CHAPTER 11

Sustainable Energy Consumption and Energy Poverty: Challenges and Trends in Bulgaria

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Abstract The chapter provides a short overview of the sustainable energy consumption challenges in the Bulgarian residential sector, with a special focus on the issue of energy poverty. The chapter first looks at the main characteristics of the household energy consumption (energy mix, use of renewables, socio-material factors) and then summarises the relevant information about the Bulgarian energy system and energy policies. The authors discuss the most important findings from the review of sustainable energy consumption initiatives (SECIs) involving Bulgarian households and present a good practice example of one such initiative (European Citizens Climate Cup [ECCC]). The conclusion of the chapter considers why Bulgarian households rarely take measures aimed at increasing their energy efficiency.

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F. Fahy et al. (eds.), *Energy Demand Challenges in Europe*,
https://doi.org/10.1007/978-3-030-20339-9_11

Keywords Energy poverty · Renewable energy sources · Inefficiency · Transition and reforms · Barriers and challenges

Introduction

This chapter presents a short overview of the sustainable energy consumption challenges in Bulgaria. It includes a brief description of the national energy system and energy policies, brings forth some findings from the review of sustainable energy consumption initiatives (SECIs) involving Bulgarian households, and presents a good practice example of one such SECI.

Socio-Material Dynamics of Household Energy Use in Bulgaria

The residential sector is the third largest sector in terms of final energy consumption (24%), after transport (35%) and industry (28%), and ahead of services (11%), and agriculture (2%) (Odyssee-Mure 2015). A relatively high share of renewable energy sources (RES) in the energy mix of households (Table 11.1) is explained by the fact that the most commonly used fuel for heating of homes is wood (59%). This is not valid for the capital Sofia, where 60% of households use district heating, but in rural areas almost all dwellings use either firewood (63%) or coal (32%) as the main heating source (National Statistical Institute of Bulgaria 2011; Eurostat 2016).

As Table 11.1 shows, renewable energy is the second most important fuel source in the residential sector. This has helped Bulgaria to already exceed its 2020 target of at least 16% energy consumption coming from RES (RES provided 19% of the final energy consumption in 2015).

Table 11.1 Final energy consumption in households by fuel (2016)

Fuel	*Bulgaria (%)*	*EU-28 average (%)*
Electrical energy	42	24
Renewable energy	33	16
Derived heat	15	8
Solid fuels	6	3
Gas	2	37
Total petroleum products	2	12

Source Eurostat (2018)

However, wood, wood wastes, and vegetable wastes account for almost 80% of the renewables balance sheet for 2016. Most of this biomass is consumed in the residential sector for heating—especially in rural areas and small towns, where many houses are heated by old and ineffective stoves (Gantcheva 2018). The widespread use of cheap and low quality wood has had a negative effect on the air quality in recent years. Another problem is that in addition to the state-controlled harvesting, distribution, and sale of wood (regulated by the Ministry of Agriculture and Food and the State Forestry Agency), up to 25% of firewood is harvested illegally[1] (Boonstra et al. 2015).

The Bulgarian housing stock has in general very poor energy efficiency performance. 65% of the 3.9 million housing units were built before 1990, including over 800,000 households located in prefabricated multi-storey buildings in poor condition and with inefficient or non-existing thermal insulation (Gaydarova 2012).

Energy poverty is a significant problem. According to EU Energy Poverty Observatory data for 2016, 41% of Bulgarians cannot maintain adequate thermal comfort in their households.[2] The rising electricity and district heating prices in recent years have forced many households towards using coal and wood for heating, which further worsens air and living quality. Although electricity prices are still the lowest in the EU (less than half of the EU average of 0.20 Euro per kWh), incomes are also significantly below the EU28 average, which means that energy costs represent a considerable burden on family budget. Over 400,000 households are claimed to be highly vulnerable to increases in electricity prices, while another 149,000 households are income-poor (Export.gov 2017).

Vulnerable consumers are often prepared to compromise their energy comfort and expose themselves to health risks in order to cut their energy expenses. A widespread practice of underheating to reduce energy bills has been observed. Therefore, special attention needs to be taken to ensure that households do not curtail their energy use in a way that would jeopardise their health or well-being.

Environmental concerns are in recent years becoming an important motivator to save energy, but the main incentive for a typical Bulgarian household is to cut expenses. Nevertheless, many households remain

[1] This explains the poor quality of the wood on the market (wet, young and poorly chopped) contributing to the high pollution when burning.

[2] See https://www.energypoverty.eu/indicator?primaryId=1461.

inactive, believing that energy saving can only be achieved after a large initial investment (e.g. purchasing energy efficient appliances, retrofitting of homes), which is often unaffordable. A typical Bulgarian household can therefore save energy only through the application of measures that can be performed with little or no cost. In addition, the artificially low electricity prices are a negative incentive for changing the behaviour even in households with moderate to high incomes.

One of the ways the government is addressing energy poverty is by subsidising the prices of electricity. This measure, however, exacerbates a bad situation for the state-owned energy holding company (Bulgarian Energy Holding [BEH]), which is at a permanent financial loss. It also sends negative signals to foreign investors, who perceive their potential involvement in the Bulgarian energy system as risky and unattractive (Boonstra et al. 2015).

The 2013 protests over the rise of energy prices that ended with the resignation of the government and early elections are a constant reminder to the authorities that a transition from regulated, centralised, supply-based energy system, towards liberalised, decentralised, and prosumer-focused energy can lead to social instability if not handled properly (Vladimirov et al. 2018).

Energy Policy in Bulgaria

According to the last version of the Bulgaria's Energy Strategy, the main efforts for developing the energy sector are directed towards energy efficiency, energy self-sufficient buildings, electric vehicles, renewable energy, and building of smart grids (MEET 2011). In order to comply with the EU Directive 2012/27/EU that aims to establish a common framework to promote energy efficiency within the EU, Bulgaria has developed the National Energy Efficiency Action Plan 2014–2020 (Ministry of Energy 2017). The NEEAP defined the long-term strategy, main actors, objectives, and measures for four main energy consuming sectors. In the residential sector (with a strong focus on multifamily buildings), minimum energy performance standards have been defined, and necessary economic incentives and financing instruments established. For example, regarding domestic appliances, eco-design requirements and energy labelling were introduced (Energy Efficiency Watch 2013).

A recent assessment of energy policy in Bulgaria highlights the steady progress of the country regarding the greening of its energy and economy, being one of the first EU members to meet its 2020 targets for RES (Center for the Study of Democracy 2017a). The report highlights four main long-term energy risk factors:

- Energy poverty: 41% of households are not able to keep their homes adequately warm and 29% have arrears on utility bills;
- Energy intensity of the economy: it remains above the EU average despite continuous improvements;
- Low level of diversification: especially in the natural gas sector, which depends on Russia as the single source of gas supplied through a single route; and
- Bad governance: corruption, bad policy choices and incompetency have considerably contributed to the recent energy price increases in the country.

The largest player in the electricity market is Bulgarian Energy Holding (BEH), which owns a diverse group of companies engaged in electricity generation, supply and transmission. Electricity is mainly generated by coal burning power plants (43% in 2017) and nuclear power (36%). Hydropower supplies 8% of electricity, while additional 8% is generated by wind, solar power and biomass (Global Legal Insights 2019).

District heating networks exist in 12 Bulgarian cities, serving in total about 600,000 households. *Toplofikatsia* Sofia, which provides district heating in the capital, is 100% owned by the Municipality of Sofia, but the central heating companies in Plovdiv and Varna (second and third largest cities) are privately owned. Regardless of the ownership, all district heating companies are local monopolies. Most use natural gas as fuel, although a few still use coal.

The rise in renewable energy in the overall mix has been mainly driven by an increase in the use of solid biomass, with a rise in wind and solar PV capacity also noticeable. Electricity from RES has been supported since 2007 through a preferential feed-in tariff scheme, the obligation for energy distributors to connect green energy producers to the grid, and the creation of long-term loan guarantees for banks financing wind and solar power plants (Boonstra et al. 2015).

These measures have resulted in a surge of wind and solar plants being constructed (almost 90% of all RES generation capacity was installed in 2010–2012), but the majority of them are owned by a handful of suppliers, who often benefit from access to favourable processing and procedural conditions. As a result, these developments did not contribute to decentralisation of electricity production. Another consequence of this faulty process was a sharp increase in final user tariffs, which coincided with the peak of the economic recession, leading to a wide popular backlash against green energy. The feed-in tariff scheme was finally suspended in 2015, but is yet to be replaced with a new state support scheme. This contributed to the minimal uptake of RES sources since 2015 (Vladimirov et al. 2018).

Furthermore, administrative procedures for installation and exploitation of small PV capacities are among the most discouraging and burdensome in the EU, and not surprisingly, investments into new capacities have been in a rapid decline (Vladimirov et al. 2018).

Trends in Household Energy Campaigns in Bulgaria

National energy campaigns are mainly focused on cutting down household energy consumption, reducing greenhouse gas emissions, and promoting green transport. They are organised by a range of actors including government, municipalities, NGOs, local communities, and businesses. Many are implemented as part of EU funded projects.

The largest initiative in terms of invested funds and involved households is the National Programme for Energy Efficiency of Residential Buildings, which provides grants for renovation of multifamily residential buildings, thus improving their energy efficiency. The programme targets over 2000 buildings in Bulgaria, which equals over 100,000 households (Ministry of Regional Development and Public Works 2015). The Energy Efficiency and Renewable Sources Fund (EERSF) was established in 2005 by the Bulgarian government to provide funding and technical assistance for energy efficiency projects implemented by public (municipalities, universities, hospitals) and private sector (businesses and private households).[3]

[3] See https://www.bgeef.com/en/.

Non-governmental organisations are often an important driving force in energy campaigns. For example, the environmental Association *Za Zemiata* (Friends of the Earth—Bulgaria) focuses on developing strategies to involve citizens in energy management, and brings together representatives of civil society, local authorities, business, and scientists to help build local energy cooperatives.[4] One of the rare examples of larger-scale cooperation on the local level is the Municipal Energy Efficiency Network (EcoEnergy). Registered in 2003, the network brings together Bulgarian municipalities to promote the efficient use of fossil fuels, increase the use of renewable energy and improve the energy security of municipalities. EcoEnergy is a supporting structure of the Covenant of Mayors and implements a number of energy related projects funded by European programmes.[5]

Nonetheless, community based sustainable energy initiatives in Bulgaria are often hindered by the inert political and bureaucratic system, numerous administrative barriers and legal hurdles, high investment costs, and unpredictability of the energy sector.

Case Study: European Citizens Climate Cup (ECCC)[6]

European Citizens Climate Cup (ECCC) was a competition of private households within and between countries with the target to achieve the highest energy savings. The competition attracted 8400 households from 11 European countries and regions. It was financially supported by the Intelligent Energy Europe programme. The competition lasted from April 2011 to April 2012.

A variety of incentives motivated households to participate. These included an appeal to patriotic feelings (being part of a national team and compete against other countries), a possibility to win attractive awards, a financial incentive (saving energy in order to save money), and a chance to contribute to a better and healthier environment. Following a disappointing response to initial recruitment efforts, Sofia Energy Agency (SOFENA), the Bulgarian partner in ECCC, enlisted the help of municipalities and corporate businesses to recruit households. In the end, 1006 Bulgarian households participated in the initiative, easily exceeding the target of 750.

[4] See https://www.zazemiata.org/.

[5] See http://www.ecoenergy-bg.net/en.

[6] See https://ec.europa.eu/energy/intelligent/projects/en/projects/eccc for more information.

All participating households had to open an Energy Saving Account (ESA). ESA stored and analysed their energy consumption and cost data, and calculated CO_2 emissions using national CO_2 indexes and climate factors. This information was used to inform each household about its environmental impact and to propose concrete actions to lower electricity and heat energy consumption. ECCC gave users tailor-made advice for modifying the ways they cook, wash, iron and consume water.

The ECCC campaign actively cooperated with media (print, online, and TV) and was endorsed by numerous corporate actors, municipalities, schools, citizens' associations and other multipliers. The Bulgarian ECCC website and social profiles were updated frequently with energy saving tips, success stories and testimonials from participants. Regular energy events were organised, including lotteries with sponsored gifts. The success of the campaign was monitored by brief weekly and more detailed monthly reports displaying benchmarks in energy consumption according to different user groups (tenants/owners), different building types, or different energy sources. The competition ended in April 2012, when the winners were announced and awarded.

Framing the Energy Challenge

As households account for almost 30% of the CO_2 emissions in the EU, the central aim of the initiative was to make people aware of their personal impact on the climate change and motivate them to implement energy improvements in their own situation. Apart from trying to influence and change the individual energy-using actions, the initiative also had a strong community aspect, as participants were encouraged to compete with other Bulgarian participants, but also as a national team competing with other countries. Householders actively used online tools to record consumption data, they received feedback on trends, and participated in social media, engaging in discussions and sharing their experiences with energy savings measures. They also attended different events including lectures, meetings, fairs, and workshops. At the end of the competition, householders completed an evaluation survey.

The campaign was predominantly successful. Bulgaria achieved better than planned results in electricity savings (5.81% against 2% targeted), however, savings of heating energy at 0.52% were considerably lower than the expected 4%. Partial explanation for this is that electricity consumption per household in Bulgaria is higher than in any other ECCC

country. Consequently, there were untapped reserves for electricity savings, which the competition managed to activate. On the other hand, opportunities for heating savings were much more restricted, due to the unfavourable state of Bulgarian building stock and limited financial ability of residents to invest in retrofitting. Hence, heat energy could often be saved only at the expense of thermal comfort (Julius 2012).

The winner of the Bulgarian ECCC was a family from a small town in Western Bulgaria, living in a detached two-storey building constructed in the 1980s with no energy efficiency measures. During the campaign, the family invested 1665 EUR into retrofitting their home (efficient lighting, new appliances like refrigerator, cooker and washing machine, and a solar panel on the roof). These measures decreased their energy consumption by 54%, with additional 14% achieved through behavioural changes.

Conclusion

Of 45 SECIs in Bulgaria, examined and described in the frame of the ENERGISE project (Table 11.2), 14 have been classified as 'Changes in Technology,' 19 as 'Changes in Individual Behaviour,' 6 as 'Changes in Everyday Life Situations' and 6 as 'Changes in Complex Interactions.' The objectives of the majority of initiatives implemented in Bulgaria are therefore to influence attitudes and choices related to energy efficiency and potentially change the energy consuming behaviour of individual households or household members, or to achieve energy savings through introduction of energy efficient technical measures. Only a minority of initiatives target more complex solutions that necessitate active involvement of a community of people who do not necessarily know each other and are willing to act and interact for the common good, and not only to reduce the energy costs of their own household.

Another curious feature of Bulgarian SECIs is that most of them (32) are implemented as part of international projects—mostly EU funded. Only a few initiatives are true grass-root projects developed and implemented by the household residents themselves. An interesting observation from the analysis on international projects is that Bulgarian householders are often very eager and active participants in top-down initiatives (in many projects, especially the ones involving a competitive dimension of energy saving, Bulgaria archived higher than average levels of participation and some of the best results), but are very reserved when it comes to self-organisation and cooperation with their neighbours and co-citizens.

Table 11.2 Number of national SECIs in Bulgaria according to their problem framing[a]

Problem framing	*No. of initiatives*
Changes in technology	14
Changes in individuals' behaviour	19
Changes in complex interactions	6
Changes in everyday life situations	6

[a]See http://www.energise-project.eu/projects for explanation

An additional reason why Bulgarian households rarely take measures aimed at increasing energy efficiency is the widespread perception that ordinary citizens cannot change anything, as the energy sector is completely controlled by the state and energy monopolies. Substantial legislative barriers and regulatory burdens further discourage Bulgarian households from taking action—a case in point is the SECI 'Solar Roof.' Households from a 15-storey apartment building in Sofia jointly installed 120 solar panels on the roof of the building. While the purchasing and installing the panels took two weeks, obtaining a considerable number of different permits took almost two years.

Finally, there is the crucial issue of low incomes and widespread (risk of) energy poverty. The main priority for most households is therefore not cleaner energy and protection of environment, but lower energy expenses. It is not surprising that a considerable number of initiatives aim to reduce the energy costs of households, mostly through measures like retrofitting and thermal insulation of multi-storey residential buildings (typically through grants provided by the Bulgarian state and EU funds). The strong focus on technological solutions and retrofitting is also a consequence of the old age and poor state of repair of the building stock, which mostly dates from the socialist period, when energy was cheap and plentiful.

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