, households should be given possibilities to invest in their dwellings and should be informed about the benefits of energy saving. In this regard, finding appropriate schemes that target low-income households is crucial.

There are also substantial differences between what is technically possible and what is organizationally achievable. While there is an urgent need to modernize the existing building stock, engineers apply generally low construction standards and there are many material frauds on the market regarding energy efficient appliances. Thus, energy efficiency investments are not always profitable, especially if buildings are connected to central or district heating and billing is based on square meter and not on actual consumption. The high share of privately owned dwellings and the lack of self-financing possibilities make a modernization of the existing building stock further complicated. The technical solutions suggested by experts range from energy efficient firewood stoves, heat distribution management in multi-family buildings and awareness raising to focusing on new buildings and social construction, pilot projects and subsidizing energy efficient appliances. Energy efficiency should be implemented as an economic possibility through strategic action plans in the context of a green economy approach.

5. Conclusions

Serbia is facing a variety of complex challenges within its energy sector development process and in particular in its efforts to address energy affordability of low-income households. Especially the electricity sector is characterized by low efficiency of the infrastructure, high network losses and high end-use inefficiency. Although Serbia has the lowest electricity prices in South-East Europe, it has been increasing them in recent years to address some of the above mentioned challenges. As a consequence, household affordability of energy services is decreasing due to low average household incomes and low energy performance of buildings, especially within the high share of illegal dwellings. Investing in energy performance of residential buildings can lead to a wide range of benefits for vulnerable households while improving the general energy situation, but still energy poverty is mainly addressed through electricity discounts, failing to reach long-term improvements.

The analysis of legal frameworks and of the daily policy making helps understand the reasons energy efficiency is not implemented as a means to address energy poverty. The EU, a main driver towards energy reforms, has recognized the need to invest in residential energy efficiency especially for poor households and the Energy Community stresses the need to address vulnerable households. Although recommendations include defining energy poverty, increasing awareness and improving consumer rights, energy efficiency measures are not specifically mentioned. Consequently, Serbia's efforts have been directed towards above mentioned issues and energy efficiency is mainly implemented to tackle energy security. Thus, the legal framework in Serbia does not particularly address residential energy efficiency improvements for low-income households. Energy poverty is mainly mentioned in social policies and tackled through electricity discounts. Accordingly, approaches fail to address the diverse causes of energy poverty and rather focus on temporary alleviation of symptoms.

It could be argued that the complexity of energy poverty has not been well understood by decision-makers, thus the topic is not clearly mentioned in relevant policies. However, the analysis of the daily policy making has highlighted other barriers. The development of policies is hampered by the political unpopularity of energy savings and the lack of detailed data. In addition, energy-related determinants are lacking in the definition of vulnerable customers making it difficult to identify the households in need. Implementation of concrete technical measures is difficult due to lack of cooperation and communication between different stakeholders and lack of clear responsibilities of each of them. Especially the problematic relationship between different ministries following different political party agendas and the refusal of governmental organizations to work with NGOs and energy experts hinders effective cooperation in addressing energy poverty. Hereby, sensitizing decision-makers and involving different actors is necessary to create a comprehensive legal frameworks and concrete measures to address energy poverty through energy efficiency. Since self-financing mechanisms for building modernization are not well developed and financial resources of governmental bodies are limited, introducing and strengthening independent energy service companies can support the investment process while promoting the local economy and SMEs. Due to the high share of privately owned dwellings, mechanisms for private households to invest in the modernization of their dwellings, such as grants and credits, should be provided, as well as tax incentives for energy efficient appliances to increase the affordability of new devices. Owners' associations of multi-family buildings could be established for both internal decision making involving all owners and for creating a direct contact partner through which access to information and organizational issues on investment possibilities are facilitated.

The energy sector development has put Serbia in a process of rapid change. In this process, energy vulnerable households have to be particularly considered to ensure equitable development. The link between energy supply, energy savings, social development and energy security must be further recognized by decision makers. In this context, pushing decision makers towards broader approaches, meaning energy efficiency and its social effects, is important to promote sustainable and equitable development.

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