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Energy efficiency [V]4 Ukraine

Peter Brezáni, Andrii Chubyk, eds.

FACULTY OF SOCIAL STUDIES, MASARYK UNIVERSITY
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Contents

Dear readers,

You are holding in your hands one of the most tangible outputs of the rather broad project we undertook within – and mainly "for" – Ukraine during 2015 and 2016. This project, entitled *Building capacities for energy sector reform in Ukraine*, was supported by *SlovakAid* as well as the *International Visegrad Fund*, and has focused primarily on the sharing of Slovakia's and the V4's experience in improving energy efficiency and the use of renewables with Ukrainian state representatives, cities and municipalities, as well as on implementing the associated EU legislation and programs, transposing them into national legislation, and incorporating all this into policies, learning from best practice, and successful projects.

The V4's advantage over the older EU member states and even overseas donors – as well as the added value that Slovakia and the other Visegrad countries bring to this field – is the fact that these countries, along with their cities and municipalities, have faced similar problems to those of Ukraine in the very recent past: V4 countries, too, use centralized heating systems to distribute heat and warm water thoroughly and evenly to public facilities and households. They have also had similar sorts of public lighting systems in the not very distant past, as well as the vast socialist architecture that did not focus much on the insulating properties of buildings. In several cases V4 countries have used new and modern technologies from the West and have succeeded in adapting them to their old post-socialist infrastructure, such as centralized heating systems. Such experience can certainly be made use of in Ukraine as well.

The book does not offer "copy and paste" models. The authors describe, inform and promote energy efficiency and the use of renewables as important steps towards Ukraine's energy independence – of crucial importance to Ukraine, as to the V4. It is for this reason that the book begins with a comprehensive piece analyzing the current "energy efficiency" situation in Ukraine. Following this initial analysis, the V4 authors attempt to put in a nutshell the experience (in alphabetical order) of the individual Visegrad Four countries in energy efficiency measures and the use of renewables, and to recapitulate what has been done in their own countries within these fields, and what among this might be of use to the EU's Eastern neighbor. Obviously, the book is only able to offer its analytical assessment within the natural limits of a publication of this kind, and not to cover all specifics and nuances of the topic.

The publication is primarily intended to serve as material for those policy and decision-makers within Ukraine responsible for implementing its energy policy (Ministry of Energy and Coal Industry, State Agency for Energy Efficiency and Energy Savings, Ministry for Regional Development, Building and Housing, Ministry of Economic Development and Trade), for

representatives of its cities and municipalities, for businesses (both Ukrainian and V4), as well as for all the independent experts, think-tankers and others who are interested in the future of Ukraine and its people.

We firmly believe that this book will ultimately find its readers and serve them well. In conclusion we would like to thank the project's donors – *SlovakAid* and the *International Visegrad Fund* – for their cooperation and support, as well as for the fact that, also thanks to them, we are able to continue building the capacity for energy sector reform in Ukraine.

Alexander Duleba
Director, Slovak Foreign Policy Association

Mykhailo Gonchar
President, Centre for Global Studies "Strategy XXI"

Ukraine

As the most energy intensive country in Central and Eastern Europe, Ukraine considers the experience of Visegrad Group countries with energy efficiency to be very valuable, due to the many similarities between Ukraine and these countries in terms of economics and household stock. Facing challenges to its very existence, in 2014–2016 Ukraine drastically reduced its consumption of primer energies (gas, electricity, oil, and oil products). The main reasons for this were a fall in economic activity, the annexation of Crimea by Russia, and the military defensive in the East, where a significant portion of heavy industries and mining enterprises found themselves behind the frontlines in the uncontrolled territories.

In 2016, Ukraine's economy started its slow recovery, while energy consumption continued to decline, thus keeping its promise to follow a decoupling path like most European countries. However, Ukraine is still a long way from the conditions needed to create a sustainable framework for further steps in energy savings and the introduction of energy efficient measures. The state has failed to adopt the necessary legislation, and its ongoing success is rather of a short term nature, being mainly due to significant efforts by external actors (the EU, the US, IFIs) and the bottom-up activities of a society challenged with increasing energy prices by virtue of a decrease in real incomes.

Overview of legislation pertaining to energy efficiency and renewables in Ukraine

Ukraine is far behind the average level of European countries regarding adopted legislative standards in energy efficiency and savings. Despite being a signatory of the Energy Community, the energy efficiency/renewables legislation package is still rather empty.

Ukraine continues to use the outdated Law of Ukraine on Energy Conservation,[1] adopted in 1994 with few amendments. A draft law on energy efficiency, developed by an international team of experts in line with Directive 2012/27/EU, is still not approved, even at the level of the Cabinet of Ministers of Ukraine, although being passed through for consideration back in 2015. This law should create a baseline for all other laws, with its introduction of the relevant terminology and definitions, and its outlining of the strategy

[1] "Law of Ukraine on Energy Savings," No. 74/94-вр, adopted on July 1, 1994. Available online: http://zakon2.rada.gov.ua/laws/show/74/94-%D0%B2%D1%80 (accessed on October 8, 2016).

of state policy in energy efficiency/renewables, and the coherence of this strategy with its economic activities.

The metering of energy resources is one of the most challenging topics for Ukraine, in particular with regard to public utilities' services. Ukraine has adopted the Law of Ukraine on providing commercial metering of natural gas[2] (reg. No. 3533-17, dated June 16, 2011), with fixed timeframes for the introduction of comprehensive gas metering by all consumers by January 1, 2018. As of February 1, 2016, nearly 95 per cent of all consumed gas in Ukraine was accounted for through metering devices.[3] A similar situation holds with the metering of electricity.

A draft Law on the Commercial Metering of Utilities (reg. No. 4901, dated July 7, 2016) has been passed through for consideration to the committees of Ukraine's Verkhovna Rada (Parliament), and should provide conditions for the commercial and distributive metering of thermal energy, hot water and drinking water; financial resources for installation, maintenance and replacement; and the level of responsibility for the violation of legislation in the sphere of commercial metering. Upon its adoption, Ukraine will create the needed conditions for the metering of nearly all consumed primary energy.

A draft Law on the Energy Performance of Buildings[4] (reg. No 4941, dated July 11, 2016) has passed through the committees of the Ukrainian parliament, and at the end of September 2016 was recommended for approval in the second reading. Its provisions are in line with Directive 2010/31/EU and should create preconditions for further reforms in Ukraine's construction industry, establishing European standards for the energy efficiency of buildings and their energy performance.

To facilitate the retrofitting of housing stock, public buildings in particular, amendments to the Laws on Peculiarities of Public Procurement of ESCO Services, and the so called "ESCO Law," were proposed to the Ukrainian Verkhovna Rada, which should increase inter alia the duration of contracts from 10 to 15 years and resolve issues of property rights.[5]

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2 "Law of Ukraine on providing commercial metering of natural gas," No. 3533-17, adopted on June 16, 2011. Available online: http://zakon5.rada.gov.ua/laws/show/3533-17 (accessed on October 8, 2016).

3 See "News of Naftogaz of Ukraine," Data on construction of gas metering devices in Ukraine, March 4, 2016. Available online: http://www.naftogaz.com/www/3/nakweb.nsf/0/D2898826E0E589E6C2257F6C0045AC2F?OpenDocument&year=2016&month=03&nt=%D0%9D%D0%BE%D0%B2%D0%B8%D0%BD%D0%B8& (accessed on October 8, 2016).

4 "Draft Law on Energy Performance in Buildings," No. 4941, dated July 11, 2016. Available online: http://w1.c1.rada.gov.ua/pls/zweb2/webproc4_1?pf3511=59631 (accessed on October 10, 2016).

5 "Draft Law on Amendments to the Law of Ukraine on the Introduction of New Investment Opportunities, Ensuring Rights and Legal Interests of Legal Entities to Conduct

With the support and supervision of its European partners, Ukraine continues to develop technical standards, software for energy performance calculation, a database of certified energy auditors, and a registry of certificates stating the energy performance of buildings.

In November 2015, Ukraine adopted the first Energy Efficiency Action Plan to 2020, with an overall national indicative energy savings target of 9 per cent of final energy consumption. To achieve this goal, however, Ukraine needs to enhance the legislative process and the implementation of legal requirements.

Among other legal issues, further work on developing national laws for the transposition of Energy Services Directive 2006/32/EC, and Energy Labeling Directive 2010/30/EU, is to be done.

With the adoption of Directive 2009/28/EC, Ukraine committed to increase the share of renewables in the national energy mix to 11 per cent by 2020. According to an Energy Community Secretariat review,[6] Ukraine achieved a 3.8 per cent share of renewables in 2014 (without big hydro power stations).

Table 1. Capacities of renewable energy

Total capacities of renewable energy (MW):	2014	2015
Hydropower	5854	5884
– Small hydropower (< 10 MW)	80	87
– Pumped storage	1186	1186
Wind	426	426
Solar	412	432
Biomass and biogas	47	52

Source: Energy Community Secretariat country review 2016

The Ukrainian parliament adopted amendments to the national legislation and removed the progressive rate of local content in renewable energy projects. However, the long wait involved in obtaining permits and licenses from various state institutions, as well as the current period of legislative uncertainties, have so far deterred foreign investors from entering the Ukrainian renewable market. Therefore, for example, wind energy has remained at nearly the same level for the past few years, while the growth in solar energy is due primarily to small installations on the roofs of private households.

Large-Scale Thermo Modernization," No. 4549, dated April 29, 2016. Available online: http://w1.c1.rada.gov.ua/pls/zweb2/webproc4_1?pf3511=58925 (accessed on October 10, 2016).

6 "Energy Community Secretariat countries review 2016, Ukraine," p. 167. Available online: https://www.energy-community.org/portal/page/portal/ENC_HOME/AREAS_OF_WORK/Implementation/Ukraine (accessed on October 14, 2016).

In 2015 and 2016, consumption of biomass continued to increase, facilitated by the state program "Warm loans," with its compensation of up to 35 per cent of loans taken out for boilers using alternative fuels (non-gas boilers).

However, the utilization of domestic biomass stock is still below its potential level, because several conditions for renewable energy's integration into the electricity market and access to the grid are not in place, due to delays in the adoption of the Law of Ukraine on the Electricity Market in line with Europe's third energy package.

Amendments to the Law of Ukraine on Heat Supply, designed to stimulate utilization of alternative energies for heat production, are under consideration in Ukraine's Verkhovna Rada, with only the first reading having passed through so far, on September 22, 2016. This should further facilitate conditions for the use of domestic biomass and provide incentives for investors.

The Ukrainian National Renewable Energy Action Plan[7], adopted in 2014, was considered incomplete by the Secretariat of the Energy Community. The promotion of renewables is conducted in the form of feed-in tariffs with their respective "green coefficients" for each category, based on capacity, type and time of commissioning. The National regulatory commission approves the relevant documents and fixes the "green coefficients." The main bottlenecks are the numerous required permits and licenses from various state institutions, the long period involved in pre-construction preparations, access to the grid, and a lack of planning for the development of networks, electricity lines, etc.

Renewables should make their way into the transport sector in Ukraine, but existing legal provisions still do not allow for the proper transposing of articles 17 to 21 of Directive 2009/28/EC.

Responsible governmental institutions

The State Agency on Energy Efficiency and Energy Saving[8] (SAEE) is the governmental institution responsible for implementation of state policy in energy efficiency and renewable energy in Ukraine. It does not operate independently, being subordinate to the Ministry for Regional Development, Building, Housing and Utility Services (Minregion).

The National Energy and Utilities Regulatory Commission[9] (NEURC) is responsible for tariffs and permits for each new renewable energy project above 30 MW.

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7 "Decree of the Cabinet of Ministers of Ukraine on National Renewable Energy Action Plan," No. 902-p, dated October 1, 2014. Available online: http://zakon3.rada.gov.ua/laws/show/902-2014-%D1%80 (accessed on October 14, 2016).

8 See official web site of the State Agency on Energy Efficiency and Energy Saving of Ukraine. Available online: http://saee.gov.ua/en (accessed on October 15, 2016).

9 See official web site of the National Energy and Utilities Regulatory Commission. Available online: http://www.nerc.gov.ua/ (accessed on October 26, 2016).

Being responsible for only two areas – energy efficiency and renewables – SAEE has neither the capacity nor the mandate to cover all spheres. During recent years, this state institution has been gradually deprived of its controlling functions and has lost regional offices. Many experts on energy efficiency and savings have been discharged, bringing about an interruption in institutional memory. The subordination of SAEE to Minregion is regarded as a step towards lowering the importance of energy efficiency at the national level.

SAEE works out the drafting of laws, regulations and strategies on renewables and energy efficiency and submits them, though Minregion, to Ukraine's Cabinet of Ministers. The circulation of documents takes a lot of time, and SAEE's experts are not able to advocate for proposed matters at all levels. Because energy efficiency is not much favored by Ukrainian energy monopolists and their political groups within public authorities, and the pathway of documents through ministries and responsible state institutions is very long and difficult, the final variants are often far removed from their original and weakened in their effectiveness.

Given Ukraine's high energy intensity, SAEE should be directly subordinate to Ukraine's Cabinet of Ministers with a mandate limited to energy efficiency and savings, and supplemented by monitoring and control capacities. Renewable energy should be transferred to the Ministry of Energy and Coal Industry, as the state institution responsible for state energy policy development, while SAEE should instead take responsibility for the revision of state energy efficiency policy, development and incorporation of innovations, new technologies and international best practices. Cooperation with domestic and international investors should also be a core responsibility of SAEE, with the related mandate to present state interests and assume responsibilities.

NEURC is a state regulatory agency in charge of the setting of green tariffs for renewable energy projects. According to Order No. 508 of March 2016, solar and wind energy projects under 30MW are tariffed with progressively reduced rates until 2030. In cases where more than 30 per cent of equipment and materials used is Ukrainian, the relevant green tariff will be increased by 5 per cent; if more than 50 per cent is Ukrainian, the green tariff will be increased by 10 per cent.[10]

As stated above, NEURC is responsible for setting up green tariffs for so called industrial generation projects from renewable energy, with capacities over 30 MW. Interested parties should apply for a license for generation from renewable energy, provide technical documentation, and obtain their

[10] "Draft Law amending Laws of Ukraine to ensure competitive conditions for electricity production from alternative energies," No 2010-d, dated May 19, 2015. Accessible online: http://w1.c1.rada.gov.ua/pls/zweb2/webproc4_2?id=&pf3516=2010-%D0%B4&skl=9 (accessed on October 16, 2016).

own green tariff, based on NEURC calculations. With the adoption of the new law on NEURC, each generation enterprise should provide co-funding of this regulatory body in order to ensure that it remains independent and works rather in the interest of energy producers and consumers than state authorities.

Minregion is currently an official institution, responsible for state policy in the sphere of energy efficiency and savings. It has a mandate to revise and supervise the activities of SAEE, work out the drafting of laws, and advocate for law amendments. Minregion's main task and concern at the current stage is the development of a draft law on special fund for energy efficiency, the aim of which is to be a unique financial source for citizens (and to some extent for businesses) in Ukraine for the undertaking of energy efficiency and saving projects. This ministry, however, has limited capacities for co-ordinating the energy efficiency sector on the whole, given that its primary mandate covers the sphere of communities and municipal development. At a maximum, therefore, Minregion should remain responsible for projects covering heat production from renewable energies, and in this regard work closely with Ministry of Energy and Coal Industry to develop a harmonized state energy policy.

Funding opportunities

On March 1, 2010, Ukraine's Cabinet of Ministers issued Decree No. 243[11] approving the State Target Economic Program on Energy Efficiency and the Development of Energy Production from Renewable Energy Sources and Alternative Fuels for 2010–2015. It was supported by the European project, Support to the implementation of Ukraine's Energy strategy in the area of energy efficiency and renewable sources of energy.[12] In 2011, the Cabinet of Ministers issued Decree No. 1056[13] approving the Procedures to Use Funds from State Budget to Support Measures on Effective Utilization of Energy Sources and Energy Savings. However, EU support was not used efficiently

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11 "Cabinet of Ministers of Ukraine, Decree No. 243, dated March 1, 2010 on approval of the State Target Economic Program on energy efficiency and the development of energy production from renewable energy sources and alternative fuels for 2010–2015." Available online: http://zakon2.rada.gov.ua/laws/show/243-2010-%D0%BF (accessed on October 16, 2016).

12 "Support for the implementation of Ukraine's Energy strategy in the area of energy efficiency and renewable sources of energy, European Union Budget Support programme on Energy Efficiency," 12/2009 – 12/2012. Available online: http://eeas.europa.eu/delegations/ukraine/projects/list_of_projects/246096_en.htm (accessed on October 16, 2016).

13 "Cabinet of Ministers of Ukraine, Decree No. 1056, dated October 17, 2011. Several issues on using funds for energy efficiency and energy savings." Available online: http://zakon5.rada.gov.ua/laws/show/1056-2011-%D0%BF (accessed on October 16, 2016).

and the relevant programs were put on hold in February, 2012. There were also reports in the media about the misuse of EU funds to support the solar business of Andriy Kluyev,[14] the head of the presidential administration at that time. Until 2014, there was not a functioning state program financially supporting the development of renewable energies or the improvement of energy efficiency in Ukraine. For several years, however, many international financial institutions and programs have provided technical assistance and loans for individual projects in Ukraine.

On October 1, 2014, Ukraine's Cabinet of Ministers, via its Decree No. 491, changed the procedures defined in Decree No. 1056, thus opening opportunities for citizens to apply for partial remuneration of loans for boilers on alternative (non-gas) fuels. On May 12, 2015, this state support was expanded to include energy efficient equipment and materials for thermal insulation, with remunerations for owners of private households and apartment houses organized into associations of owners (condominiums). Since that time, state program "warm loans" have been providing opportunities for the compensation of energy efficient measures and the introduction of renewable energy sources, primary solar collectors, and heat pumps.

This program for energy efficiency materials and equipment was put on hold for two months in 2016 due to a lack of financial resources, and restarted again on October 6, 2016.[15] It has become quite popular among citizens, but it contains a gap – namely, that up to now no one provides any monitoring of the effectiveness of fund allocation or the quality of work carried out.

On April 7, 2016, the European Bank for Reconstruction and Development (EBRD) launched a Ukraine Residential energy efficiency financing facility, called "IQ Energy," in the amount of 75 million euros until 2020.[16] The program will be implemented through Ukrainian partner banks and provides both technical and financial support in order to facilitate residential modernization.

As mentioned above, Minregion is in charge of developing a legislative basis for an energy efficiency fund, which should become a comprehensive mechanism to support the long-term modernization of Ukrainian household stock and economy, decrease energy consumption, and introduce modern energy efficiency tools. A comparison table is provided below, showing the particularities of all the programmes.

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14 "Ukraine appears in a new light," *Kommersant*, February 8, 2012. Available online: http://www.kommersant.ru/Doc/1868231 (accessed on October 16, 2016).

15 "Governmental program on supporting citizens with insulation of their private houses is being restarted." October 6, 2016. Available online: http://saee.gov.ua/uk/news/1363 (accessed on October 10, 2016).

16 "EBRD launches Ukraine Residential Energy Efficiency Financial Facility," April 7, 2016. Available online: http://www.iqenergy.org.ua/en/news/ebrd-launches-ukraine-residential-energy-efficiency-financing-facility (accessed on October 16, 2016).

Table 2. Comprehensive modernization support programs

State program "Warm loans"	IQ Energy	Energy efficiency fund
Funds from the state budget, international financial institutions, donors (international, domestic)	Funds from international and private donors	Funds from the state budget, international financial institutions, donors (international, domestic)
Approval of each year's budget transfers to SAEE, 1.1 billion UAH during 2015–2016	Until 2020, a fixed amount of 75 million euros	Regular transfers from state budget to the fund, not yet fixed, no budget yet
Compensation of 30–70 per cent of loans for energy efficient equipment and materials, including renewable energy	Compensation of 15–20 per cent of loans for energy efficient equipment and materials	Compensation will be calculated based on achieved energy efficiency
14000 UAH per person compensation limit	3000 euros per person compensation limit	No information
21.5–24.5 per cent bank interest per loan, Oschadbank, Ukrgasbank, Ukreksimbank	19.99 per cent bank interest per loan, OTP Bank, Megabank, Ukrsibbank	Each bank will be in line with Fund requirements
No technical support, no obligation to perform energy audit, no verification of results of energy efficiency measures	Technical support, no obligation to perform energy audit, verification of results of energy efficiency measures	Technical support, obligation to perform energy audit, verification of results of energy efficiency measures
Support for condominiums, no support for ESCO	Support for condominiums is being considered, no support for ESCO	Support for condominiums, support for ESCO is considered in the middle term perspective

Facility for Energy Saving Credits,[17] from the Scandinavian institution NEFCO, is another loan program that provides funds to finance energy saving measures in municipally owned buildings such as schools, day-care centers, hospitals and sports facilities. As of 2016, NEFCO has supported over 120 energy efficient projects in Ukraine with loans.

The Eastern Europe Energy Efficiency and Environment Partnership[18] (E5P) is a multi-donor fund with around 168 million EUR for supporting energy efficiency. Ukraine has been chosen as a focal area for activities and

[17] "Facility for energy saving credits," Nordic Environment Finance Corporation. Available online: http://www.nefco.org/work-us/our-services/loans-and-equity/facility-energy-saving-credits (accessed on October 16, 2016).

[18] "Background on E5P." Available online: http://ukraine.e5p.eu/about-e5p/history-rationale/ (accessed on October 16, 2016).

has gained support for 15 projects, including modernization of district heating networks, upgrading of water and wastewater systems, and measures to improve energy savings in public buildings. EBRD, EIB, NIB, NEFCO, CEB, The World Bank and any other International Financial Institutions (IFI) may act as Implementing Agencies (IA) for the Fund.

German company GIZ has implemented the project Energy Efficiency in Municipalities[19] in Ukraine, commissioned by the German Federal Ministry for Economic Cooperation and Development, for the period of 2013–2016 with a possible extension to 2020, with 4 million euros.

Since September 2013, the USAID Municipal Energy Reform Project[20] (MERP) has been implemented in Ukraine with a budget of 14.5 million USD. The project's goals include support for improved energy policies, increased energy efficiency, a growth in investment in Ukraine's energy sector, and the reduction of GHG emissions.

Since 2010, the Covenant of Mayors[21] (CoM) initiative has been expanded to include Ukraine and has become an essential part of efforts to boost energy efficiency from the ground up. CoM includes 56 member cities in Ukraine, with several of them being very active in reform efforts.

Best practices – case studies

Ukraine does not have a single success story so far in energy efficiency at the state level, given the contradictory nature of the results of previous years' activities. State energy efficiency programmes have contributed to the development of the first large solar and wind equipment parts in Ukraine, but were considered to be insufficient and non-eligible for international financial support in early 2010.

Since 2014, a "warm loans" program has covered the entire territory of Ukraine, but there are no reliable monitoring and evaluation instruments to measure its actual effectiveness, remove gaps or improve it for further use. The Government of Ukraine indirectly felt a positive impact of the "warm loans" programme, when most local authorities initiated within their communities additional supporting projects for the benefit of their population,

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19 See "Energy Efficiency in Municipalities" project brochure, GIZ, 2013–2017. Available online: http://eeim.org.ua/wp-content/uploads/2014/09/EE_Factsheet_EEiM_2016-04-19_en.pdf (accessed on October 16, 2016).

20 See "Tasks and activities of MERP project," USAID. Available online: http://www.merp.org.ua/index.php?option=com_content&view=category&id=50&Itemid=914&lang=us (accessed on October 16, 2016).

21 See "Covenant of Mayors in Eastern Partnership and Central Asian Cities." Available online: http://iet.jrc.ec.europa.eu/energyefficiency/covenant-mayors/com-east (accessed on October 16, 2016).

to ease the repayment of loans through partial compensation from regions' and districts' budgets.[22]

Ukrainian cities have used these financial mechanisms to start up sustainable development plans, pilot energy efficiency projects, and the introduction of renewables. Many of these plans and success stories can be found on the web site of the ESCO company, Ecological Systems.[23]

What was a quite intensive development of solar and wind parks slowed down in 2014–2015, due to the fact that the main developers lost access to loans with preferential conditions from state banks, green tariffs were lowered, and the economic situation worsened. The state introduced several amendments to laws in order to facilitate biomass and the utilization of other alternative sources. However, the big players in renewable energy equipment continued doing business, and in 2016 some new projects were commissioned.

On September 23, 2016, Ukrainian company Fuhrlaender Wind Technology commissioned its first 3 MW wind gondola, thus starting up Ukrainian domestic production of all components for wind mills.[24]

On October 7, 2016, in the Lviv region, the first wind project[25] was commissioned. A 13.2 MW wind park, "Stariy Sambir-1," was built by the company Eco-Optima in cooperation with the European Bank for Reconstruction and Development, and the Clean Technology Fund of the World Bank. The company is planning to build other new wind parks in the Lviv region as well.

Ukrainian small and medium sized enterprises have begun to produce different types of boilers for alternative (mostly solid) fuels, thus boosting the use of biomass on the level of private households and to some extent for public buildings. Their quality is gradually improving, and some are already looking at opportunities to start exporting to European markets.

However, the lack of a state program facilitating the harmonized development of the biomass market in Ukraine hinders the implementation

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22 See "Interactive map of regional energy efficiency support programmes for the state "warm loans" program." Available online: http://saee.gov.ua/en/programs/map (accessed on October 16, 2016).

23 "Best practices of energy efficient projects in Ukraine and abroad." Available online: http://www.misto.esco.co.ua/ (accessed on October 16, 2016).

24 "First gondola for 'Prychernomorsky' wind park is being delivered to its destination. Fuhrlaender Wind Technology." Available online: http://fwt.com.ua/otgruzhena-pervaya-gondola-dlya-vetroparka-prichernomorskij/ (accessed on October 15, 2016).

25 "First wind park in Western Ukraine is put in operation at full capacity," Ukrainian Wind Energy Association. Available online: http://uwea.com.ua/ua/news/entry/pervaya-ves-v-zapadnoj-ukraine-vyvedena-na-polnuyu-moschnost/ (accessed on October 15, 2016).

of numerous biomass-to-energy projects, particularly in electricity and co-generation.[26]

The main problems and ways to overcome them

Energy efficiency and savings is still far from being an actual priority for the Ukrainian authorities, in terms of adopted legislation and regulations in place. The long period involved in the consideration of most draft laws, and the low capacity and level of responsibility of functioning state institutions in charge of implementing the state's energy efficiency policy, are very clear examples of the position that top officials find themselves in with regard to this issue.

The main reasons for this are: the interest of most monopolistic energy providers (controlled by Ukrainian and Russian tycoons) in maintaining a highly energy intensive economy so as not to lose revenues; a subsidized population with no motivation to develop energy efficiency; the weak financial status of most private consumers; and the high interest rates of banks for energy efficiency loans.

In Ukraine, SAEE and other state institutions are functioning without a basic Law on Energy Efficiency as the legal ground for implementing the state's energy efficiency policy.

Moreover, a special Code of Energy Efficiency[27] should become the official strategic document for Ukraine's transition to an eco-friendly economy and sustainable development. It should contain Glossaries with the relevant terminology from European directives, chapters on national energy efficiency policy in line with international obligations, and prospects of national energy needs and available energy sources. Other chapters should include energy performance in buildings, energy efficient lighting, energy management, energy audit, energy services, etc.

So far, the investment and business climate in Ukraine has been far from favorable towards energy efficiency and renewable projects. Difficult bureaucratic procedures, and the many state institutions with overlapping mandates and supervising functions, make efforts time consuming and expensive, and make it difficult to calculate the payback period of investments. Therefore, a further simplification of procedures and the introduction of a one-stop

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26 "Survey findings, market conditions for biomass-to-energy projects in Ukraine," International Finance Corporation. Available online: http://uabio.org/img/files/news/pdf/ifc-survey-findings-biomass-to-energy-in-ukraine-2015-en.pdf (accessed on October 16, 2016).

27 "Cherkashyn Igor: There are errors in energy efficiency, which could lead to belief in an international conspiracy," Expert platform for energy efficiency. Available online: http://expe.energoeffect.org.ua/node/220 (accessed on October 27, 2016).

shopping office for permits and licenses should be at the core of the state's energy efficiency policy.

With the adoption of market pricing and the ongoing reform of the energy sector, Ukraine has been facing new challenges of a management, technical and financial nature.

By the end of 2016, Ukraine expects to adopt a new law, "On the Electricity Market of Ukraine," which will change the existing model of a state regulated wholesale market. Outdated electricity generation assets need significant investment, and the lack of a state energy strategy for the middle and long term threatens to kill investor interest, and hinder sustainable development in line with international trends toward a low-carbon and eco-friendly economy.

Among the pending issues are the development of mechanisms to introduce more renewables into the Unified Energy System of Ukraine, compensation instruments for curtailments, the improvement of Ukrainian meteorological forecasts, and a broad awareness-raising campaign on energy efficiency and renewables directed towards private consumers.

Ukraine needs its political leaders to raise energy efficiency to a top priority, and experts to develop relevant programs that will solve the issues obstructing the national path toward an energy efficient economy, based on the technical, production and financial capacities that are actually available.

Main sources of information on energy efficiency and renewables

Covenant of Mayors in Eastern Partnership and Central Asian Cities: http://iet.jrc.ec.europa.eu/energyefficiency/covenant-mayors/com-east

Energy Efficiency in Municipalities project in Ukraine. GIZ, 2013–2017: http://eeim.org.ua/wp-content/uploads/2014/09/EE_Factsheet_EEiM_2016-04-19_en.pdf

Facility for energy saving credits, Nordic Environment Finance Corporation: http://www.nefco.org/work-us/our-services/loans-and-equity/facility-energy-saving-credits

MERP project of the USAID in Ukraine: http://www.merp.org.ua/index.php?option=com_content&view=category&id=50&Itemid=914&lang=us

Official web site of the National Energy and Utilities Regulatory Commission: http://www.nerc.gov.ua/

Official web site of the State Agency on Energy Efficiency and Energy Saving of Ukraine: http://saee.gov.ua/en.

The Eastern Europe Energy Efficiency and Environment Partnership (E5P): http://ukraine.e5p.eu/about-e5p/history-rationale/

The Czech Republic

When analyzing the energy situation within the Czech Republic, it's clear that the country is fairly energy intensive. In terms of crude energy intensity (gross energy consumption over gross domestic product (GDP), it is the third most energy-intensive EU member country, with a 2014 energy intensity level of 256.3 kg of oil equivalent per 1,000 euros of GDP – twice the EU average.[1] All this is true despite the Czech economy having undergone a major transition since the 1990s, with its level of energy intensity decreasing significantly over that time.[2] However, a lot of effort needs to be invested in achieving the targets set out in line with the 2020 goal of a 20 per cent reduction of energy consumption across the EU.

Analytical overview of energy efficiency/renewables legislation in the Czech Republic

The Czech Republic is bound by European Union law, which has been one of the drivers of the implementation of efficiency-related legislation. Most of the measures currently being implemented stem from Directive 2012/27/EU.[3]

Legislative documents

The main legal basis for dealing with energy efficiency is Act 406/2000 Coll., on Energy Savings (hereafter referred to as the Energy Savings Act), which was adopted as part of the EU accession process and the related legal approximation. This Act has been frequently amended, adopting all new EU legislation since then. The Act serves as the primary vehicle for all efficiency-related measures. Hence, it currently implements the provisions of all relevant EU directives: 2012/27/EU on energy efficiency; 2009/28/EC on renewable

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1 "Energy intensity of the economy: tsdec360," Eurostat, 2016. Available online: http://ec.europa.eu/eurostat/tgm/table.do?tab=table&plugin=1&language=en&pcode=tsdec360 (accessed on September 12, 2016).

2 See for example "COMMISSION STAFF WORKING DOCUMENT: Country Report Czech Republic 2015," European Commission, Brussels, 2015. Available online: http://ec.europa.eu/europe2020/pdf/csr2015/cr2015_czech_en.pdf (accessed on September 27, 2016), pp. 30.

3 "Directive 2012/27/EU of the European Parliament and of the Council of 25 October 2012 on energy efficiency, amending Directives 2009/125/EC and 2010/30/EU and repealing Directives 2004/8/EC and 2006/32/EC Text with EEA relevance," European Parliament and Council of the European Union, Brussels, 2012. Available online: http://data.europa.eu/eli/dir/2012/27/oj (accessed on September 10, 2016).

energy; 2009/125/EC on eco-design; 2010/30/EU on labelling; and 2010/31/EU on energy performance of buildings.[4]

Most of the important concepts are thus defined in the bill. The state program for energy savings is defined and outlined in the act, as are energy audits, energy labels, energy services and the like. The scope of activities of the Czech Republic's Ministry of Industry and Trade is also defined in the document, making it the main public institution responsible for enacting efficiency-related policies. Another important part of the Energy Savings Act is the governing of administrative penalties for non-compliance.

Strategic documents and implementation of EU legislation

The main strategic document outlining future actions to be taken by the government is the State Energy Concept (SEC). After several unsuccessful attempts, the document was passed in 2015, outlining strategic goals in the energy domain. Energy efficiency is one of the strategy's five priorities, which also include goals in industry, the residential sector, transport, and transformation.[5]

Apart from the SEC, the Czech Republic was also obliged to adopt a particular strategic document outlining energy efficiency goals, at first to be pursued in line with EU Directive 2006/32/EC, and later in line with 2012/27/EU – the Energy Efficiency National Action Plan (EENAP). The first EENAP was published in 2007, with three major revisions being published since then – in 2011, 2014, and most recently in 2016 in response to the update of the SEC.[6] The 2014 revision became the basis for achieving the goals set forth in Directive 2012/27/EU (EED), with the 2016 revision further fine tuning the mechanisms geared to fulfilling Czech obligations under the directive.

It is worth mentioning that neither the SEC nor the EENAP are legally binding documents, as they are not implemented directly into the legal system. The existence of the EENAP is legally mandated by the Energy Savings Act, while particular provisions are dependent upon governmental decisions.

The main goal set forth by the most recent EENAP is to achieve 50.67 PJ of new energy savings by 2020.[7] These savings are to be achieved incremen-

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4 "406/2000 Sb. Zákon o hospodaření energií," 2000. Available online: http://www.zakonyprolidi.cz/cs/2000-406#f4367267 (accessed on September 10, 2016).

5 See "Státní energetická koncepce," Ministry of Industry and Trade of the Czech Republic, 2015, pp. 48–50. Available online: http://download.mpo.cz/get/52841/60959/636207/priloha006.pdf (accessed on September 27, 2016).

6 "Národní akční plán energetické účinnosti ČR," Ministry of Industry and Trade of the Czech Republic, 2016. Available online: http://www.mpo.cz/dokument150542.html (accessed on September 10, 2016).

7 "Národní akční plán energetické účinnosti ČR 2016," Ministry of Industry and Trade of the Czech Republic, 2016, p. 20. Available online: http://download.mpo.cz/get/50711/63238/651838/priloha004.pdf (accessed on September 6, 2016).

tally, with annual savings increasing gradually until the 2020 deadline,[8] as stipulated by the EED. All this should be achieved through implementation of the alternative scheme in line with Article 7 of the EED.[9] This means that the Czech Republic decided to manage the achievement of energy savings predominantly through measures implemented by central governmental institutions and agencies. Financial incentives are the main tools used in achieving goals.[10] There are several reasons cited for this decision – already existing (and in place) structures and programs; experience in the implementation of comparable schemes; and continuity of previously existing programs.[11]

It is interesting to note that the Czech Republic has decided to make use of an exception that allows for a slower implementation of energy saving measures right from the start: the EENAP of 2014 counts on two phases in the implementation of measures – the first of these being from 2014 to the end of December 2017.[12] The 2016 update pushes the end of this first phase forward one year, to the end of 2018.[13] The reasons for this will be discussed further below.

Oversight and enforcement

Two specialized institutions deal with the protection of consumers' rights in the energy domain – the Energy Regulatory Office (ERO) and State Energy Inspection (SEI).

The Energy Regulatory Office primarily regulates the prices of certain services in the energy market. End-user prices are mostly deregulated in the Czech Republic. In electricity and gas, only prices of utility services are regulated (transmission, distribution, etc.). Apart from this, the price of the commodity itself is set by market conditions. This, however, is not the case with heat, where end-user prices also are regulated by the ERO.

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8 Ibid

9 Exact wording available in "Directive 2012/27/EU of the European Parliament and of the Council of 25 October 2012 on energy efficiency, amending Directives 2009/125/EC and 2010/30/EU and repealing Directives 2004/8/EC and 2006/32/EC Text with EEA relevance," op.cit., p. L 315/4.

10 See "Národní akční plán energetické účinnosti ČR 2016," op. cit., pp. 21–30.

11 "Národní akční plán energetické účinnosti ČR: dle čl. 24 odst. 2 směrnice Evropského parlamentu a Rady 2012/27/EU ze dne 25. října 2012 o energetické účinnosti," Ministry of Industry and Trade of the Czech Republic, 2014, pp. 15–6. Available online: http://download.mpo.cz/get/50711/63238/651839/priloha003.pdf (accessed on September 27, 2016).

12 "Národní akční plán energetické účinnosti ČR: dle čl. 24 odst. 2 směrnice Evropského parlamentu a Rady 2012/27/EU ze dne 25. října 2012 o energetické účinnosti," op.cit., p. 16.

13 "Národní akční plán energetické účinnosti ČR 2016," op.cit., p. 21.

The price of heat is determined only by the costs incurred by heating company; an acceptable profit margin; and VAT.[14] Individual prices may vary and are calculated by private companies using a methodology defined by the ERO.[15]

State Energy Inspection deals predominantly with adherence to the above mentioned law 406/2000 Coll., on Energy Savings. By the end of 2015, it was also inspecting adherence to law 165/2012 Coll., on Supported Sources of Energy. Its main role is to assess whether preferential financing (subsidies; low-interest loans, etc.), provided by the state on the basis of energy savings, was indeed spent properly and whether promised savings were achieved. The inspections are mainly concerned with checking heating units, the regulation of heating in buildings; the energy performance of buildings; energy audits; and like.[16]

With regard to issues related to the protection of energy consumers, the ERO and the SEI are the two institutions to contact.

The ERO has a specialized unit – the Department of Legal Protection of Customers – dealing with issues of energy supply and price. The head of this unit is the Energy Ombudsman. It is interesting to note that the unit is placed under the ERO, rather than established separately or included under the Office of the Public Defender of Rights (general ombudsman).[17] However, it is not possible to address the energy ombudsman directly – this office belongs to the ERO's internal structure and was formally established in February 2014, according to an associated press release by the ERO.[18]

Both the ERO and SEI have subsidiary offices throughout the country. ERO headquarters is located in Jihlava, half-way between Prague and the country's second largest city, Brno. In addition it has subsidiary offices in Prague and in Ostrava, the country's third largest town. The SEI is located in Prague, with ten additional regional offices around the country.

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14 "ERÚ – Často kladené dotazy," Energy Regulatory Office. Available online: https://www.eru.cz/teplo/casto-kladene-dotazy (accessed on September 27, 2016).

15 More details "Cenové rozhodnutí Energetického regulačního úřadu č. 2/2013 ze dne 1. listopadu 2013, k cenám tepelné energie," Energy Regulatory Office, Jihlava, 2013. Available online: http://www.eru.cz/documents/10540/481581/CR_teplo_2_2013.pdf/928fdb34-9828-455a-8218-839cc48ee335 (accessed on September 27, 2016).

16 "Zprávy o činnosti – Státní energetická inspekce," State Energy Inspection. Available online: http://www.cr-sei.cz/?page_id=490 (accessed on September 27, 2016).

17 "Jak řešit spor s dodavatelem? Poradí vám Energetický ombudsman," 2014. Available online: http://www.elektrina.cz/jak-resit-spor-s-dodavatelem-poradi-vam-energeticky-ombudsman (accessed on September 9, 2016); "Tisková zpráva: ERÚ zřídil funkci interního energetického ombudsmana," Energy Regulatory Office, 2016. Available online: http://www.eru.cz/documents/10540/580499/20140205_TZ_ombudsman.pdf/00107fdd-6946-434b-a410-96a100f689ce (accessed on September 27, 2016).

18 "Tisková zpráva: ERÚ zřídil funkci interního energetického ombudsmana," op. cit.

Renewables

Renewable resources began to be supported in late 1990s. This support was more thoroughly codified in bill 180/2005 Coll., on support of electricity production from renewable resources. This act introduced rules regarding the rights and duties of producers; pricing mechanisms; rules on access to the market; and the like.[19] The bill was amended twice. In 2010, a so called "solar levy" – a de facto tax on income from production to mitigate the solar boom – was introduced as a temporary measure. This action prompted an unsuccessful challenge to the measure at the Czech constitutional court in 2011.[20] The original bill was replaced in 2012 with law 165/2012 on Supported sources of energy,[21] cancelling support for any new large solar installations and making solar levy a permanent taxation measure.

Law 165/2012 Coll. also mandates the Czech government to prepare and enforce the National Action Plan on renewable resources.[22] The action plan sets out goals to be achieved by 2020, in terms of the share of renewable resources in the grid. The minimum target the Czech Republic aims to achieve is 13 per cent of renewables in the overall energy mix. The action plan underwent its last update in January 2016.[23]

Energy Management standards

The state encourages energy companies to implement energy management in line with the ISO 50 001[24] standard, in large companies and owners of larger housing stock. To date this implementation is only voluntary. In the case of large companies, they may be exempt from the legal requirement to undergo an energy audit if they implement the energy management measures,[25] yet

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19 J. Doležel, "Zákon o podpoře využívání obnovitelných zdrojů energie (zákon č. 180/2005 Sb.)," Ministry of Industry and Trade of the Czech Republic, 2006. Available online: http://www.mpo.cz/dokument6697.html (accessed on September 27, 2016).

20 *NÁLEZ Ústavního soudu Pl. ÚS 17/11*, Constitutional Court of the Czech Republic, 2011.

21 See "165/2012 Sb. Zákon o podporovaných zdrojích energie a o změně některých zákonů," 2012. Available online: https://www.zakonyprolidi.cz/cs/2012-165#redakce (accessed on September 27, 2016).

22 "165/2012 Sb. Zákon o podporovaných zdrojích energie a o změně některých zákonů," op.cit.

23 "Národní akční plán pro obnovitelné zdroje energie," Ministry of Industry and Trade of the Czech Republic, 2016. Available online: http://www.mpo.cz/dokument169894.html (accessed on September 27, 2016).

24 International standard ISO EN 50 001 replaced the EN 16 001 standard, which was standardized only in the EU.

25 See "406/2000 Sb. Zákon o hospodaření energií," op.cit.; "Národní akční plán energetické účinnosti ČR 2016," op. cit., p. 24.

this is the only case in which the energy management system is mentioned in any legal documents in the Czech Republic.[26]

The implementation of energy management is supported in various state-related entities, such as cities, regional administrations, or semi-budgetary organizations. These institutions are entitled to apply for financing through the EFEKT program[27] – national program on energy savings – which will be discussed in a later section.

According to a study of the success of the ISO 50 001 standard implementation in 2013, the measure's reach was limited.[28] This seems still to be the case – according to the EENAP, there are no expected savings to be included in the reporting before 2017.[29] Energy management is listed as one of "other" measures (e. g. including implementation of EPC solutions; accession of cities to the Covenant of Mayors; etc.),[30] hence there is no particular prediction of savings to be achieved by energy management alone. The "other" chapter as a whole is expected to achieve energy savings equal to 5.44 PJ.[31]

Funding opportunities of energy efficiency projects in the Czech Republic

EU funding

The largest part of the funding of energy efficiency (EE) projects comes from European funds – the Cohesion Fund (CF) and the European Regional Development Fund (ERDF). The intention to spend European money on EE projects is evident from the increase in the allocation of resources on efficiency-related activities. European resources are distributed under operational programs defined by individual countries – each country allocates finances according to its own priorities. Three Czech operational programs contain efficiency-related schemes. Each program is managed by a different ministry. The following table clearly summarizes the main sources of European financing.

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26 See "Národní akční plán energetické účinnosti ČR 2016," op. cit., p. 24.

27 "EFEKT 2016: E.1 Zavádění systému managementu hospodaření s energií podle ČSN EN ISO 50001," Ministry of Industry and Trade of the Czech Republic. Available online: http://www.mpo-efekt.cz/cz/programy-podpory/64506/54079 (accessed on September 27, 2016).

28 T. Chudoba, A. Chalupová, P. Zeman, *Implementace normy ISO 50001 ve veřejné sféře*, 2013.

29 "Národní akční plán energetické účinnosti ČR 2016," op. cit., p. 44.

30 Ibid, pp. 96–8.

31 Ibid, pp. 43–4.

Table 1. Sources of European financing

Ministry	Operational Program	EE Allocation (CZK)	EU Fund*	Type of support**	Expected savings by 2020 (PJ)[32]
Ministry of Industry and Trade	Enterprises and Innovations OP	32,862,500,766	ERDF	IS, NIS, FI, EPC	20
Ministry of Environment	OP Environment	26,553,042,459	ERDF, CF	IS, NIS, FI	4.98
Ministry of Regional Development	Integrated Regional OP	2,550,000,000	ERDF	IS	3.57

* ERDF – European Regional Development Fund; CF – Cohesion Fund
** IS – investment subsidies; NIS – non-investment subsidies; FI – financial instruments; EPC – energy performance contracting

The Enterprises and Innovations Operational Program is focused on the industry and business environment. Efficiency is the second highest priority, consuming 28 per cent of the overall program allocation. Out of the total 33 billion CZK, 20 billion will be used directly to finance energy efficiency investments, with the rest being used for other related measures.[33]

The Operational Program Environment has two separate chapters on energy savings. The first provides financing for the reconstruction and refit of public buildings – 96 per cent of the chapter is dedicated to this goal.[34] The second offers subsidies for the replacement of inefficient fossil fuel burning heating sources, subsumed under a program for the improvement of air quality. The overall allocation of the savings-related sub-schemes constitutes 33 per cent of the overall program allocation.[35] Subsidies for heating source replacements are redistributed to regions that apply for projects and further administer individual applications. This approach is different from that of other schemes or chapters, where projects are evaluated and resources redistributed at the national level.[36]

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32 Ibid

33 "33 mld. půjde na energetické projekty," Operační program Podnikání a inovace pro konkurenceschopnost, 2014. Available online: http://www.oppik.cz/aktuality/33-mld-pujde-na-energeticke-projekty (accessed on September 14, 2016).

34 See "Operační program Životní prostředí 2014-2020: 9. verze," Ministry of Environment of the Czech Republic, 2015, p. 124. Available online: http://www.opzp.cz/dokumenty/download/34-1-9_verze OPZP_ 2014_2020.pdf (accessed on September 27, 2016).

35 "O programu," Ministry of Environment of the Czech Republic. Available online: http://www.opzp.cz/o-programu/ (accessed on September 14, 2016).

36 "MŽP zveřejnilo základní podmínky pro nové 'kotlíkové dotace' a vyhlásilo výzvy pro kraje. Na výměnu starých kotlů je 9 miliard.," State Environmental Fund, 2015. Available online: http://www.opzp.cz/o-programu/aktuality-a-tiskove-zpravy/mzp-zverejnilo-zakladni-podminky-pro-nove-kotlikove-dotace-a-vyhlasilo-vyzvy-pro-kraje-na-vymenu-starych-kotlu-je-9-miliard (accessed on September 27, 2016).

The Integrated Regional Operational Programme is primarily for financing regional development. It contains one chapter related to energy savings, targeting money to the reconstruction and refit of condominium houses (insulation and/or replacement of heating source).[37]

Other operational programs, such as Operational Program Prague–Pole of Growth, cover some efficiency measures, but the chapters in these schemes are very small compared to the three mentioned above, and their effect is negligible.

Non-EU funding

Despite the heavy reliance on European sources of financing until 2020, there are also other means of financing available, albeit on a significantly smaller scale. In addition, these programs are predominantly organized at the national level, mainly at centralized government institutions. If funding is available at the regional level, it is usually part of a wider national scheme administered at the sub-national level.

The first type of non-EU financing comes from the sale of unused emission allowances. The Czech Republic has not been using all the emission allowances it was assigned under the Kyoto protocol, and thus has been able to amass financial resources by trading them. These resources are primarily acquired by the State Environmental Fund, which redistributes them and finances the refit of houses with modern technologies through a scheme called Green Savings, discussed in the next section.

The second type of financing has been available as low-interest loans financed from the state budget, to date used predominantly to finance refits of condominium houses.

Apart from these special forms of financing, the state has its own domestically financed national energy savings program titled EFEKT. This program has been running since the late 1990s, with finances coming directly from the state budget. The program is run by the Industry and Trade Ministry and is currently used to supplement the European financing. Details of the scheme will be discussed in the next section.

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[37] "Integrated Regional Operational Program For Period 2014–2020," Ministry of Regional Development of the Czech Republic, 2015, pp. 96–9. Available online: http://www.strukturalni-fondy.cz/getmedia/a1500e9a-34af-4a8e-b6cb-8e0b119f26d4/Programming-document-of-IROP.pdf?ext=.pdf (accessed on September 27, 2016).

Table 2. National sources of financing

Ministry	Program	EE Allocation (CZK)	Type of support*	Expected savings by 2020 (PJ)[38]
Ministry of Industry and Trade	National energy savings program EFEKT	80,000,000 (2016)	IS, NIS, FI, EPC	0.14
Ministry of Environment	Green Savings	2,850,000,000 (2016) 27,000,000,000 (2014-2020)	IS, NIS, FI	14.42
Ministry of Regional Development	PANEL 2013+	600,000,000 (2016) 4,500,000,000 (2014-2020)	FI	0.18

* IS – investment subsidies; NIS – non-investment subsidies; FI – financial instruments; EPC – energy performance contracting

Best practices – case studies

Green Savings

Program Green Savings is a subsidy scheme, which was introduced in 2009 in reaction to the fulfillment of Kyoto protocol requirements and in line with the requirements of European Directive 2006/32/EC. The logic of the scheme is based on the utilization of financial resources acquired through trade of unused AAU emission allowances to refit the aging housing stock. Essentially, the scheme provides partial subsidies, decreasing the price and thus increasing the availability of new technologies. Incentives have been provided to obtain insulation for the outer shell of a building (outer walls, roofs, replacement of windows), and/or replacement of an old inefficient heating source.

The first iteration of the program was designed to be in operation from 2009 to 2012. In 2013, a one-year-long small follow-up scheme with a single call for applications was introduced. In 2014, a longer lasting continuous scheme was opened, designed to continue until 2021.

In terms of achieving energy savings, the Green Savings program has proven to be relatively efficient. A projection of savings was included in the 2011 NAPEE, with an expected savings of 8.7 PJ (2419 GWh) by 2016.[39] The subsequent 2014 action plan claimed that a savings of 8.9 PJ (approx. 2472 GWh) was achieved[40] – although there is some inconsistency in the

[38] "Národní akční plán energetické účinnosti ČR 2016," op.cit., pp. 43–4.

[39] Compare with "2. Národní akční plán energetické účinnosti České republiky," Ministry of Industry and Trade of the Czech Republic, 2011, p. 45. Available online: http://download.mpo.cz/get/50711/63238/651840/priloha002.pdf (accessed on September 10, 2016).

[40] "Národní akční plán energetické účinnosti ČR: dle čl. 24 odst. 2 směrnice Evropského parlamentu a Rady 2012/27/EU ze dne 25. října 2012 o energetické účinnosti," op. cit., p. 49.

estimate, as only 5.9 PJ (1639 GWh) of those savings are included in the projection of the overall outcome in 2020.[41]

The Green Savings schemes (previous and current) may also be used to finance renewable sources of energy, predominantly photovoltaic installations for individual heating and electricity production. This is covered under Chapter C on the efficient utilization of energy, along with the replacement of heating sources in houses and other comparable measures.[42]

From the administrative point of view, however, the program has suffered from serious mismanagement, which will be discussed below.

PANEL – loan schemes

There are approximately 200,000 concrete slab-block condominium houses across the Czech Republic – a legacy of the former regime's housing policy. These blocks of flats contain roughly 1.2 million flats – 30 per cent of all dwellings.[43] Almost all of these blocks were built before 1989, and thus are at least 25 years old.

Questions over the fate of these buildings became prominent soon after the fall of communism in 1989, as the buildings belonged to public bodies and some of them even then were already obsolete. This led, among other policies, to the creation of the PANEL program, aimed at the refurbishment of these panel-built condominium houses. The scheme wasn't introduced as an energy-efficiency measure – it is rather a general scheme for reconstruction and refit.

The logic of PANEL is to incentivize condominium owners by providing them with low-interest loans. The program's mechanism is thus only to provide cheap loans with state guarantees.[44] Originally, only projects directed at concrete slab-block condominium houses were eligible. Since

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41 This is both true for EENAP of 2014 – see "Národní akční plán energetické účinnosti ČR: dle čl. 24 odst. 2 směrnice Evropského parlamentu a Rady 2012/27/EU ze dne 25. října 2012 o energetické účinnosti," op. cit., p. 41, as well as the EENAP of 2016, see "Národní akční plán energetické účinnosti ČR 2016," op. cit., p. 19.

42 "Oblasti podpory," Nová Zelená úsporám. Available online: http://www.novazelenausporam.cz/zadatele-o-dotaci/rodinne-domy/3-vyzva-rodinne-domy/oblasti-podpory-3-vyzva/ (accessed on September 30, 2016).

43 See for example M. Zámečník, J. Hlaváč, "Důvody pro zateplování domů: desetitisíce pracovních míst v Česku," Prague, Brno, 2010, p. 11. Available online: https://cz.boell.org/sites/default/files/downloads/zateplovani_zamecnik_studie.pdf (accessed on September 27, 2016).

44 See for example "Výroční zpráva Státního fondu rozvoje bydlení za rok 2003," State Housing Development Fund, 2004, pp. 10–1. Available online: http://www.sfrb.cz/fileadmin/sfrb/docs/vyrocnizpravy/VyrocniZpravaSFRB2003.pdf (accessed on September 27, 2016).

2009, projects aimed at any condominium houses are eligible for this type of support.[45]

By 2012, the program was subsidizing the interest payments for regular commercial loans acquired by house owners. This meant that applicants were first supposed to acquire a commercial loan, and subsequently to receive a subsidy for the interest of the loan from Czech-Moravian Guarantee and Development Bank (CMGDB). Since 2012, the program has been modified, the scheme's low-interest loans now being provided directly by CMGDB, streamlining the whole process.[46]

It is worth mentioning that the scheme is relatively small as compared with Green Savings, which also target condominium houses, providing further subsidies on insulation and heat source replacement in condominium housing. The PANEL program, however, provides an alternative financing scheme, not focused on subsidies.

EFEKT – National program on energy savings

As mentioned earlier, this program is financed from resources of the national government, which allocates the finances to various priority areas. The program has been operational since the 1990s. The scheme is updated on an annual basis, thus allowing for potentially needed adjustments according to the political priorities set forth by the Industry and Trade Ministry.[47] It must be pointed out that the program has always been a small one. In 2016, the whole scheme is only expected to redistribute roughly 80 million CZK (slightly below 3 million euros).[48] According to the EENAP, the program should result in 0.14 PJ of total energy savings for the years 2014–2020.[49]

The scheme finances both direct investment in efficiency measures, and non-investment projects. The investment-oriented portion of the 2016

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45 "Vláda posílila program Nový panel o miliardu korun," *ČTK*, 2011. Available online: http://stavba.tzb-info.cz/panel/107604-vlada-posilila-program-novy-panel-o-miliardu-korun (accessed on September 13, 2016).

46 See "Účetní závěrka a výroční zpráva o činnosti Státního fondu rozvoje bydlení za rok 2013," State Housing Development Fund, 2014, p. 46. Available online: http://www.sfrb.cz/fileadmin/sfrb/docs/vyrocnizpravy/Vyrocni_zprava_za_rok_2013.pdf (accessed on September 27, 2016).

47 For example, in 2011, the ministry was keen on supporting some forms of energy production from renewable sources (small hydro power), while since 2012 this is no longer supported. Similarly, investment support was offered for projects utilizing waste heat until 2013, but not since 2014.

48 "MPO Efekt: Informační portál Ministerstva průmyslu a obchodu o podpoře energetických úspor a využití obnovitelných zdrojů energie," Ministry of Industry and Trade of the Czech Republic, 2016. Available online: http://www.mpo-efekt.cz/cz/programy-podpory/64506 (accessed on September 14, 2016).

49 See "Národní akční plán energetické účinnosti ČR 2016," op. cit., pp. 43–4.

program provides resources for the reconstruction of public lighting and the replacement of old heating sources in public buildings. It is, however, worth taking a moment to focus on those chapters that provide non-investment aid.

First, the program finances energy efficiency consultancy services for the general public, which are provided by commercial companies offering such services. Their experts are outsourced by the state and paid from the national budget. There are approximately 30 such companies located throughout the country, constituting an accessible network of advisors.[50] Secondly, the scheme provides financing for various sorts of studies and project documentation related to the application of energy saving measures. For example, feasibility studies of EPC solutions may be financed under this chapter. This is especially useful for semi-budgetary organizations, such as schools or hospitals. In addition, implementation of ISO 50001 energy management systems in cities with a population over 20,000 may also be covered.[51] This chapter has been gradually established over time.

It is interesting to note that the scheme's financial allocation has been substantially increased in 2016, after years of downscaling. Between 2010 and 2015, the allocation was oscillating around 30 million CZK (around 1.1 million euros), down from 60–80 million CZK in previous years. Only in 2016 was the program's allocation increased again to level maintained before 2010.

Analysis of the main problems and ways to overcome them

Overreliance on EU funding and the late opening of EU-funded schemes

As European funds are the main driver of the implementation of Directive 2012/27/EU, it is of crucial importance to distribute the finances from these schemes in line with EED requirements. Unfortunately, Czech schemes have been lagging behind the original schedule by a huge margin. Any operational program needs to be negotiated and approved by the European Commission before it may be opened. Both the Enterprises and Innovations Operational Program, and the Operational Program Environment, were among the last

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50 "PROGRAM EFEKT 2016: Státní program na podporu úspor energie a využití obnovitelných a druhotných zdrojů energie pro rok 2016," Ministry of Industry and Trade of the Czech Republic, 2015, pp. 11–2. Available online: http://mpo-efekt.cz/upload/62d0d69c2bcb052223969e1a31d35403/program_efekt_2016_plny_text.docx (accessed on September 14, 2016).

51 "PROGRAM EFEKT 2016: Státní program na podporu úspor energie a využití obnovitelných a druhotných zdrojů energie pro rok 2016," op. cit., pp. 13–4.

of the approved Czech programs, getting the green light from Brussels only at the beginning of 2015.[52]

In addition to this, individual project calls were lagging even more – the first call for projects in the Enterprises and Innovations operational program was opened in November 2015, resulting in the first savings only in 2016. This means there were no savings from these operational programs, not only in 2014 but also in 2015. This fact is explicitly referred to in the 2016 National Action Plan update, which mentions the hardships encountered in opening the programs. The first implementation phase was hence prolonged by one year (as mentioned above).[53] As the overall target of the savings is cumulative,[54] the delays in 2014 and 2015, and the late opening of the schemes, will likely impact the overall achievement of savings unless there are additional measures taken by the government.[55] This might in turn prompt changes in the operational programs toward shorter calls for proposals, aimed at supporting less complicated measures, in order to be able to spend the allocated resources. Such "crisis management" measures occurred within several Czech operational programs in the previous budgetary period (2007–2013).

It must be said that this quick spending of allocated resources towards the end of the 2007–2013 programs was not connected to energy savings – the resources allocated for efficiency were in fact fully spent. Alternatively, there may be other measures introduced to offset the deficit of savings in implementation. There was already a hint of this possibility present in the 2014 EENAP, which considered the option of implementing the Energy Efficiency Obligatory Scheme, if alternative measures were to prove insufficient.[56] This option was dropped in the 2016 update.[57]

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52 See "OPPIK má od Evropské komise zelenou," Operační program Podnikání a inovace pro konkurenceschopnost, 2015. Available online: http://www.oppik.cz/aktuality/oppik-ma-od-evropske-komise-zelenou (accessed on September 15, 2016).

53 See "Národní akční plán energetické účinnosti ČR 2016," op. cit., p. 21.

54 This means the amount of savings for each year is included in the calculation for later years as well. If 6.9 PJ was thought to be saved in 2014, as envisaged in the 2014 EENAP, this means that the same 6.9 PJ is included in the total of each subsequent year. The overall achievement adds up accumulatively. Thus the savings shown for each year is in fact the total savings *as of* that year.

55 V. Sochor, "Strategie ČR v plnění národních cílů Směrnice o energetické účinnosti – stávající a budoucí nástroje podpory," Prague, 2015. Available online: http://www.svn.cz/assets/files/seminare_a_konference/2015/listopad-2015/2_VSochor.pdf (accessed on September 27, 2016).

56 "Národní akční plán energetické účinnosti ČR: dle čl. 24 odst. 2 směrnice Evropského parlamentu a Rady 2012/27/EU ze dne 25. října 2012 o energetické účinnosti," op. cit., p. 16.

57 Compare "Národní akční plán energetické účinnosti ČR 2016," op. cit., pp. 20–2.

Challenging the setup and improper management of schemes

State-managed programs that redistribute financial resources could turn out to be a large burden from the administrative perspective. This proved to be a significant problem when opening the first Green Savings scheme in 2009. The program – as mentioned – was intended to last from 2009 to 2012. Initially, interest in the call for house insulation seemed to fall short of expectations, hence new calls for refit projects for condominium houses and public buildings were opened. Interest, however, increased significantly in 2010. Due to mismanagement and design flaws, there was a large number of applications pouring in even as it became apparent that the program's financial resources would be insufficient to cover all projects. The accepting of applications for condominium house projects was thus stopped in August, and of all applications in October 2010.[58] Both stops were abrupt, announced only a few days beforehand. At the time, the program was expected to reopen at the beginning 2011.[59]

An overview of received applications as of April 2011 showed a program shortfall of 8 billion CZK. The Environment Ministry – the body responsible for the program – faced a dilemma: it needed to either find the necessary resources or disadvantage some or all of the projects, either by lowering support or discarding some projects entirely. Discarding projects would be very problematic, as the application process stipulated that an application whose project documentation was complete would be accepted. Hence any project discarded due to the unavailability of resources would in effect mean writing off the cost to house owners of project preparation. The ministry chose to discard all applications received for the refit of public buildings in order to satisfy the owners of private and condominium houses instead.[60]

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58 "Panelové domy v programu Zelená úsporám skončily, alespoň prozatím," *TZB Info*, 2010. Available online: http://www.tzb-info.cz/106546-ministerstvo-zivotniho-prostredi-rozhodlo-ze-dnes-od-15-00-hodin-docasne (accessed on September 15, 2016); P. Bohuslávek, "Příjem žádostí Zelená úsporám končí," *TZB Info*, 2010. Available online: http://stavba.tzb-info.cz/zelena-usporam-na-tzb-info/6881-prijem-zadosti-zelena-usporam-skoncil (accessed on September 15, 2016).

59 L. Machálek, "Přijímání žádostí o dotace z programu Zelená úsporám pro rok 2010 bude od konce října přerušeno," 2010. Available online: http://www.zelenausporam.cz/clanek/193/1159/prijimani-zadosti-o-dotace-z-programu-zelena-usporam-pro-rok-2010-bude-od-konce-rijna-preruseno/ (accessed on September 15, 2016).

60 See for example "Ministr představil další postup v programu Zelená úsporám. Peníze jsou na všechny řádné žádosti. Žadatelé s chybami budou vyzváni k opravě a postupně vypláceni.," Ministry of Environment of the Czech Republic, 2011. Available online: http://www.zelenausporam.cz/clanek/193/1178/ministr-predstavil-dalsi-postup-v-programu-zelena-usporam-penize-jsou-na-vsechny-radne-zadosti-zadatele-s-chybami-budou-vyzvani-k-oprave-a-postupne-vyplaceni/ (accessed on September 15, 2016).

The original program was not reopened, and it took all of 2011 and 2012 to administer the received applications.[61]

The main conclusion drawn from all this is that the scheme was not prepared thoroughly. There was mismanagement in controlling the number of received applications throughout the lifetime of the program. Thus, from the perspective of the State Environmental Fund, at no point was it clear whether or not the received applications had already reached the level of the program's allocation. Hence the mechanism for closing the process of collecting applications could not be triggered at the appropriate time, ending in an abrupt termination of the project call.

The Environment Ministry reviewed the scheme and adjustments were made in order to prevent such mismanagement from happening again. Currently, the New Green Savings scheme – its current successor – is said to be running smoothly.

A similar issue appeared in the efforts to support renewable sources of energy, particularly photovoltaic installations (PV). One introduced scheme allowed the owners of installations to choose either a fixed feed-in tariff, or a feed-in premium to be paid on top of the market price of electricity (green bonus). In addition, renewable sources were given priority access to the grid.[62] This generous support scheme made PV lucrative, with a fairly short return on investment. This led to a massive increase in the installed PV capacity. According to the Supreme audit office, the PV capacity increased 23-fold between 2009 and 2012.[63] Several structural factors allowed such a boom to happen. The lack of data on a number of installations under construction prevented any flexible response from the state authorities. A legal cap on the maximal yearly decrease in feed-in tariff value of 5 per cent,[64] and a revaluation of Czech currency against the Euro, kept the tariff prices unreasonably favorable for PV (higher than in Germany at the time, for example). All this

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61 See "Výroční zpráva programu Zelená úsporám za rok 2012," State Environmental Fund, Praha, 2013, pp. 21–2. Available online: http://www.zelenausporam.cz/souborke-stazeni/17/5112-vz_zu_2012_cz.pdf (accessed on September 27, 2016).

62 For more details see T. Vlček, F. Černoch, *The Energy Sector and Energy Policy of the Czech Republic*. Brno: Masaryk University Press: 2013; L. Dusonchet, E. Telaretti, "Economic analysis of different supporting policies for the production of electrical energy by solar photovoltaics in eastern European Union countries," *Energy Policy* Vol. 38, No. 8, 2010, pp. 4011–20.

63 "Podpora zelené energie vyjde Českou republiku na bilion korun, dvě třetiny této částky odčerpají provozovatelé fotovoltaických elektráren," Supreme Audit Office, 2015. Available online: http://www.nku.cz/cz/media/podpora-zelene-energie-vyjde-ceskou-republiku-na-bilion-korun--dve-tretiny-teto-castky-odcerpaji-provozovatele-fotovoltaickych-elektraren-id7419/ (accessed on September 30, 2016).

64 It was announced the cap would be scrapped in 2009, but in fact it was not until 2011 – thus maintaining the overly generous PV support.

was true at the very moment when it became clear that the support was too generous.[65]

The so called "solar boom" resulted in issues with the managing and balancing of the electric grid, which was not prepared for such a shift in electricity production sources. Since then, support for large PV projects has been halted and the activation of various additional financial devices prompted, such as the above mentioned "solar levy,"[66] in order to manage state expenditure on already existing PV projects.

Administrative strain over implementation

Many of the difficulties in shaping the policy related to energy savings stem from the relatively low administrative priority given to the issue. The question of energy savings became more prominent only after it became apparent that the Czech Republic needed to implement Directive 2012/27/EU. There is no official account of the development of the internal structure of the Industry and Trade Ministry (the main coordinating body), yet from an examination of its organizational structures it's apparent that the individual department dealing with energy savings was created only in June 2015.[67] By then, energy savings was part of the agenda of the Department of Electric Energy under the ministry's energy division.

In addition, when preparing the main policies for the period of 2014–2020, there was no proper cross-coordination between bodies implementing energy efficiency measures. Historically, different programs have been under the auspices of different implementing bodies – primarily the Industry and Trade, Environment, and Regional Development ministries – but also dependent on the Finance Ministry, various regional administrations, the administration of the capital, Prague, and others. An informal coordinating body was established only in 2015, providing a platform for connecting the various stakeholders. All this happened only after the European programs were already approved.

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65 B. Bechník, "Byly výkupní ceny elektřiny z fotovoltaiky stanoveny přiměřeně?," *TZB Info*, 2013. Available online: http://oze.tzb-info.cz/fotovoltaika/9698-byly-vykupni-ceny-elektriny-z-fotovoltaiky-stanoveny-primerene (accessed on September 30, 2016).

66 See for example P. Doucha, "Solární daň pokračuje," *Frank Bold Advokáti*, 2013. Available online: http://www.fbadvokati.cz/novinky/energetika/solarni-dan-pokracuje (accessed on September 30, 2016).

67 Compare "Ministerstvo průmyslu a obchodu: Stav k 1. 6. 2015," Ministry of Industry and Trade of the Czech Republic, 2015. Available online: http://download.mpo.cz/get/52966/60337/633316/priloha001.pdf (accessed on September 16, 2016); and "Ministerstvo průmyslu a obchodu: Aktuální stav k 29. 6. 2015," Ministry of Industry and Trade of the Czech Republic, 2015. Available online: http://download.mpo.cz/get/53102/60552/634449/priloha001.pdf (accessed on September 16, 2016).

Hence also from this perspective the implementation of savings measures is constrained. Such development suggests, moreover, that there is a less than optimal consistency and continuity to be found in the implementation itself.

Additional resources

Ministry of Industry and Trade: http://www.mpo.cz/default_en.html

Ministry of Environment: http://mzp.cz/en

Ministry of Regional Development: http://www.mmr.cz/en/Homepage

Overview of EU structural funds: http://www.strukturalni-fondy.cz/en/Fondy-EU/2014-2020

Enterprise and Innovations Operational Program: http://www.oppik.cz/en

Operational Program Environment: http://www.opzp.cz/about/

State Environmental Fund: http://en.sfzp.cz/sekce/585/sef/

State Housing Development Fund (Czech only): http://www.sfrb.cz/

New Green Savings: http://www.novazelenausporam.cz/en/

EFEKT program (Czech only): http://www.mpo-efekt.cz/

PANEL 2013+ (Czech only): http://www.sfrb.cz/programy/uvery-na-opravy-a-modernizace-domu/

State Energy Inspection (Czech only): http://www.cr-sei.cz/

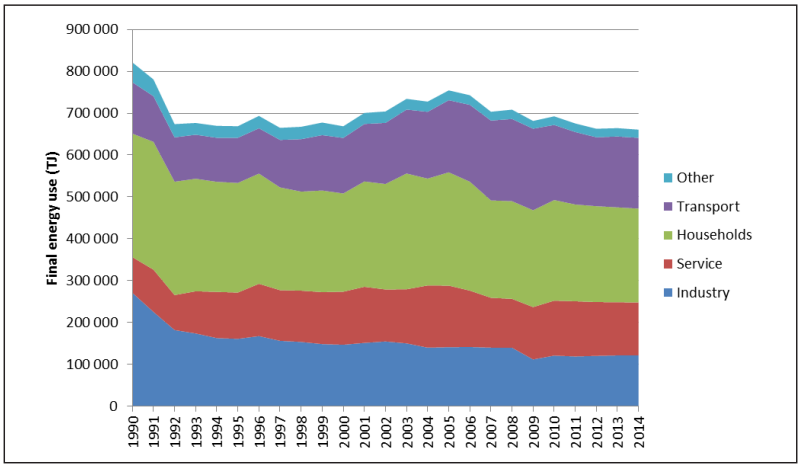
Energy Regulatory Office: http://www.eru.cz/en/

Hungary

Energy use trend and targets and the underlying energy statistics

Final energy use in Hungary has experienced several major reductions: first in the early 1990s, due to the restructuring of the economy; then households energy use was reduced significantly in 2005–2007, as a consumer response to the increase of end use gas prices; and finally again in 2008–2009 as a consequence of the economic recession.

Figure 1. Final energy use in Hungary

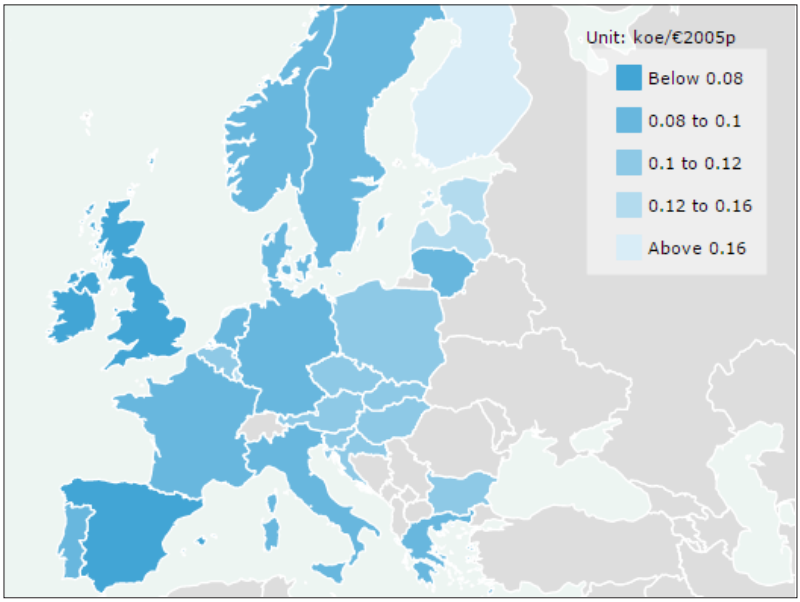


Source: Eurostat

As shown in the following map, Hungary's performance in terms of energy intensity is similar to that of other V4 countries, and lags behind most of Western Europe.

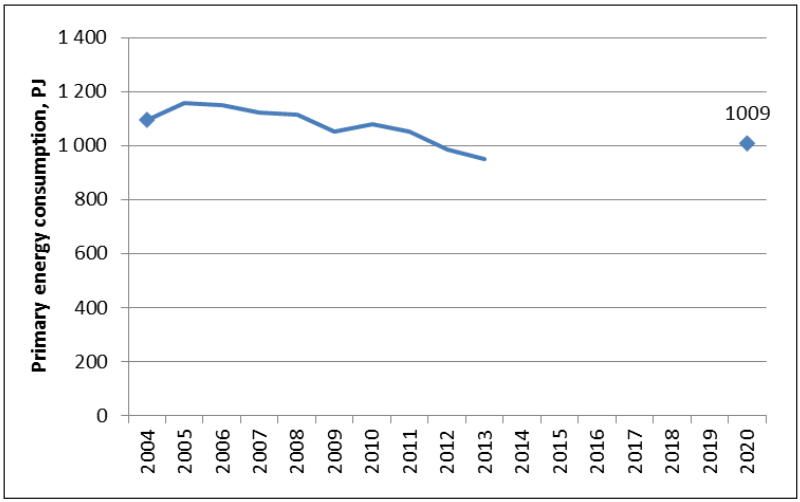
In 2015, the Hungarian government set an indicative target for primary energy use – down to 1009 PJ by 2020 – which is to be achieved via the implementation of various energy efficiency policies (Policy scenario). Projected energy use in 2020 under the business-as-usual (BAU) scenario is 1101 PJ. It is worth noting that the estimate prepared in 2010 (based on 2008 data) for the Energy Strategy of Hungary – and submitted to the European Commission under EED Art 3 – for primary energy use in 2020, was 1113 PJ. Even after the upgrade of this energy use trajectory in the more recent estimate, as the following figure shows, the energy use target is still rather modest.

Figure 2. Final energy intensity in Europe (at PPP), 2014



Source: "Final energy intensity in Europe (at purchasing power parities)," *Odyssee-Mure.* Available online: http://www.indicators.odyssee-mure.eu/online-indicators.html (accessed on October 15, 2016).

Figure 3. Primary energy consumption through 2013 and the 2020 target, PJ



The primary savings gained by the Policy scenario over the BAU scenario translates into a savings of 73 PJ in final energy use. The following table shows the estimates of the Hungarian government by sector in achieving this savings target. The residential sector – i.e. predominantly the heat consumption of residential buildings – is expected to constitute the majority of savings.

Table 1. Final energy savings target per sector, 2020

Sector	Saving target (final energy use in PJ, 2020)
Industry	10
Transport	14
Residential	40
Service, agriculture and public buildings	3
Total	**73**

Source: Government Resolution No. 1160/2015 of 20 March2015 on updating the energy consumption forecasts of the National Energy Strategy

Energy data collection

The annual energy balance tabulates the energy supply and primary energy use according to energy carrier. Final energy use is divided into 13 industrial sectors, six transport sectors and four other sectors (households, agriculture, services/public and other), including both energy and non-energy use. Energy balance statistics are not based on a separate data collection but compiled on the basis of energy supply and energy use statistics. The data pertaining to production, import, export, stocks and primary energy use are gathered from annual and monthly energy supply statistics, while final energy use in the energy balance is derived from annual energy use statistics. The energy balance statistics are in line with Eurostat/IEA energy product categories, and with the Statistical Classification of Economic Activities in the European Community (NACE REV.2). The energy supply and use data are collected within the framework of the National Statistical Data Collection Program (OSAP).[1]

[1] The legal basis for energy statistics are the actual OSAP (National Statistical Data Collection Program) government decrees: Law on electricity (2007/LXXXVI), Law on gas supply (2008/XL), Law on district heating (2005/XVIII), 1099/2008/EC On energy statistics, and Directive 2012/27/EU on energy efficiency.

Overview of EE strategic documents in Hungary

Energy efficiency policies in Hungary are predominantly driven by European Union legislation, most notably Directive 2012/27/EU (EED).[2] The Law on energy efficiency (57/2015) is the main legislative document transposing the EED that provides the framework for implementation, together with the 3rd NEEAP (National Energy Efficiency Action Plan)[3], both adopted in 2015. The Law lists the implementing legislation that is further required, and the responsible public institutions for various tasks. The energy regulator (HEPURA) is responsible for the collection and aggregation of energy savings data. The EED is a complex Directive, affecting many individual policy fields. The most important topics with regard to implementation in Hungary are:

- Achievement of a certain amount of final energy savings between 2014 and 2020 by means of *energy efficiency obligations schemes* or other targeted policy measures (alternative measures): member states should introduce either obligations schemes, or alternative measures that achieve the same level of savings (annual new energy savings equaling 1.5 per cent of a baseline defined as the 2010–2012 average of final energy use – energy used by transport and energy produced for the country's own use can be deducted from the total final energy use figure). The Law clearly states that Hungary does not intend to introduce an energy efficiency obligation scheme to meet its savings target under Art 7 of the EED, and will make full use of the flexibilities provided (deduction of transport energy use from the baseline and full use of flexibilities translating into a maximum 25 per cent reduction of the energy savings target). Hungary will rely exclusively on 19 alternative policy measures that will deliver the required savings by 2020.

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2 "Directive 2012/27/EU of the European Parliament and of the Council of 25 October 2012 on energy efficiency, amending Directives 2009/125/EC and 2010/30/EU and repealing Directives 2004/8/EC and 2006/32/EC Text with EEA relevance," Official Journal of the European Union, L 315/1, 2012.

3 "Magyarország Nemzeti Energiahatékonysági Cselekvési Terve 2020-ig. Az Európai Parlament és Tanács 2012/27/EU irányelve az energiahatékonyságról (EED) 24. cikk (2) bekezdésében előírt beszámolási kötelezettség," August 2015. Available online: http://www.kormany.hu/download/1/25/80000/IIINemzeti%20Energiahat%C3%A9konys%C3%A1gi%20Cselekv%C3%A9si%20Terv_HU.PDF (accessed on October 2, 2016).

	Alternative policy measure	Savings in PJ (2014-2020)
1	Green economy financial scheme	9.5
2	EE Operational programs	39.9
3	KEHOP – awareness raising	3.5
4	Non-EE Operational programs	9.7
5	Financial support for new buildings	0.2
6	EE in buildings of law enforcement organizations	0.1
7	Swiss–Hungarian Cooperation Program	0.1
8	EEA and Norway Grants	0.0
9	EE in public institutions	0.1
10	Regulation for new buildings	0.1
11	Modern cities program	2.0
12	EE in central government buildings	1.1
13	Energy use planning in public buildings	0.0
14	Mandatory employment of energy managers at large enterprises	15.0
15	Building EE program	3.3
16	EE in transport	30.7
17	EE from real estate funds	3.9
18	Company tax concession for EE investments	20.4
19	National Energy Manager Network	14.8
	TOTAL	**154.4**

The majority of these measures are related to construction (especially of public buildings) but some measures are planned for transport as well. The dominant form of support is financial incentive (refundable and non-refundable). The collection of achieved savings data is the task of the energy regulator.

- *Energy audits*: the EED obliges large enterprises to carry out an energy audit at least once every four years (the first was to be executed by December 5, 2015). Hungary has only 865 (less than 2,000 even when partner and connected enterprises are counted) large companies (defined as more than 250 employees and a 50 million euro turnover). SMEs are the dominant company form in Hungary (690,000 companies), but currently no targeted support is included in the Operational Programs (with EU funds) for their energy audits.
- The EN 16001 Certification was transposed to the Hungarian standard as the MSZ EN 16001:2009 (in 2009). Since then, this standard has been replaced by the MSZ EN ISO 50001 (in 2012, based on the ISO 50001). The application of this standard – apart from being a useful

tool for voluntary energy management improvement efforts within companies – provides an exemption for large companies in Hungary that have to carry out an energy audit every 4 years under the EED. The companies that have acquired the EN 16001 in the past can – with limited effort – obtain the EN ISO 50001. The auditor market is well developed; the registry of the energy office currently includes 67 companies and 119 individual auditors. The Registry of auditors is maintained by the energy office (HEPURA); the requirements for getting a license include engineering education and practice, and the successfully passing of an exam at an authorized professional organization. Detailed reporting requirements are defined.[4] The renovation of 3 per cent of buildings (based on floor area) owned and occupied by the central government is a requirement stated in Art 5 of the EED. The Directive prescribes the cost-optimal level for the upgrade of these buildings (set by each member state under the Energy Performance of Buildings Directive),[5] but Hungary targets the Nearly Zero Energy Building (NZEB) level (which also requires the installation of renewable technologies providing at least 25 per cent of total energy use), with EU funding providing a nearly 100 per cent support intensity. The scheme covers 66 buildings altogether (many of them monuments where only some elements can be renovated).

- The EED requires the efficient provision of heating and cooling, mainly via the use of *cogeneration*. The energy office is mandated to develop the methodology for mandatory cost benefit analyses, whenever existing thermal electricity generation installations, industrial installations or DHC networks (above 20 MWth) are planned or substantially refurbished, with a view to promoting co-generation. It may grant exemption both from the CBA analysis and the compulsory combined heat production (based on a general justification but with mandatory reporting to the European Commission).

Apart from the EE Law and the NEEAP, the third major strategic document is the National Building Energy Use Strategy, prepared in 2015 by the Ministry of National Development and its supporting institution responsible for building related issues (ÉMI). It was adopted in the same year as the aforementioned two, by government resolution 1073/2015. It defines energy

4 "Energetikai audit," *Energiahatékonyság,* December 28, 2015. Available online: http://enhat.mekh.hu/index.php/2015/12/28/energetikai-audit/ (accessed on October 15, 2016).

5 "Directive 2010/31/EU of the European Parliament and of the Council of 19 May 2010 on the energy performance of buildings," *Official Journal of the EU,* L153/13, June 18, 2010. Available online: http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2010:153:0013:0035:en:PDF (accessed on October 15, 2016).

savings targets for public buildings (1.6 PJ), residential buildings (38.4 PJ), and other buildings (9 PJ), for 2020. It calculates energy savings on the basis of a detailed building typology, and sometimes – in cases of differing refurbishment levels – together with cost estimates of the required investments. It includes as well concrete actions for implementation, including the preparation of an action plan, possible financial resources, further required regulations, and awareness-raising measures.

Energy consumer rights' protection

Hungary has no ombudsman for energy. The ombudsman for basic rights is primarily concerned with issues concerning future generations, disadvantaged social groups, children and minorities living in Hungary.

The Hungarian energy regulator carries out the complex task of consumer protection, not only by investigating consumer complaints but also by setting minimum quality requirements for DSOs (distribution system operators) and suppliers, via an incentive scheme including further demands for continuous improvement. The supervision and potential application of sanctions are also performed by the regulator.

Continuity of supply – electricity: minimum quality requirements are defined for three indicators:

- average number of long unplanned interruptions;
- average duration of long unplanned interruptions;
- outage rate.

Non-compliance with a required level involves economic consequences for the company. The initial required levels were determined for 2004–2006 based on actual data provided by the six DSOs for 2002–2004. Companies with a better base performance (2004–2006) are expected to achieve a lower rate of improvement than companies with a weaker initial performance. Thus the performance of the various DSOs is expected to converge over time. If a company fails to meet the required standards, its network charges are automatically reduced by a pre-defined rate.

Continuity of supply – gas: minimum quality requirements are defined for three indicators:

- average duration of interruptions in the gas supply;
- average number of interruptions in the gas supply;
- outage rate.

These requirements are used only for monitoring – non-compliance does not involve any direct consequences.

Commercial quality relates to the quality of services provided for customers, including the timeliness of service and other aspects of transactions and

customer contact. Quality indicators are linked to direct incentives (both electricity and gas):

- response time to customer complaints and enquiries;
- call center's service level (3 indicators);
- number of customer complaints received by the regulator concerning activity of the licensee;
- proportion of consumers with a waiting time of less than 20 minutes at Customer centers.

If the deviation is between 5–10 per cent, then the maximum penalty which may be imposed is 167,000 euros per quality indicator. The amount of the penalty doubles above a 10 per cent deviation. In order to collect information on consumers' expectations, priorities, and satisfaction with the energy supply, the regulator conducts a *Consumers' Satisfaction Survey* on a regular basis.

Smart metering

Hungary is lagging behind in the introduction of smart electricity meters. The Ministry of National Development has submitted a derogation request from the auctioning of EUAs in the power sector based on EU ETS 10c, and has allocated 38 million euros for financing the Smart Meter Pilot Project. The derogation request was approved by the Commission in 2012 and the Hungarian Government established a company (KOM ZRT) to administer the project.[6] The company is owned by the Hungarian system operator, MAVIR. The implementation has been delayed and it was only in 2015 that the goals, expected results, and budget of the Project were defined. Public procurement of the smart meters and the required system level IT started in the last quarter of 2015. In 2016, the company issued calls for applications to be involved in the project to local governments, energy companies, infrastructure owners, EV charging station operators, and owners of distributed renewable generators. The company plans to roll out 20,000 meters, the majority being electricity meters, but with gas and water meters included in the rollout as well.

At the same time, all DSOs have started their smart meter pilots, mainly with the aim of testing alternative technological solutions for data collection and transfer. The results that have been made public show that with the offered time-of-use tariffs (lower in off peak periods and higher in peak periods during the day), the impact on consumer behavior – i.e. energy savings due to real time consumption data, and peak shaving due to ToU tariffs – was negligible.

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[6] More see at official website of the KOM ZRT company: http://www.komzrt.hu/ (accessed on October 16, 2016).

Renewables

Renewable energy policy development in Hungary (as with energy efficiency policy) derives from EU policy making and the subsequent legislation. With accession to EU membership in 2004 Hungary was required to transpose the *aqcuis communautaire*, including the 2001 Renewable Energy Sources Directive, which set the community level renewable electricity target at 21 per cent for the enlarged Union (EU25) by 2010.[7] The Hungarian contribution to this target was 3.6 per cent, which was reached as soon as 2005 with the introduction of biomass co-firing in six large coal fired power plants, due to the feed-in tariff (FIT) and mandatory power purchase introduced in 2003. Essentially the same feed-in tariff system is still in place today, albeit slightly modified in 2008 with the introduction of a scheduling requirement for renewable electricity (RES-E) producers (even though the requirements are preferential for intermittent technologies) coupled a with guarantee of origin (regulated separately since 2013) and the formation of a separate balance group for renewables. EU funds have been available since 2007 for renewable investment support, both for electricity and heat generation capacity development.

The 2009 Renewable Energy Directive set national renewable energy targets and required Member States to report on the general direction of their renewable energy policy in their National Renewable Energy Action Plans (NREAPs).[8] Hungary's NREAP committed to cover 14.65 per cent of its gross energy consumption with energy from renewable sources, higher than the mandatory 13 per cent target set in the Directive. This 14.65 per cent renewable energy target is associated with a 10.9 per cent share of RES-E in electricity consumption.

Hungary has been operating a relatively stable renewable electricity support scheme with modest feed-in tariff levels but with preferential treatment in terms of access to the grid, scheduling rules, and – in the case of small scale units – net metering. The major share of renewable heat production (i.e. firewood burning in individual households) is independent of state intervention

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7 Directive 2001/77/EC of the European Parliament and of the Council of 27 September 2001 on the promotion of electricity produced from renewable energy sources in the internal electricity market," *Official Journal of the EU*, L283, October 27, 2001. Available online: http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex%3A32001L0077 (accessed on October 16, 2016).

8 "Directive 2009/28/EC of the European Parliament and of the Council of 23 April 2009 on the promotion of the use of energy from renewable sources and amending and subsequently repealing Directives 2001/77/EC and 2003/30/EC (Text with EEA relevance)," Official Journal of the EU, L140/16, June 5, 2009. Available online: http://eur-lex.europa.eu/legal-content/en/ALL/?uri=CELEX%3A32009L0028 (accessed on October 16, 2016).

and mainly driven by the relative price of wood to gas. The availability of EU funding, however, has recently given further encouragement to renewable based district heating (mainly biomass and geothermal).

Hungary implements the requirements of the EU State Aid Guidelines of 2014, aimed at the gradual reduction of the support provided to renewable producers in order to ensure a smooth transition to cost efficient energy generation based on market mechanisms.[9] Hungary plans to stop its feed-in tariff scheme and introduce a feed-in premium system with producers selling RES-E on the electricity market. Support allocation will be auction-based.

Hungary has no specific legal act governing the renewable energy supply, the various aspects of renewable energy regulation being contained in a wide array of legislation.

Funding opportunities for EE projects in Hungary

Public financial support for energy efficiency investments comes from EU funds and revenues from greenhouse gas emission quotas created in the framework of the Kyoto Protocol (AAUs) and the EU Emissions Trading Scheme (EUAs).

EU Funding

EU funds are dispersed according to Operation Programs defined jointly by the European Commission and the beneficiary country (in this case Hungary). These funds have been allocated for two funding periods: 2007–2013 and 2013–2020. In the 2007–2013 funding period, the allocation (preparation of calls, evaluation, contracting and monitoring) was administered by a separate public institution (National Development Agency). This dedicated agency has been dismantled, the Operation Programs now being managed by the various ministries according to their portfolio. The common feature of these Operation Programs is that they target legal persons only, such as companies, public organizations, churches, and NGOs. Natural persons, i.e. households, are not supported from these funds. Data regarding applications and support awarded was collected by the National Development Agency in the previous period. The following tables have been prepared based on the database of the Agency.

The average support intensity is rather high, above 60 per cent even for large enterprises. Public organizations have been most successful in the calls (almost 400 projects), with an average 85 per cent support intensity.

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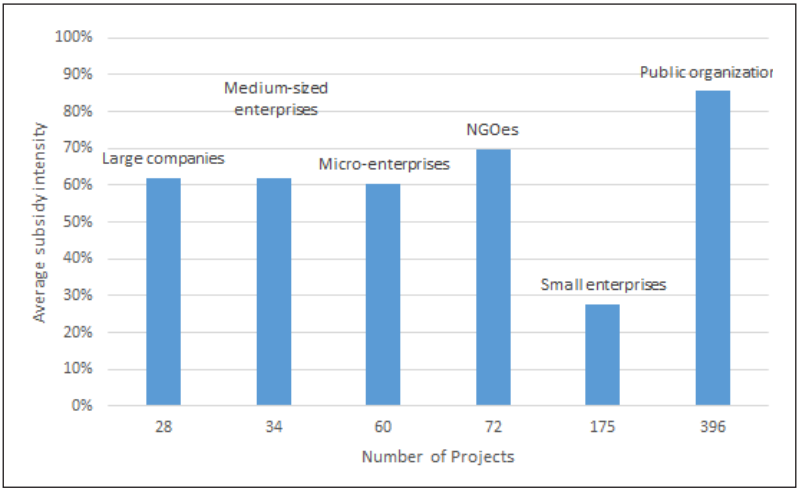
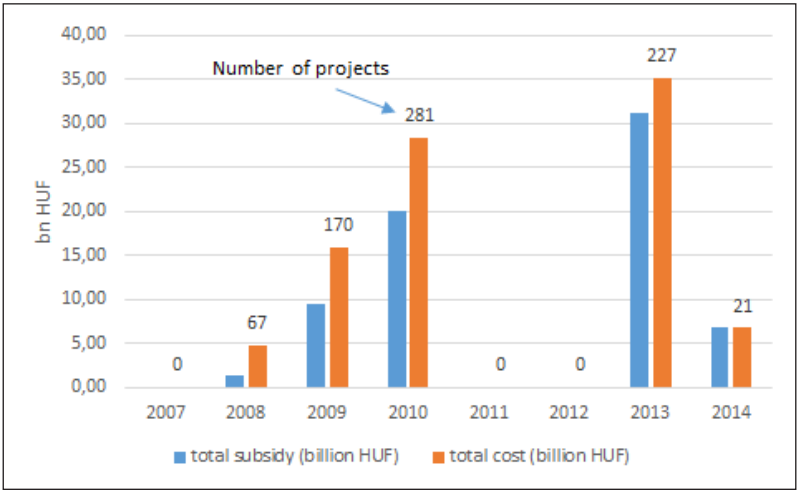
[9] "Commission Staff working document. Executive summary of the impact assessment. Communication from the Commission. Guidelines on State aid for environmental protection and energy 2014–2020," C(2014) 2322/3, April 9, 2014.

Figure 4. Use of EU funds in the 2007–2013 period



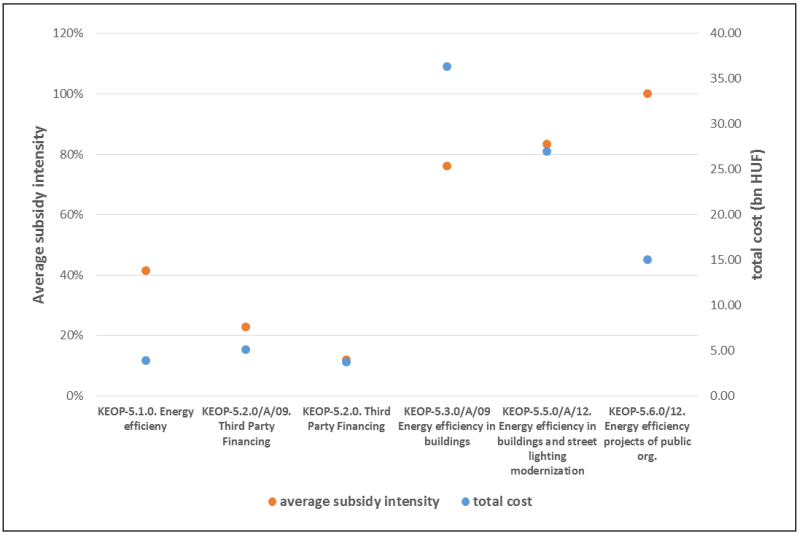
The next figure shows that the allocation of funds within the period has been far from evenly distributed. Just before the closure of the funding period, a large share of resources was awarded rapidly, coupled with an even higher support intensity. Some funds were reallocated across the Operation Programs (e.g. from transport to energy efficiency and renewable energy use), so that they could be spent within the time limit.

Figure 5. Use of EU funds in the 2007–2013 funding period



The following figure shows the average subsidy intensity and total cost of various energy efficiency calls. Public organizations received full support, which is questionable from an efficiency point of view.

Figure 6. Use of EU funds in the 2007–2013 funding period



The Hungarian government plans to provide support for energy efficiency investments (often jointly with renewable energy investment support) under four Operation Programs (OPs) – KEHOP, TOP, VEKOP and GINOP – in the current funding period. These OPs target different groups and activities (see table below).

In 2015, calls totaling 44.9 billion HUF were opened for energy efficiency investment support for public buildings, 10 billion HUF for district heating modernization, 5 billion HUF for renewable based heat production, and 10 billion HUF for renewable based electricity production, all in the framework of KEHOP, the most important OP for energy efficiency investment support.[10]

[10] See the Kéhop Pályázatok: http://www.kehop.hu/palyazatok/ (accessed on October 16, 2016).

Table 2. Planned use of EU funds in the 2013–2020 funding period

	priority	action	target group	Budget (mil. euros)	type
KEHOP	5. EE and RES	5.1. RES-E for grid	companies	78.64	non-ref
		5.2. EE and RES in buildings	public sector, churches, LGs	761.99	non-ref
		5.3. district heating	DH companies (producers and providers)	147.53	non-ref
		5.4. educational campaigns	schools, NGOs, LGs, churches	6.61	non-ref
TOP	3. low carbon development in cities	EE and RES in local governments	LGs	431.21	non-ref
	5. development of county level cities	EE and RES in local governments	large LGs	201.39	non-ref
VEKOP	5. RES and EE	RE and EE for companies	companies in Central Region	37.91	non-ref
		accompanying financial tools	financial institutions	37.91	ref
GINOP	4. energy	RES and EE for companies	SMEs	225.55	non-ref
	8. financial tools	Accompanying financial tools	financial institutions	141.65	ref
		Accompanying financial tools (KEHOP)	financial institutions	425.53	ref
				2,495.92	

Non-EU funding

The second source of funding, apart from EU funds, is revenue from carbon quotas: unused AAUs defined under the Kyoto Protocol have been sold to countries emitting in excess of their limits, and the revenue distributed among the Member States from the central auctioning of EUAs in the European Emissions Trading Scheme. The Green Investment Scheme (GIS) of Hungary operated until 2014. According to the rules of the Scheme, revenues from AAUs must be used for GHG mitigation or adaptation, and the use of these funds needs to be reported to the buyer of the AAUs. The successor of the GIS, since 2014, is the Green Economy Financing Scheme, but this is financed from EUA revenues (not AAUs). These programs provide financial support to natural persons, i.e. households.

Table 3. Major GIS support programs

Climate friendly home energy efficiency sub-program

- Eligibility:
  - residential buildings built with conventional technology, and improved by at least one energy category as compared to its original state as a result of the investment;
  - new buildings with an energy category of minimum A+, with a maximum 130 m² of net usable floor area;
- ex post funding: support payments effectuated after the investment is completed;
- for refurbishment investments, grant consists of a cost-proportionate basic grant and an efficiency-related Climate Bonus funding;
  - basic grant: 30 per cent with a max. 2,055 to 5,444 euros, depending on the type of investment;
  - climate Bonus: 10–30 per cent, depending on the energy category reached (B, A, or A+) with a max. 740 to 12,000 euros;
  - planned energy saving (of approved applications): 52,417 GJ/year (14,560,000 kWh/year);
  - average cost: 88.59 HUF/kWh saved (0.328 EUR/kWh saved);
  - 2,363 applications received, 1,224 were accepted and 858 executed;
  - the total GIS support awarded: 4.81 million euros.

Name	Oopening	Notes	Number of flats/items involved	Notes
climate friendly home – panel buildings II	2009	window replacement, wall insulation	46,000	
climate friendly home – traditional buildings	2009	complex refurbishment and new buildings	15,000	
household machine replacement	2010	support households in special need	195	
lightbulb replacement	2010	support households in special need	238	
our home	2011	complex refurbishment and new buildings	439	
solar collector program	2011		1,400	
window/door replacement	2014		2,000 applications	minimum cost optimal U value
household machine replacements	2014	support households in special need	25,000 planned	minimum 10 per cent energy savings
boiler replacement	2014		900 planned	condensing boilers

Table 4. Programs supported from EUA revenue

Name	Opening	Notes	Number of flats/items involved	Notes
climate friendly home – panel buildings I	2008	window replacement, wall insulation	36,000	
individual heat metering	2009	heat meters and cost allocators	110,000	Average savings is 15 per cent
the warmth of home multi-apartment buildings	2015		n/a – ongoing	4–60 flats

The Warmth of Home – multi-apartment buildings

- individual metering is a prerequisite for renovation support;
- support is given per saved kg of CO_2/year:
  - 750 HUF for window replacement + insulation (district heating);
  - 950 HUF for RES utilization (district heating);
  - 850 HUF for refurbishment of individually heated flats;
- minimum advancement in building labelling category: 2 (min C);
- 150,000 HUF (max. 50 per cent) for boiler replacement;
- the refurbishment should result in completely modernized building envelope.

Summary

Hungary's energy efficiency and renewable policy is driven by European policy developments and confined to implementation of the relevant EU legislation, most notably the energy efficiency directive and the renewable directive.[11] The transposition of the EED has been delayed considerably but major legislation and strategies were prepared in 2015: the Energy Efficiency Law, the NEEAP and the National Building Energy Use Strategy. The 2020 final energy use target is not very ambitious – the majority of savings between the Policy and BAU scenarios is expected to be achieved in the building sector.

The most important energy efficiency regulation consists of energy performance requirements related to the refurbishment of existing buildings

[11] "Directive 2012/27/EU of the European Parliament and of the Council of 25 October 2012 on energy efficiency, amending Directives 2009/125/EC and 2010/30/EU and repealing Directives 2004/8/EC and 2006/32/EC Text with EEA relevance," op. cit.; and "Directive 2009/28/EC of the European Parliament and of the Council of 23 April 2009 on the promotion of the use of energy from renewable sources and amending and subsequently repealing Directives 2001/77/EC and 2003/30/EC (Text with EEA relevance)," op. cit.

(based on EU requirements such as the cost optimal level and nearly zero energy buildings). Financial support for building renovation provided to legal persons is secured from EU funds (both in the 2007–2013 and 2014–2020 periods). The emphasis is moving away from non-refundable grants, to financial instruments of all sorts. Household renovation programs are financed from carbon quota revenue and as such are cyclical, based on the availability of resources. The policy priority in Hungary is clearly the renovation of public buildings, including buildings of the central government referred to in EED Art 5 (3 per cent of the yearly refurbishment requirement). There is an ongoing debate as to whether households should be provided with non-refundable grants or only supported by preferential loans. The attitude of the population towards bank loans is likely to be an impediment to the efficient uptake of loans (even preferential ones).

The governmental program on the gradual reduction of end user gas and electricity prices for households under the universal service system,[12] in operation since 2013, resulted in a 20 per cent gas and electricity price cut. Such a considerable reduction deteriorates the economic viability of energy efficiency investments and is counterproductive to the energy efficiency policies and financial support of the government.

The renewable electricity support policy is currently undergoing a major reform: the feed-in tariff will be replaced with a feed-in premium that will be allocated in auctions. Renewable electricity producers will have to sell their electricity on the market themselves (no obligatory take-off) and will need to balance their production, as do conventional producers. These future auctions, together with the investment support provided from EU funds, should create the additional renewable capacities needed to comply with Hungary's 2020 renewable target.

Additional resources

Energy regulator: http://www.mekh.hu/

Ministry of National Development: http://www.kormany.hu/hu/nemzeti-fejlesztesi-miniszterium

Most relevant OPs for energy efficiency investment: http://www.kehop.hu/; http://www.ginop.hu/

Smart metering state pilot: http://www.komzrt.hu/

[12] Households can purchase electricity and gas under this regime at regulated end user prices. They can opt for purchasing from the market as well.

Poland

Poland is a very energy intensive country. It consumes roughly 150 kg of oil equivalent for every 1000 euros earned, above the EU average. Although Poland has reduced much of its energy consumption and greenhouse gas emissions since the end of the communist era, it still uses a lot of energy produced by burning coal, oil and gas. Transforming itself into a low-emission economy is not an easy task for such a big economy as this and one dependent on fossil fuels, which are still mined within the country.

An overview of Polish law pertaining to RES and energy efficiency as of 2015

Regulations regarding support for renewable energy sources (RES) and energy efficiency (EE) began to develop within Poland shortly after the country entered the EU (2004). This development was guided by EU requirements and goals, as well as the necessity to implement EU laws. The most important issue was the fulfillment of EU goals set on a timeline up to 2020, namely as to the share of RES in electricity production, energy savings, and reduction of GHGs.

Polish national goals are more modest, however, than those of the rest of the EU, as Poland managed to negotiate a less ambitious policy. The Polish RES goal is only a 15 per cent share instead of 20 per cent. The Polish energy savings goal is likewise about 15 per cent instead of 20 per cent. The quantitative goals in energy savings as set for Poland are shown in Table 1.

Table 1. Energy savings goals for Poland 2020 – according to Directive 2012/27/EC

Energy efficiency goal	Total energy consumption in 2020	
Savings in primary energy between 2010–2020 (Mtoe)	Final energy consumption in total numbers (Mtoe)	Primary energy consumption in total numbers (Mtoe)
13.6	71.6	96.4[1]

[1] In line with the baseline for Poland described in the forecast made for the European Commission (PRIMES – Baseline 2007), primary energy use should be 110 Mtoe in 2020, so minus the energy savings of 13.6 Mtoe the result is: 110 Mtoe – 13.6 Mtoe = 96.4 Mtoe.

In terms of reducing greenhouse gas emissions, Poland has achieved significant reductions in terms of progress made since the base year adopted in the Kyoto Protocol. The reduction required was 6 per cent from the year 1988, whereas Poland achieved a 30 per cent reduction. This reduction was also significant when measured from the base year of existing EU legislation (1990), and therefore these objectives have so far played only a minor role in Poland's implementation of European Union policy. While the Paris agreement has been accepted by the government and society, it does not play a significant role in domestic energy policy. Both former and current Polish governments present Poland as an example of a country achieving significant emissions reductions, and use this as an excuse for the fact that Poland does not have an active climate mitigation policy.

The country's official energy policy, including renewable energy sources and energy efficiency, includes the following government documents:

- Polish Energy Policy until 2030,[2] adopted by the Council of Ministers on November 10, 2009, and not yet replaced by a new government document;
- The National Action Plans (KPD) in energy efficiency (1st, 2nd, 3rd from 2007, 2012, 2014) created for implementation of Directive 2006/32/EC.[3] A new Action Plan has not been prepared since 2014.
- The National Action Plan for energy from renewable sources,[4] which is the implementation document for Directive 2009/28/EC,[5] prepared by the Ministry of Economy and adopted in 2010, which has not yet been replaced by a new government document.

The main legal acts regulating the sphere of renewable energy sources and energy efficiency are:

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2 See "Polityka energetyczna Polski do 2030 roku," Ministry of Energy of Poland, 2009. Available online: http://www.me.gov.pl/Energetyka/Polityka+energetyczna (accessed on October 16, 2016).

3 "Directive 2006/32/EC of the European Parliament and of the Council of 5 April 2006 on energy end-use efficiency and energy services and repealing Council Directive 93/76/EEC (Text with EEA relevance)," *Offical Journal of the European Union,* L 114/64, 2006. Available online: http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex%3A32006L0032 (accessed on October 19, 2016).

4 "National Renewable Energy Action Plan (NREAP) of Poland," 2010. Available online: http://ec.europa.eu/energy/en/topics/renewable-energy/national-action-plans (accessed on October 19, 2016).

5 "Directive 2009/28/EC of the European Parliament and of the Council of 23 April 2009 on the promotion of the use of energy from renewable sources and amending and subsequently repealing Directives 2001/77/EC and 2003/30/EC (Text with EEA relevance)," *Official Journal of the European Union,* L140/16, 2009. Available online: http://eur-lex.europa.eu/legal-content/en/ALL/?uri=CELEX%3A32009L0028 (accessed on October 15, 2016).

- Act of April 10, 1997 – Energy Law (Dz. U. z 2012 r. poz. 1059, z późn. zm.);[6]
- The Regulation of August 14, 2008,[7] issued pursuant to the Energy Law by the Ministry of Economy, on the detailed scope of duties to obtain and submit for redemption certificates of origin, the substitute fee, the purchase of electricity and heat from renewable energy sources, and the obligation to confirm the amount of electricity produced from renewable energy sources (Dz. U. z 2008 r. Nr 156, poz. 969 z późn. zm.);
- The Act of August 25, 2006[8] on biocomponents and liquid biofuels (Dz. U. z 2014 r. poz. 1643, z późn. zm.) for the purpose of sale in Poland, the required amount of bio-components in the market of liquid fuels;
- Energy Efficiency Act[9] (Dz. U. 2011 No. 94, item. 551), which aims to develop mechanisms for stimulating energy efficiency improvements. The Act primarily introduced the obligation of energy companies (selling electricity, heat or natural gas to end users connected to the network on Polish territory) to obtain an exact number of energy efficiency certificates (so-called white certificates).
- The law on renewable energy sources[10] (Dz. U. of 2015. Poz.478), adopted on February 20, 2015, which replaced the existing system of support for the development of renewable energy sources (based on revenues from the sale of electricity in a price competitive market, and increased revenues from property rights of certificates of origin, so-called green certificates), with an auction system for larger systems, and a system of feed-in tariffs (FIT) for smaller energy installations. The law excluded the co-firing of wood with coal and large hydroelectric power stations from this support system. Unfortunately, the amendment of December 2015 suspended the FIT from entry into force. In fact, the regulations applicable in this Act were not in effect during the analyzed period. The Act of August 29, 2014 on the energy

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6 Act of April 10, 1997 – Energy Law, 1997. Available online: http://www.ure.gov.pl/download.php?s=2&id=2 (accessed on October 19, 2016).

7 Full text is available at the Polish internet portal of legal acts. Available online: http://isap.sejm.gov.pl/DetailsServlet?id=WDU19970540348 (accessed on November 16, 2016).

8 Full text is available at the Polish internet portal of legal acts. Available online: http://isap.sejm.gov.pl/DetailsServlet?id=WDU20061691199 (accessed on November 16, 2016).

9 Full text is available at the Polish internet portal of legal acts. Available online: http://isap.sejm.gov.pl/DetailsServlet?id=WDU20110940551 (accessed on November 16, 2016).

10 Full text is available at the Polish internet portal of legal acts. Available online: http://isap.sejm.gov.pl/DetailsServlet?id=WDU20150000478 (accessed on November 16, 2016).

performance of buildings (Dz.U. 2014 poz. 1200), which introduced a mechanism for the energy certification of buildings.

- The amended regulation on the technical conditions (WT) to be met by buildings and their sites, issued under the Building Law, which came into force on January 1, 2014, and decided upon a gradual tightening of the requirements for the thermal insulation of buildings envelope (U), and the ratio of used primary energy (EP), successively in 2014, 2017 and 2021. The required value of the EP in 2021 will be 70 kWh/m^2/year for a detached house, 65 kWh/m^2/year for a multi-family house, and up to 45 kWh/m^2/year for public buildings.
- The Act of November 21, 2008[11] on supporting refurbishment and repair (Dz.U. z 2008 r. Nr 223, poz. 1459.), which introduced a system of cheap loans for individuals and entities pursuing refurbishment projects.

Some regulations related to RES and energy efficiency are present also in other acts, such as the Building Code[12] and the Environmental Protection Act.[13]

The energy policy's institutional surrounding

At the beginning of 2016, responsibility for RES and EE was scattered across the government. Most RES and EE responsibility lay with the Ministry of Economy, which was responsible for the preparation and implementation of the relevant supporting schemes. It also prepared the country's energy policy and worked on a program for nuclear power. The Energy Regulatory Office,[14] responsible for overview of the supporting schemes and energy price regulations for households, operates under this Ministry. The Ministry of Environment was next in importance, under which operates the National Fund for Environmental Protection and Water Management,[15] which disseminates substantial financial support for RES and EE projects. This ministry is also keen on the implementation of popular education campaigns on energy efficiency and (although less likely) RES. The Environmental Protection fund

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11 Full text is available at the Polish internet portal of legal acts. Available online: http://isap.sejm.gov.pl/DetailsServlet?id=WDU20082231459 (accessed on November 16, 2016).

12 Full text is available at the Polish internet portal of legal acts. Available online: http://isap.sejm.gov.pl/DetailsServlet?id=WDU19940890414 (accessed on November 16, 2016).

13 Full text is available at the Polish internet portal of legal acts. Available online: http://isap.sejm.gov.pl/DetailsServlet?id=WDU20010620627 (accessed on November 16, 2016).

14 For more see the official website of the Energy Regulatory Office: https://www.ure.gov.pl/en/ (accessed on October 15, 2016).

15 For more see the official website of the National Fund for Environmental Protection and Water Management https://www.nfosigw.gov.pl/en/ (accessed on October 15, 2016).

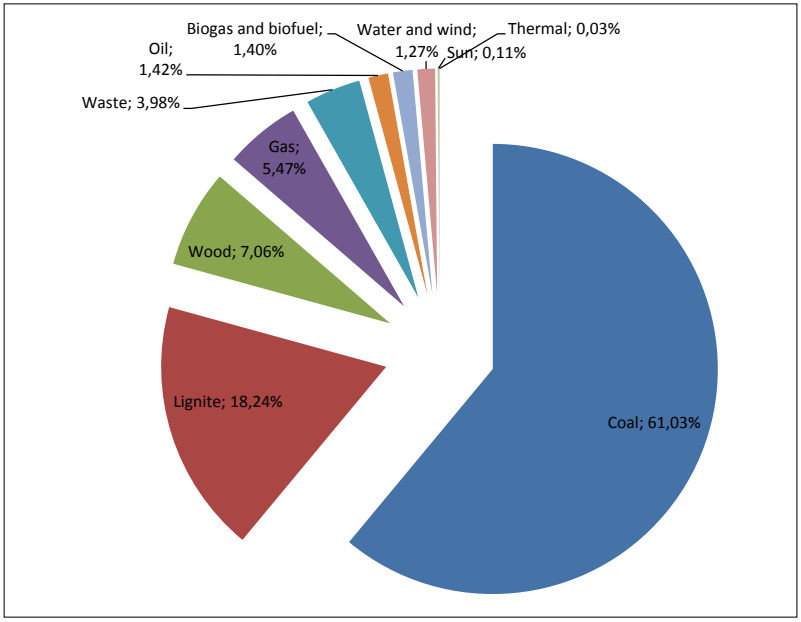
also overviews the extraction of certain resources and is very keen on the startup of shale gas extraction in Poland. The Ministry of State Treasury has been responsible for the management of nationally owned companies – many of them in the energy sector, such as coal mines and power plants.

In 2016, however, a new ministry was created – the Ministry of Energy,[16] which is now responsible for all energy matters. The Energy Regulatory Office still exists and now operates under this ministry. The National Fund for Environmental Protection and Water Management remained under the Ministry of Environment, with the same goals.

Renewables, laws, mix, share in national balance

As of 2014, the share of RES in the national energy balance was still not significant, though it had grown much since 2008. RES produced around 14 per cent of primary energy in 2014. The national mix is shown in the figure below.

Figure 1. Share of the RES in Polish energy balance,



Source: Own work based on the data of Main Statistical Office of Poland[17]

[16] For more see the official website of the Ministry of Energy of Poland: http://www.me.gov.pl/ (accessed on October 15, 2016).

[17] "Energy Statistics in 2013 and 2014," GUS, 2015

Most of the renewable energy was produced from biomass, primarily wood. Waste also held a significant share in primary energy production. The other forms of RES follow: biogas, water, wind and sun, with very low shares in the national energy mix.

Funding opportunities for RES and EE projects in Poland

EU support

Through 2013, EU support for RES and energy efficiency in Poland was provided through national and regional operational programs covering the EU financial period of 2007–2013. Beginning in 2014 new operational programs came into effect, but their organization did not change significantly. The main operational program representing the energy sector is called the National Operational Program "Infrastructure and Environment." In addition, each Polish region has its own Regional Operational Program. A special operational program has been created for the regions of Eastern Poland: Podlaskie, Lubelskie, Podkarpackie and Świętokrzyskie voivodships.

The National Operational Program of 2007–2013[18] offered financing for the biggest energy projects, among them wind farms, waste power plants, and refurbishment of significant buildings. Though the amount allocated to the energy sector was not the largest among the sectors (the largest share was dedicated to transport and environment), the program managed to finance 838 MW of renewable energy investments (among them 48 wind farms) and 560 refurbished buildings. It spent over 6.5 million PLN (around 5 per cent of the whole program) on the energy sector, with a significant share going to RES and energy efficiency. The Regional Operational Programs followed suit with their own projects.

Both the National Operation Program of 2014–2020 and the Regional Programs established a separate line of funding for energy efficiency and RES – the so called low-emission economy. The National Program has earmarked around 1.8 million euros for these priorities (6.7 per cent of the whole program's support value). The Regional Operational Programs have approximately another 4.4 million euros available (around 22 per cent of the regional programs support value), but this is calculated together with sustainable transport investments. As with the earlier program, this support may be given for RES energy generation projects, the refurbishment of buildings, and other energy efficiency or RES projects.

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[18] See "European Fund Program" part "Infrastructure and Environment." Available online: https://www.pois.2007-2013.gov.pl/WstepDoFunduszyEuropejskich/Strony/o_pois.aspx (accessed on November 15, 2016).

The Polish (non-EU funded) support system for RES and energy efficiency through 2015

Poland has also decided to build its own support system, in which color certificates of origin for various types of energy are issued. This system is based on a mechanism in which a certificate (which is a kind of a bond and has a certain price value) is obtained for a certain kind of electricity, heat or energy savings, as laid out in the Act. The minimum value for obtaining the certificate is 1 MWh of energy. The support for a given type of energy lies in the fact that the manufacturer of the energy, in addition to the market price of the sale, receives a certificate whose value represents additional income. The income itself is obtained through the sale of certificates on the Power Exchange Market, or by contract with another party outside the exchange market.

The certificate system is able to work because of national legislation introducing requirements for energy sellers in reporting the sale of a certain amount of energy (both electricity and heat) from renewable sources each year. The reporting requirement lies in the fact that in any given year, an energy supplier is obliged to redeem a certain number of certificates at the Energy Regulatory Office, corresponding to the amount of renewable energy required in the power grid for that particular year. Energy efficiency requirements have been introduced – for sellers of electricity, natural gas, and thermal energy – in terms of amount of energy savings in the energy system.

Starting from different years, at different times, under different laws, and with varying degrees of success, the following types of certificates of origin have existed in Poland:

1. Green certificates. These were introduced in 2005 by the Energy Law, and abolished in 2016 with the introduction of the auction system for the production of energy from renewable sources. From the beginning, 2016 was defined in the Energy Law as the last year for green certificates. In Poland, green certificates could be obtained by means of any type of renewable energy introduced into the power system – wind, solar, biogas, hydro, biomass, they were all entitled to the same certificate, and consequently to the same discount in the system.
2. Yellow certificates. These were introduced in 2007 by the Energy Law, being issued for producers of heat energy using a process of high efficient cogeneration in plants fired by gas or by units with a capacity less than 1 MW. Initially, yellow certificates were to be issued only until 2012 – then, after a two year pause, in 2014 parliament extended their issuance to 2019.
3. Violet certificates. Introduced in 2007 by the Energy Law. These certificates were issued to producers of heat energy from cogeneration units fired with methane or gas, obtained from biomass processing.

Energy savings achieved in cogeneration units with a capacity greater than 1 MW must be not less than 10 per cent of the total generation of the electricity or heat system in each case.

4. Red certificates. These were introduced in 2007 by the Energy Law for energy produced by other cogeneration sources. Energy savings achieved in cogeneration units with a capacity greater than 1 MW must be not less than 10 per cent of the total generation of the electricity or heat system in each case.
5. Brown certificates. Introduced in 2011 by the Energy Law. These certificates confirm the production and introduction of gas produced in agricultural biogas plants for the gas network.
6. White certificates. Introduced in 2011 by the Law on energy efficiency (Dz. U. 2011 Nr 94, poz. 551). Certificates are issued for an amount of energy savings achieved. Unlike the other color certificates, the Energy Regulatory Office does not issue them to anyone who has achieved savings, but selects companies that offer these savings for the lowest certificate price, through an auction. Energy savings can be realized by end users, by equipment being used by its owner, or by reducing the loss of electricity, heat or natural gas either in transmission or distribution.

More than one kind of certificate cannot be obtained for the same amount of produced energy, with the exception of green and yellow certificates, which can be obtained at the same time.

The whole system of certificates has been conceived in such a way as to achieve the effect of self-financing. The legislative acts impose obligations on the sellers of different types of energy, in terms of sales volume of the particular type of renewable energy or energy savings. The state does not directly subsidize any kind of energy. Because the seller must disclose within a specified time horizon a specific amount of energy or cost savings – through the retirement of an appropriate number of color certificates – he is forced to obtain them, which creates a situation of demand for certificates. Investments in renewable energy or in energy savings bring about a supply of certificates. The Power Exchange Market, and agreements outside the market, regulate the price at which the responsibilities of power sellers will be fulfilled. Thus the financial resources to support investment in renewable energy or energy savings are derived from energy sellers, although in practice are probably transferred to the buyers of energy (end users).

As to the other mechanisms employed up until 2016 to promote renewable energy and energy efficiency in Poland, it is worth mentioning:

1. the obligation imposed on operators of the power grid, that they connect to network installations using renewable energy sources on request;

2. there are no requirements to obtain building permits for the installation of photovoltaic or solar panels, when installed on the roof of a building;
3. the introduction of energy performance certificates for new buildings;
4. a tightening of energy efficiency standards for newly built and retrofit buildings from 2014 onwards.

Investment financing mechanisms

In addition to the color certificates, there are a number of other programs operating in Poland that are designed to provide financial support in the form of grants or loans for investment in renewable energy or energy efficiency. There are many such programs in Poland, due to the multiplicity of sources of funding – including EU funds, funds from the sale of Polish rights to greenhouse gas emissions on the international market, and aid from countries of the European Economic Area. The following programs (described further in the "Examples" section below) have had the biggest impact on the renewable energy and energy efficiency market in Poland:

- National Environmental and Water Management Fund – provides subsidies for solar collectors from national resources. The program was implemented from 2010 to 2013, and then replaced by a broader program called Prosumer. (See the "Examples" section below for details.)
- Benefits for bank loans issued by Gospodarstwa Krajowego Bank for the modernization of housing stock. (See the "Examples" section below for details.)

In addition, we could enumerate dozens of various types of programs and lines of financing, both public and private, operating in Poland as of 2015, for the development of renewable energy sources. Funds for the implementation of renewable energy and energy efficiency projects could also be obtained from the:

- Swiss Cooperation Fund;
- Aid from European Economic Area Countries (Norway, Iceland);
- Green Investment Scheme (money obtained from the sale of allowances for GHG emissions, according to the Kyoto Protocol rules);
- Bank of Environmental Protection.

In practice, the funding of renewable energy projects in Poland can be divided into two types. Small projects are implemented mainly using a formula of mixed financing, i.e. combining a grant with one's own contribution, often utilizing a loan (including with subsidized interest). Large projects are carried out mainly by private funds supported by a credit without subsidies.

Projects related to the energy efficiency of buildings are implemented mainly with the partial help of grants or concessional loans. The ESCO formula is not widespread. Efficiency projects in large enterprises are carried out using their own resources.

Effects of the support system

This support system, operating since 2008, has clearly helped to develop the renewable energy portion of the Polish energy sector. According to national statistics, various renewable energy sources have increased their production capacity in Poland, as follows:

- In the years 2004–2014 the amount of energy produced in Poland by wind turbines increased nearly 50-fold, to approximately 27,600 TJ (since 2010 there has been approx. a 5-fold increase). Currently, approx. 5 per cent of electricity in Poland is produced using wind turbines.
- In 2010, the total installed capacity of solar collectors in Poland amounted to 1.2 GWt, and photovoltaic to 27 MW. In 2014, the total surface area of solar collectors installed in the country reached 1.7 million m^2. From 2010 until 2014, the total amount of solar energy produced in Poland doubled, from approx. 350 TJ to 715 TJ.
- An inventory of hydropower plants done in the 1980s shows only 650 small hydropower facilities. Currently, according to the Energy Regulatory Office, 757 hydropower plants are in operation in Poland, with a total installed capacity of 988 MW, including more than 700 small plants with a total capacity of 250 MW. Between the years 2010–2014 the amount of energy produced from water power stations dropped from approx. 10,500 TJ to about 7,800 TJ. The production of energy from water is dominated by large power plants.
- Currently only 11 geothermal plants and a number of balneological facilities operate in the country. There are no geothermal energy plants producing electricity.
- In 2014, the share of biogas in the total consumption of final energy from renewable sources was only 2.5 per cent; in the same year agricultural biogas alone had a share of only 0.08 per cent. The increase from 2010 was roughly 2-fold, from approx. 4,800 to approx. 8,600 TJ. In 2015 there were 217 biogas plants in Poland, with a total power of approximately 217 MW.
- In 2010, the consumption of biofuels amounted to approx. 37,100 TJ. After 2012 there was a drop in domestic use of these fuels, resulting in an 11.8 per cent lower consumption than in 2011. In the following years consumption dropped from each previous year by 10.2 per cent and 6.8 per cent, in 2013 and 2014 respectively. In 2014 consumption was approximately 28,800 TJ.

- The data indicate a significant increase in the use of geothermal energy (geothermal deep), mainly for heating purposes, especially in 2012–2014. In 2014 geothermal energy consumption was 50.5 per cent higher than in 2010, growing from approx. 560 TJ to approx. 840 TJ. Similarly, but more modestly, the use of shallow geothermal energy technology increased from approximately 250 TJ (2010) to 510 TJ (2014).
- The use of solid biomass for energy production was the highest of all renewable energy sources. Although its use varied, it increased between the years 2010–2014 from 245,000 TJ to 282,000 TJ. The production of electricity from solid biomass increased the most, from approx. 5,900 GWh to approx. 9,100 GWh.

The growth of production capacity of the various renewable energy sources was also significant, as shown in Table 2.

Table 2. Capacity reached by RES power stations for years 2010–2014 in MW

	2010	2011	2012	2013	2014
Total	2,178	3,018	4,093	5,116	5,637
Hydro	936	940	945	949	958
with power less than 1 MW	78	82	88	88	89
with power between 1–10MW	185	186	185	189	185
with power more than 10 MW	673	672	672	672	684
Wind	1,108	1,800	2,564	3,429	3,836
Biomass	53	175	455	582	629
Biogas	81	102	128	154	187
from waste	44	51	57	56	59
from sewage	31	35	42	51	60
other (eg. agricultural)	6	16	29	47	68
Solar	0	1	1	2	27

Source: GUS, 2015

Poland's situation in the field of micro-installations for the production of heat and electricity is completely different than that of Western countries (including the relationship between installations connected to the network, on the grid, and those outside the network, off the grid). The achievements based on the investments of individuals and small businesses over the past 10–12 years (approx. 10 billion PLN) has led to the creation of a basis for the prosumer energy movement in Poland. A total of over 300 thousand installations were created, mainly producing heat. Within this group, installations connected to the grid represent only a fraction of a percent.

Data from the Energy Regulatory Office show that in Poland at the end of June 2015, there were 1,954 RES installations connected to the grid (or on-grid) that were generating electricity (with approx. 4000 off-grid systems) with a total capacity of 15.8 MWe – much more than at the end of 2014, when there were only 875, and a great deal more than at the end of 2013, when there were only 41. The majority of those installations were photovoltaic. According to data collected from the market by the Institute for Renewable Energy (IEO), the current cumulative power in photovoltaic systems (as of end of May 2015) is 40 MWp, which is over 400 times less than in Germany (16.6 GWp in 2014).

The total number of small wind turbines in Poland is estimated by the IEO to be 3,500 units. Of the total number of small turbines sold, only approx. 6 per cent were intended for connection to the power grid, despite the fact that of all the smaller forms of RES, small wind turbines achieve the highest economic efficiency within the electricity network. At the end of 2015, Poland had 70 agricultural biogas plants, including three at the micro scale (up to 40 kWe). A further seven or so were under construction.

Table 3. Approximated characteristics of small RES installations for electricity with power less than 40 kWe.

	Small wind	Photovoltaic	Microbiomass (CHP)	Total
Quantity of sources [szt.]	3,500	500	10	approx. 4000
Total power [MWe]	11.0	1.5	0.23	12.7

Renewable energy installations that produce heat often are built exclusively from the private funds of investors who are looking for alternatives, or who believe such an installation will meet their needs in terms of promoting ecology, innovation, and energy security. For several years, a support system of micro-donations and preferential loans from environmental funds was available for this market segment in Poland.

In recent years, solar collectors have become the leading technology of micro-installations in Poland. This substantial, even massive effort of private investors shows that, in households and among farmers, single investments in microenergetics amounting to tens of thousands of euros are possible, as well as the synergistic merging of an investors' own resources with the support of grant financing and bank loans. This growth has stemmed largely from economic conditions, i.e. the economic viability of, and support provided for, different types of renewable energy sources within this decade. Shown below is the estimated number of micro-installations producing heat that were installed for investors' own use in Poland.

Table 4. Approximated characteristics of small RES heating installations with a capacity below 200 kW_t.

	Sollar collectors	Heat pumps	Biomass burning stations	Total
Quantity of sources [tys. szt.]	174 tys.	25 tys.(20 tys.)	90 tys.	310 tys.
Power [GW_t]	1.4	0.28 (0.2)	1.8	3.4 GW_t

Table 5. Statistical data on small scale RES with less than 40 kW of power for producing electricity at the end of 2015.

Small installation type		At end of 2nd half of 2013	At end of 1st half of 2014	At end of 2nd half of 2014	At end of 3rd quarter 2015	At end of 4th quarter 2015
PV	Photovoltaic systems	40	280	874	2,776	4,215
WO	Small hydropower	1	2	2	173	252
WI	Small windpower turbines	0	0	0	17	29
BG	Small biogas plants	0	0	0	2	3
BM	Biomass burning stations	0	0	0	0	2
PV+WI	Combined solar+wind systems	0	0	0	2	2
SUM		41	282	876	2,970	4,503

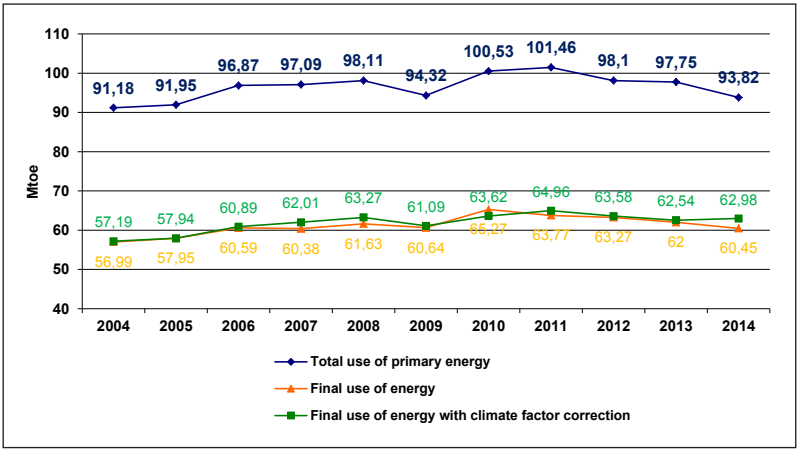
Source: URE, opracowanie IEO.

The data indicate that photovoltaic systems dominated the market of small scale RES in Poland. A new phenomenon in the second half of 2015 was a significant increase in the number of micro-installations installed in small firms (at the end of 2015, 735 micro-installations were in the hands of companies).

In the field of energy efficiency, the highest energy efficiency standard (of the EU, or of the world for that matter) was achieved in some industries and at a number of plants in Poland. So far, the implementation of energy efficiency measures is driven more by the need to achieve market competitiveness than by the utilization of support mechanisms. One of the conditions for competitiveness is minimal energy consumption, in addition to the advantages gained by innovative products and methods of production.

Final energy consumption in the period 2004–2014 is illustrated in Figure 2. Consumption at this level is subject to fluctuations, as a result of recession or economic growth among other things. Maintaining the current achievements in energy efficiency requires a rise in economic innovation, as well as effective, intensive actions with regard to low and high capital.

Figure 2. Total use of primary and final energy in Poland



Source: GUS, KAPE, Efektywność wykorzystania energii w latach 2004–2014

As can be seen from the graph, primary and final energy consumption in Poland in 2014 was 93.84 Mtoe, which is lower than the 96.1 Mtoe expected for 2020 (please see Table 1). Particularly important are developments in the thermo-modernization of Polish buildings, which are described below, in the examples of local action.

Best practices – case studies

Examples of RES financing in Poland

Support for solar thermal heating

The program "Aid for the partial repayment of bank loans Capital allocated to the purchase and installation of solar collectors for Individuals and residential communities." Was implemented in Poland in the years 2010–2014. Individuals and housing associations could get funding to install solar collectors for water preparation and heating support on their residential buildings. The grant was in the form of a 45 per cent repayment of loans given by commercial banks for the costs of a project. It was the first program in Poland aimed at individuals and implemented throughout the country by more than 3,500 bank branches, which made it possible to finance thousands of small projects undertaken by individuals.

The result of the program was the funding of 67,400 installations with 449.6 million Polish zloty of support. The installed solar collectors have a total

area exceeding 483,000 square meters, contributing to the reduction of CO_2 emissions by 75,000 tonnes per year.

The program had a very positive impact on the solar collector market. In the ranking of sales in Europe, Poland advanced from ninth place in 2009, to third in 2012. The market of solar collectors, the only renewable energy segment in Poland, recorded the large increase. Promoting the certified quality of collectors contributed to a significant increase in the number of certified collector models on the market, while imposing eligibility requirements for contractors and designers, as well as requiring a manufacturer's warranty, raised the quality of installations.

In 2011 the National Fund for Environmental Protection received a prestigious award – the Certificate of Good Practices of European Public Sector Award – which is awarded by the European Institute of Public Administration (EIPA). The explanatory memorandum highlighted the effectiveness of the mechanism of cooperation between the public sector and commercial banks, and the balance between the service costs and the effects of implementing the program.

Prosumer

The program "Prosumer - line of financing for the purchase and installation of micro-installations of renewable sources of energy" – of the National Fund for Environmental Protection and Water Management – was a continuation and expansion of a subsidy program for the purchase and installation of solar collectors that finished in 2014. The program offered subsidies for the purchase and installation of new plants and micro-installations of renewable energy sources for producing electricity or heat for residential single-family or multi-family houses. Beneficiaries of the program could include individual persons, housing associations, housing communities and local government units.

The program financed installations for the production of heat from biomass, heat pumps and solar thermal with an installation capacity up to 300 kW, and the production of electricity from photovoltaic systems, small wind turbines, and CHP systems up to 40 kW. The program's budget was 800 million Polish zloty for the years 2014–2022. Funding took the form of a preferential loan with a grant total of up to 100 per cent of eligible installation costs, including a grant of 20 per cent or 40 per cent co-financing until 2016 (15 per cent or 30 per cent after 2016).

The program was implemented in three ways: by local government units, through banks, and by means of provincial funds for environmental protection and water management.

By the end of 2015, the program had concluded agreements with ultimate beneficiaries on the implementation of 2,842 RES installations, for a total

amount of 155.8 million Polish zloty, including 95.6 million Polish zloty in loans and 60.2 million Polish zloty in grants. An amount of 33.8 million Polish zloty was given mainly for photovoltaic installations (1,095). The program was ended in 2016 for political reasons.

The increase of RES in Suski county

An example of local action that led to the installation of renewable energy sources in the community was a program implemented by Suski county in Malopolska province. In the first phase of the project, implemented in 2012–2013, solar installations were mounted for 2,349 family houses with a total area of 15,000 square meters, and for a hospital building in Sucha Beskidzka with an area of about 300 square meters. In total, the project spent 29.1 million Polish zloty. The hospital installation was funded by a grant of the Swiss-Polish Cooperation Program – SPCP (69 per cent), and by the Regional Fund for Environmental Protection in Krakow (31 per cent). The residential installations were funded by the National Fund for Environmental Protection (46 per cent), SPCP (39 per cent), and local contributions of residents (15 per cent). In 86 per cent of cases these solar installations were replacing carbon sources.

The second phase of the program's implementation brought about the installation of 564 solar collectors on single-family houses. A very good promotional campaign was organized by the program coordinator at the County Office. The program's website contains complete information on the program, including the effects of the monitoring system, allows for the reporting of failures, and provides current information on projects.

The Fund for Refurbishment and Repair of housing stock, operated by BGK

The end result of the Act on support for refurbishment and repair, is the refurbishment bonus. This bonus contributes to the repayment of loans taken by investors for the undertaking of refurbishment. It is available only to investors who have taken a loan. Investors carrying out refurbishment exclusively from their own resources are not eligible. The amount of the bonus is 20 per cent of the loan amount, but not to exceed:

- 16 per cent of the costs incurred for refurbishment;
- double the expected annual savings in energy costs, determined on the basis of an energy audit.

The refurbishment bonus can be applied for by the owners or managers of:

- housing buildings;
- communal housing buildings;

- buildings of local authorities that are used for the public good and public service;
- local heating networks;
- local heat sources;

regardless of their legal status – for example counties, municipalities, housing cooperatives, housing associations, commercial companies, and individuals, with the exception of budgetary units and budgetary companies.

From its inception in 1999 to December 31, 2014, the Fund was credited with 1.885 billion Polish zloty. As of March 20, 2015, BGK had funds in the amount of 165.9 million Polish zloty on account, or in refurbishment funds for handling the refurbishment bonus. Up to that date the fund had granted approx. 23,700 refurbishment bonuses, mostly in the Mazovia, Silesia and Wielkopolska provinces. Housing cooperatives, and housing cooperatives for the modernization of multifamily buildings, received most of the premium.

This modernization effort undertaken over many years is visible within Polish cities. Refurbished buildings from the 60s, 70s and 80s have new facades or windows. The amount of annual energy cost savings resulting from this program between the years 1999 and 2014 amounts to 796 million Polish zloty.

Analysis of main problems/challenges and ways to overcome them

By 2014, the implementation of support for renewable energy sources was effective, as it helped to meet targets as to the amount of renewable energy sources in the power system, as was described above. This does not mean, however, that many of the disadvantages of the existing system have not been argued. The major disadvantages are:

1. The temporariness of the system. In the case of several types of certificate, the term has been fixed for a specific, short period, and then either not extended, or an extension came only after a significant break, without explanation by the legislature. This caused uncertainty among investors as to the possibility of receiving support, especially in the case of investments whose investment cycles lasted longer than the certificates' period of validity (biogas plants, larger wind installations).
2. The lack of sensitivity of the system to differences between renewable energy technologies. Green certificates could be awarded for energy produced in any type of installation, which in turn promoted those installations with the lowest cost of energy production. The result was an uneven development of renewable energy technologies in Poland, with a significant advantage for wind and coal-biomass power installations.

3. Too wide a definition of renewable energy installations eligible for support. For example, the co-firing of biomass with coal (in later versions of the Res Act so-called multi-fuel burning) was designated as renewable energy. As a result, many traditional coal-fired power plants, while still using significant amounts of coal for energy production, received support after making only slight modifications. One of the cheapest forms of energy production was therefore receiving green certificates. As a result, it has greatly dominated the renewable energy market and led to an oversupply of certificates and hence a decline in their prices after 2014.
4. In the field of energy efficiency, the very slow, late implementation of the tender system for white certificates was problematic. The first tender lasted one year, even though it only aimed at approx. 2 per cent of the energy savings target.
5. In practice, from 2014 onwards, the network operator refused in many cases to provide the conditions needed to connect energy sources to the grid. It appeared it would be possible to overcome this obstacle through the implementation of a new supporting scheme due to start in 2016. The new scheme would be able to finance different technologies and forms of investment in different ways. Micro and small installations would be supported by a Feed-in-tariff mechanism, large installations through auctions. It was not determined whether the auctions should be held jointly or separately for different technologies, but these were possible options. Nevertheless, in early 2016 the plan was abandoned.

Additional resources

National Operational Program Infrastructure and Environment 2014–2020: https://www.pois.gov.pl/media/10900/POIiS_2014-2020_04112015.pdf

Analysis of the available funds for low-emission economy in Regional Operational Programs 2014–2020: http://ekoprojekty.pl/wp-content/uploads/2014/09/raport-energetyka.pdf

National Action Plan for energy efficiency in Poland 2014: https://ec.europa.eu/energy/sites/ener/files/documents/2014_ar_pl_poland.pdf

National Action Plan for Renewable Energy Sources: http://www.pigeor.pl/media/js/kcfinder/upload/files/Krajowy-Plan-Dzia%C5%82ania-w-zakresie-energii-ze-zrodel-odnawialnych.pdf

Energy Policy for Poland until 2030 (actual version): http://www.me.gov.pl/files/upload/8134/Polityka%20energetyczna%20ost.pdf

Statistics on renewable energy sources in Poland (2014): http://stat.gov.pl/download/gfx/portalinformacyjny/pl/defaultaktualnosci/5485/3/9/1/energia_ze_zrodel_odnawialnych_w_2014_roku.pdf

The Slovak Republic

In the energy policy of the Slovak Republic,[1] there are four key pillars – energy security, competitiveness, a sustainable energy sector, and energy efficiency. At the same time, priorities are set out for particular areas, one of these being a further reduction of energy consumption more in line with the EU average. This is particularly important for countries with energy-intensive industries, or with a high dependence on the import of primary energy sources, such as Slovakia.

In order to support energy efficiency, it is important to follow a systematic approach at all levels of governance. Slovakia has a strategic and legislative framework in place in the areas of energy efficiency and renewable energy sources. Recognizing the fact that energy production, distribution and consumption are locally interconnected and mutually influence each other, the Slovak Republic has moved away from a system of statutory obligation for municipalities and cities, to a system of support for the preparation of local strategies regarding energy, particularly in the field of energy efficiency.

The Slovak Ministry of Economy has stated that the development of renewable energy is one means to improving energy security, along with nuclear energy and the diversification of sources of fossil energy. In the field of nuclear energy, Slovakia has launched a major project to complete two new units of the Mochovce nuclear power plant (Units 3 and 4). Sooner or later Slovakia will face the problem of how to replace the energy sources that are "at the end of their lifetime," and in this regard Mochovce represents a carbon free solution, although at current the return on investment is rather negative.

Since network industries such as energy supply can exhibit traits of natural monopoly, there is a widely held notion that the state should be a market regulator in order to achieve efficiency – but efficient market regulation does not come easy. It must be mentioned that the over-regulation of energy prices contributes to deformations in the energy market in Slovakia, and is a subject of close review by the European Commission (EC).

Energy policy of the Slovak Republic in the light of COP 21

Slovakia ratified the Kyoto protocol in 2002. For the second Kyoto Protocol commitment period, Slovakia has adopted the joint EU "20–20–20" targets of the "climate and energy packages." As part of the EU joint commitment, Slovakia is required to limit the increase in its non-ETS GHG emissions to

[1] "Energy policy of the Slovak Republic," Ministry of Economy of the Slovak Republic, October 2014. Available online: http://www.economy.gov.sk/energy-policy-of-the-slovak-republic_october-2014-qci/145533s. (accessed on October 21, 2016).

13 per cent by 2020 (base year 2005), achieve a 14 per cent minimum share of gross final energy consumption from renewables by 2020, and reduce total final energy consumption by 11 per cent by 2020 (base year 2005).

So far, meeting international commitments for emissions reduction has not been particularly challenging, as reflected in the National GHG inventory System data. Total GHG emissions decreased by more than 38 per cent over 1990–2011, thanks to the country's structural economic changes and strict domestic environmental policies – particularly regarding air quality – even before joining the EU in 2004. F-gases (HFCs, SF6) are the only GHGs whose emissions have increased since 1990 (mainly in industry). The country overachieved its Kyoto protocol target and had a significant surplus of tradable emissions allowances in the first commitment period of the Kyoto protocol. The profits from the Kyoto Protocol flexible mechanism were reinvested in measures aimed at the further reduction of GHG emissions through the State Environmental Fund and the SlovSEFF III Greening Program.

The government also approved preparation of the Low-carbon development strategy of the Slovak Republic until 2030 with an outlook to 2050. This document will be prepared with the advisory support of the World Bank. The aim of the project is to analyze possible scenarios of Slovakia's low-carbon development in the medium and long terms, via macroeconomic and energy models that are in line with the goals of the EU climate-energy framework. The total cost of the project is 589,000 euros, which will be covered from the state budget. The work has already commenced and is expected to take 18 months.[2]

Currently, most of the policies and measures designed to tackle climate change are guided by EU regulation. Beyond the legislative level, many public and private initiatives also exist, such as research activities (e.g. Water Research Institute, Forestry Research Institute, Transportation Research Institute, Slovak Academy of Science). Non-governmental organizations and private initiatives (e.g. the Slovak Innovation and Energy Agency, Friends of Earth, Green Building Council, etc.) are also involved in the development and implementation of measures.

The key objectives of energy policy, following mostly from EU legislation, are detailed in the Energy Policy of the Slovak Republic (2000, 2006, 2013), in the Energy Security Strategy of the Slovak Republic and Action Plan for Energy Efficiency (2008–2010; 2011–2013; 2014–2016), the National Plan for Biomass Use (2008), and the National Renewable Energy Action Plan (2010). The main objectives are: to increase efficiency in the power and end-use sectors, reduce energy intensity, reduce dependence on energy imports, expand

[2] "World Bank to help Slovakia with low-carbon strategy," *Radio Slovakia International,* November 29, 2016. Available online: http://enrsi.rtvs.sk/articles/topical-issue/121349/world-bank-to-help-slovakia-with-low-carbon-strategy (accessed on November 29, 2016).

the use of nuclear power, and increase the share of renewables in the heat, electricity and transport sectors to 14 per cent of total use by 2020. Because of the high dependence on oil and gas imports (mainly from Russia), energy security is high on the policy agenda and the Government is aiming to expand storage capacities and increase energy efficiency. It has already enabled the reverse flows at the country's two western interconnectors.

The Renewable Energy Act is the main instrument for supporting renewable electricity generation and fuel switching, and led to an unanticipated "solar boom" in early 2011 due to its generous feed-in tariffs for solar energy. The tariffs were scaled back and further restricted in 2013, in an effort to tackle non-transparent practices occurring in the context of financial support for large scale PV (photovoltaics) installations. At the same time, some administrative barriers to small rooftop PV facilities installations have been reduced, and operators of these installations can now generate electricity for their own use without having to register as entrepreneurs. In 2016, a massive grant program to further support "prosumers" was launched within the Operational program Quality of Environment, financed from the European Structural and Investment Fund (ESIF). Further support for self-consumption is given only to those facilities with accumulation capabilities.

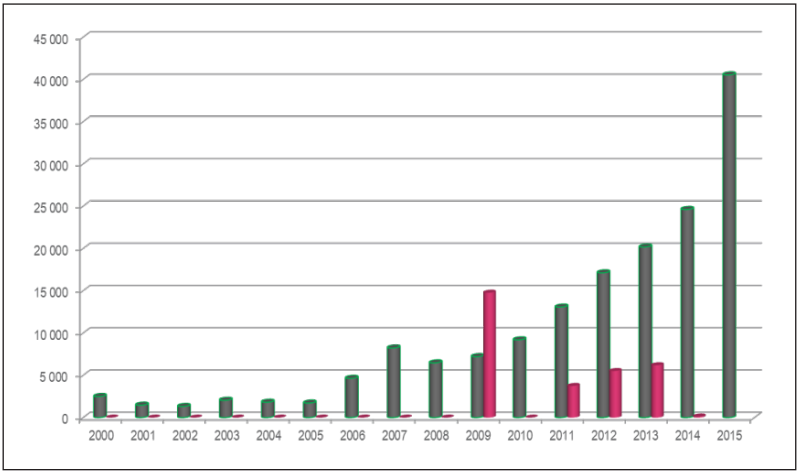
Energy efficiency

Slovakia has achieved impressive results in energy efficiency since the 1990s (with one of the steepest curves among OECD countries), mainly due to economic restructuring, but also to energy efficiency improvements. Energy intensity decreased by 45 per cent between 2001 and 2012. Although still falling, it remains higher than the European average and a large energy savings potential exists in most sectors, especially in buildings and transport. The main targets – which will contribute to meeting the EU's 20 per cent energy efficiency target – include an indicative national energy efficiency target of 3.12 Mtoe for final energy savings for the period of 2014–2020, and an absolute target of 16.2 Mtoe for primary consumption and 10.4 Mtoe for final consumption by 2020. The Energy Efficiency Act and the Act on Energy Performance of Buildings are the main instruments for managing demand by 2020. Additional financial support for energy efficiency measures is provided by a number of programs, such as the Operational program Competitiveness and Economic Growth (program period 2007–2013) and the Operational program Quality of Environment (program period 2014–2020).

The savings in the buildings sector (either private or public) are achieved by an extensive use of loans or grant based schemes. Most European countries operate either a loan or a grant based scheme (or complementary schemes), Slovakia being an exception, offering two independent subsidy products: a grant with high aid intensity (up to 70 per cent) for a limited number of interventions mainly affect-

ing the most severe building deficiencies, and a preferential loan product for all interventions that may result in savings or help to diminish structural problems. Based on the experience of several countries, these programs generally need 3–5 years to have a real effect, regardless of each program's particular characteristics. In the programs' early years, neither the buildings' owners nor the institutional system had sufficient experience with tendering and implementation. The loan schemes began to be successful only when commercial banks developed products that were acceptable to home owners' associations. The subsidy schemes, both within Slovakia and in the wider region of Central and Eastern Europe, mostly concentrated on multi-unit buildings that had been built before the transition of 1989–1990 (later extended to those built between 2002–2006). Family houses were also subsidized, although this program has been somewhat less successful. The Slovak subsidy scheme includes a grant scheme and an independent loan scheme. It should be noted that the loans, being repayable, constitute a much lower financial burden on the state in the long run. The subsidy amount of such loans is usually five to ten percent, which is the real expense borne by the state (and going to the benefit of the owner).[3] The programs' impressive results are shown in the following chart, where the grey bars represent the number of renovated apartments in a particular year, and the pink bars the number of apartments with thermal insulation only. (This form of support ended in 2014.)

Figure 1. Renovated apartments (grey) and thermal insulated-only apartments (pink)



Source: State Housing Development Fund: www.sfrb.sk (accessed on November 1, 2016).

[3] "Analysis of subsidy schemes aiming to support energy efficient renovation of multi-family buildings in selected countries of Central and Eastern Europe," Metropolitan Research Institute, Budapest 2015.

The result of 20 years of continuous investment is that 52 per cent of the flats in the apartment buildings and 33 per cent of the dwellings in residential houses have been deeply renovated as of December 31, 2015.

Table 1. Overview of legislation related to energy efficiency

Name of Act	Act 321/2014 on Energy Efficiency
Date	December 1, 2014 (recent amendment)
Summary of Bill	The Energy Efficiency Act implements the EU's Energy Efficiency Directive (EED) 2012/27/EU into the Slovak legislative system. The Act deals with and contains the following rules and obligations. • Measures for support and improvement of energy efficiency for new and refurbished electricity production facilities. In addition, electricity producers using combustion engines with a capacity of 1 MW or more, gas turbines with a capacity of 2 MW or more, or other thermal processes with a total energy capacity of 10 MW or more, are obliged to undergo an energy audit of the equipment, and to investigate the possibility of the Combined Heat and Power (CHP) operation of such equipment. Power transmission system operators and distribution system operators are obliged to regularly evaluate transmission efficiency, and to publish this evaluation no later than March 31 of the following year. The same obligation applies to the operators of gas, liquid fuels, delivered heat, waterworks and sewage systems. • Energy consumers must comply with economic operational rules for energy-consuming equipment. Owners of non-industrial buildings with a floor space of 1000 m^2 or more and with centralized space heating must provide hydraulic balanced heating systems within the building and thermostatic valves for the heaters. Obligations for the preparation of strategic documents in the field of energy efficiency. Here the Ministry of Economy (MoE) is obliged to develop an energy efficiency strategy, submit it to the Government, evaluate the fulfilment of the strategy's goals, and regularly (every three years) provide an action plan for energy efficiency and monitor its outcomes. The MoE also determines energy efficiency targets, estimates the energy efficiency potential of district heating systems, and concludes energy savings agreements with entrepreneurs. In the area of energy efficiency of public buildings, the MoE, in close cooperation with the Ministry of Transport, Construction and Regional Development, has obligations concerning the strategy development, planning, and periodic evaluation of the renovation of public buildings with a floor area of 250 m^2 or more. The Act also defines rules and obligations related to the monitoring and evaluation of the national energy efficiency target for the MoE and the operator of the monitoring system, as well as for data providers (energy companies, utilities, and relevant public bodies).

Name of Act	Act 321/2014 on Energy Efficiency

	• Rules for performing energy audits:
	  • Here the Act defines rules and conditions for energy auditors, as well as the obligation of "big" enterprises – meaning those either with more than 250 employees or an annual turnover of 50 million euros – to undergo a successful energy audit at least once every four years.
	• Entrepreneurship in the field of energy services: The new Act on energy efficiency recognizes three types of energy service
	  • Support (i.e. "soft") Energy Service – includes mainly advisory or education activities;
	  • Guaranteed Energy Service – implementation of actual, complete energy services based on a project; and
	  • Energy Service for Public Sector – a special type of Guaranteed Energy Service, where either public authority or public financial resources are involved according to the rules specified in the Act.
	• Information provision: This includes, on the one hand, information about energy service providers to be compiled by an authority specified by the MoE. On the other hand, the Act stipulates obligations concerning the providing of information on thermal energy and on gas and electricity distribution companies to final customers. Finally, violations of the Act, and related financial penalties, are enumerated.

Name of Act	Act. 251/2012 on Energy
Date	September 1, 2012 (recent amendment December 1, 2014)
Summary of Bill	Implementation of the provisions of the EU's Third Energy Package into the national legislation. The Energy Act introduces the obligation of companies to unbundle energy generation and supply from transmission services. The law strengthens consumer rights and grants new powers to the independent national energy regulator. The Act lays down business conditions for the energy sector, measures to ensure the security of supply of electrical energy and gas to their respective functioning internal markets, the rights and obligations of persons whose rights and obligations may be affected by market players, the powers of state administration and supervision, and the control of business within the energy sector.

Name of Act	Act 314/2012 on Regular Inspections of Heating Systems and Air Conditioning Systems
Date	2007, amended January 1, 2013
Summary of Bill	Act No. 17/2007 on the Regular Inspection of Boilers, Heating Systems and Air-conditioning Systems, and related Decrees which implement the Act (No. 195/2008 and No. 548/2008), define procedures and set intervals for the regular inspection of boilers, one-off inspections of heating systems, and the inspection of air-conditioning systems. The Act also defines the professional expertise required for such inspections. It implements Directive 2002/91/EC (EPBD) aimed at improving the energy efficiency of buildings.

Name of Act	Act 314/2012 on Regular Inspections of Heating Systems and Air Conditioning Systems
	The Act establishes inspection procedures, duties of the building owner, periodicity of various regular inspections, content of the inspection report, procedures for the examination of professional expertise, surveillance mechanisms, and penalties. The Decrees define administrative procedures for professional expertise examination and inspection procedures in detail. The Act mandates the regular audit of heating systems (nominal power over 20 kW) and air conditioning systems (nominal power over 12 kW) in order to provide better information on system performance to the system operators, as well as opportunities for system maintenance, leading to better energy efficiency and thus contributing to the fight against climate change. System operators may be fined for not having scheduled and performed an audit within the mandated timeframe. However, the recommendations given by auditors are non-binding.

Name of Act	Act. 476/2008 on Energy Efficiency and on amendments to Act 555/2005 on the Energy Efficiency of Buildings
Date	November 4, 2008
Summary of Bill	This Act lays down obligations and requirements for the efficient use of energy. The Act applies to all forms of commercially available energy with the exception of aviation fuel and heavy fuel oil for maritime transport. The Ministry of Economy is mandated to prepare the Framework for efficient use of energy, evaluate the performance of the policy for five years, and prepare action plans for energy efficiency every three years. The Act also specifies the obligations of energy producers, distributors, suppliers and consumers. It lays down minimum technical requirements for heat insulation and hot water distribution networks, as well as minimum technical standards for the transfer, transport and distribution of heat. The amendment of December 1, 2014 regulates obligations for the conducting of energy audits, and establishes deadlines (2015 and 2017) for owners of large buildings (over 1000 m^2) to supply data on the buildings' energy consumption and to insulate heat and hot water distribution.

Name of Act	Act No. 529/2010 on the eco-design of energy related products
Date	December 14, 2010
Summary of Bill	Act No. 529/2010 transposes directive 2009/125/EC of the European Parliament and of the Council for establishing a framework for the setting of eco-design requirements for energy-related products.

Name of Act	Act. 555/2005 on the Energy Efficiency Certification of Buildings
Date	September 1, 2005
Summary of Bill	This Act is the main instrument for reducing GHG emissions from buildings up to 2020. It defines measures leading to the improvement of energy efficiency in buildings with the aim of optimizing indoor conditions and reducing CO2 emissions emitted from the maintenance of buildings. It also stipulates the relevant powers of public authorities. The Act also regulates energy performance certificates (EPCs) for buildings. These legislative changes set standards for the compilation of EPCs in order to improve their quality. Differing energy efficiency categories are designed to help both property owners and purchasers classify the energy status of buildings as well as related expenditures for energy consumption and GHG emissions. Buildings for which an energy performance certificate as well as an energy label must be provided include public buildings with a total floor area of more than 250 m^2, used by a public authority, and frequently visited by the public. Energy certification is required for buildings or separate parts of a building that are sold or rented to new tenants, as well as all newly constructed buildings or buildings that have undergone major renovation. The Act determines the circumstances under which the owner of building or the auditors may be fined. The Act also establishes that new large buildings must use either central heat delivery, or heat produced by a combined heat and power source or a source utilizing a local heat delivery system running on renewable energy. Compliance with the relevant technical standards is mandatory as of the passing of the Act.

Name of Policy	3rd Energy Efficiency Action Plan for years 2014–2016 with the prospect by 2020 (Government resolution no. 576/2007 of July 4, 2007)
Date	2014 (2007; 2011; 2014)
Summary of Policy	The Slovak Republic's Energy Efficiency Action Plans, pursuant to the European Commission Directive on energy end-use efficiency and energy services, aim to achieve energy savings in individual sectors of consumption, amounting to 9 per cent of the average annual national consumption from 2001–2005. Overall attainable energy savings amount to 37,215 TJ by 2016, with an intermediate target of attaining 30 per cent of this final energy consumption savings by 2010, amounting to approximately 12,405 TJ. The Action Plan aims at forming the necessary legislative environment, establishing an effective monitoring and information system, defining and implementing low-cost organizational and technical measures, and financial support mechanisms. The latter include the planned establishment of an Energy Efficiency Fund to provide grants for supporting specific energy efficiency-related activities. The Action Plan categorizes energy-saving measures according to various sectors. Planned measures include: Buildings (non-industrial) • Updating and improving building regulations and requirements for new and existing buildings • Establishing a building documentation package, with transparent information on audits and energy certification

Name of Policy	3rd Energy Efficiency Action Plan for years 2014–2016 with the prospect by 2020 (Government resolution no. 576/2007 of July 4, 2007)
	• Improving the energy efficiency and thermal properties of public sector buildings • Improving monitoring and verification of buildings' energy performance • Introducing voluntary energy certificates/audits • Investment support for refurbishment of prefabricated buildings • Support for local utilization of renewable sources for heat generation Appliances • Implementation of the eco-design directive • Providing information campaigns and consultancy services on energy-efficient appliances • Replacing inefficient white goods Public Sector • Improving public lighting, setting minimum efficiency requirements for public lighting Industry and Agriculture • Funding energy audits as a basis for establishing energy saving targets in industry • Promoting energy demand monitoring and management, innovation and technology transfers • Improving efficiency in the manufacturing process • Promoting high efficiency cogeneration Transport • Fleet replacement and modernization in public passenger railway transport • Modernization of fleet to promote low-emission road vehicles • Optimizing traffic control, public transport, intelligent transport systems • Modernizing transport infrastructure Amended: The Second National Energy Efficiency Action Plan covered 2011–2013. The Third National Energy Efficiency Action Plan is for the period 2014–2016.

Name of Policy	Energy Efficiency Fund
Date	2009–2015 (ended)
Summary of Policy	The Ministry of Economy proposed the Bill on the Energy Efficiency Fund to be presented to the Slovak Parliament in the second half of 2008. It was intended to transpose EU Directive 2006/32/EC on energy end-use efficiency and energy services. Although the Bill was originally expected to be implemented from January 2009 onwards, it has never reached the point of being established. However, in relation to the new Energy Efficiency Directive (EED) adopted at the EU level in 2012, and in accord with articles 7 and 14 of the EED, Slovakia is in the process of preparing a financial mechanism for energy efficiency.

Name of Policy	Energy Efficiency Fund
	The Energy Efficiency Fund was one of the financial mechanisms proposed in the Slovak Government's Energy Efficiency Action Plan for the years 2008–2010. The main goal was to provide supplementary financing for energy efficiency measures. The initial financing of the Fund would be provided from the national budget (Chapter of the Ministry of Economy) up to the year 2010, totaling 600 million Slovak crowns. Beginning in 2011, a substantial portion of the Fund was to be financed by obligatory contributions from energy companies selling electricity, natural gas, and heat produced from coal for final energy consumption, which would be obliged to contribute to the Fund in the amount of: • 4 Slovak crowns for each MWh of electricity sold • 3.2 Slovak crowns for each MWh of natural gas sold • 4 Slovak crowns for each MWh of heat produced from coal sold The Fund would provide financing for: • establishing and operating a system for energy efficiency monitoring • increased public information campaigns on energy efficiency • promoting energy audits in all sectors of the national economy • promoting energy rationalization projects in industry, services, the public sector, and households • the development of energy services

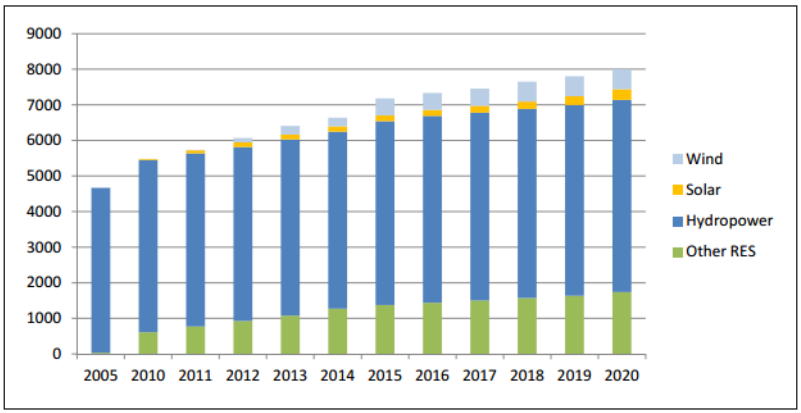
Name of Policy	Draft of the Energy Efficiency of Buildings up to 2010 with a further outlook to 2020
Date	2008, amended 2012
Summary of Policy	The Ministry of Construction and Regional Development of the Slovak Republic issued its Draft of the energy efficiency of buildings up to 2010 with a further outlook to 2020, in June 2008. The Draft presents the legal framework and necessary institutional, technical, promotional and incentive frameworks for achieving energy efficiency in buildings. It includes: an analysis of the current state of energy efficiency in the Slovak building stock; barriers to improved energy efficiency potential of buildings; the possibilities of achieving higher building energy efficiency related to the program of energy end-use efficiency; a preliminary set of measures for improving the energy efficiency of buildings; the available potential for energy conservation in buildings; and possible forms of financing, promotional programs, funds and new measures for the outlook from 2010 to 2020.

Renewable energy sources (RES)

Slovakia has a relatively large potential in RES. Its diversity and complex geological structure create opportunities for wide RES utilization. 98 per cent of electricity currently generated from renewable sources comes from hydroelectric generation, mostly contributed by major hydro-generation

stations. It is estimated that 55 per cent of the hydro-generation potential of Slovakia is currently in use, although only 25 per cent of the potential of smaller hydroelectric stations is being exploited. The Slovak government plans to continue to support and to effectively use this energy source, and refers to the future construction of four new major, and approximately 100 smaller, hydroelectric stations. The high forestation levels (44.3 per cent), and the advanced forestry and agricultural sectors, allow for the extensive utilization of biomass.

Figure 2. RES-E generation (GWh)



Source: author's own elaboration of Slovakia's NREAP

The use of RES has grown in the past decade. In 2010 the share of RES reached 9.5 per cent of gross domestic power consumption in the Slovak Republic. Biomass in particular presents an opportunity for agriculture. Of all the RES in Slovakia, agricultural biomass has the highest energy potential. Its theoretical energy potential within Slovakia may be quantified at more than 106 PJ or 29,449 GWh of heat, equal to 13.2 per cent of total energy consumption (800 PJ).

Slovakia's Ministry of Agriculture and Rural Development is responsible for the renewable energy from biomass of agricultural origin. The Ministry is therefore preparing support for RES through legislation, innovation, and implementation of EU directives and regulations, as well as subventions for farmers supporting technologies for utilization of biomass for energy.

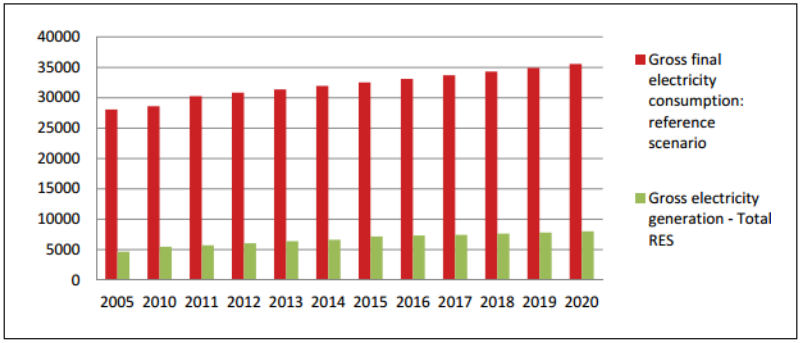
Direct subsidies for the planting of energy crops in Slovakia are used only in the form of subsidies from the EU framework. Subventions for technologies for utilization of biomass for energy purposes were available to Slovak farmers

within the framework of Slovakia's Rural Development Program 2007–2013. The program supported the use of renewable energy for diversification into non-agricultural activities and for farm modernization measures. Projects were assessed in particular with regard to the following criteria: solution of biogas treatment from the waste of livestock (manure, slurry) as well as biodegradable waste (dendromass, agricultural biomass), waste from vegetable production, and specific waste from food production and rendering. The modernization projects were to support the utilization of RES other than wind, hydro and solar energy, provided that the bulk of the energy was consumed by the final beneficiary within their own business (i.e. by legal or natural persons, whose share of income revenue from agricultural production was at least 30 per cent of total receipts/revenues). These subsidies were mainly in the form of financial support for the purchase of biomass utilization technologies, such as small agricultural or regional biogas stations which use agricultural waste to produce energy, or technologies such as furnaces, or pellet, chip and straw bale manufacturing machines. Support for the processing of material for the production of renewable energy is in the country's interests, enabling it to honor its EU agreements on the use of bio-fuels and biomass.

While in the past the use of biomass did not receive adequate attention, it is considered today, among all the renewal energy sources, to have the greatest potential for growth. The proportion of biomass in Slovakia's energy generation is small, at approximately 2 per cent of energy consumption (the EU average is approximately 4 per cent). The use of biomass, however, has shown a relatively stable rate of increase in recent years. This tendency is reflected in some government documents, for example in the Strategy for Higher Utilization of Renewable Energy Sources in the Slovak Republic, adopted in April 2007, and in the Action plan for the use of biomass for the years 2008–2013, which is based on a similar EU Commission document, namely The Biomass Action Plan of December 2005. It is expected that the use of biomass could potentially expand to approximately 18 per cent of the entire energy generated in Slovakia. Biomass has therefore the greatest growth potential of all renewable energy sources in the next 5–10 years. This high potential for the use of biomass is seen particularly in heat generation, biogas production, and manufacture in the form of methyl ester as an addition to fuels, and in the form of bio-alcohol as an additive to petrol. Investment in rape seed oil is also under discussion. In this connection it should be noted that the Slovak government, as the first among the Central and Eastern Europe states, imposed the obligation on producers to add biofuels to diesel and petrol. Regarding solar and wind energy, it must be pointed out that the National Grid Operator regards and defines it as "non-predictable RES," and this is the reason why more serious and difficult administrative procedures are applied when starting such RES projects in Slovakia. In spite of the small proportion of solar and wind energy in use at present, it is seen to have solid potential for growth. As mentioned

above, thanks to Slovakia's geographical conditions, there is a relatively high potential for the use of geothermal energy. The characteristics of Slovakia's geothermal sources are particularly suitable for heating.

Figure 3. Electricity consumption and RES-E generation (GWh)



Source: author's own elaboration of Slovakia's NREAP

According to the Slovak NREAP, gross final electricity consumption is forecasted to grow from 28,609 GWh to 35,552 GWh (a 24 per cent growth) between 2010 and 2020. RES-E production, in the same period, is expected to grow from 5.481 GWh to 8.000 GWh (a 46 per cent growth). Combining these figures suggests that the share of RES generation in gross final electricity consumption will grow from 19.16 per cent in 2010 to 22.5 per cent in 2020, meaning that Slovakia (according to this outlook) will be able to satisfy 19.16 per cent and 22.5 per cent of its internal electricity consumption through the internal production of RES in 2010 and 2020 respectively. In absolute terms, this would nevertheless involve an increase in consumption through non-renewable generation or from imports, from 23.1 to 27.6 TWh/year. In comparison, historical data indicate that the share of RES generation in total consumption rose from 6.4 per cent in 1990 to 15.5 per cent in 1998, dropped to 12.4 per cent in 2003, rose again to 15.5 per cent in 2008 and in 2014 it was 12.7 per cent.[4]

Projections to 2020 take into account the trajectories foreseen in the Slovak NREAP. The NREAP foresees a focus on renewable heat, mainly driven by the need to limit dependency on fossil heating fuels. In the near term, therefore, renewable electricity will receive comparatively less attention, and

[4] For more see the official website of the Ministry of Economy of the Slovak Republic, part Energy, Important Documents. Available online: http://www.economy.gov.sk/dolezite-dokumenty-5714/127399s (accessed on October 20, 2016).

support for it gradually reduced. According to the NREAP, Slovakia has overfulfilled its PV plan by a large margin and is thus planning to add little or no PV to its existing capacities before 2020. In contrast, no new wind installations have been built in Slovakia in recent years and the overall installed capacity (Eurostat) is very low, with 5 MW of onshore wind. This is not in line with the Slovak NREAP, which foresees a significant increase in wind capacities to 350 MW by 2020. Roughly 200 MW worth of projects are currently still in the planning stage or have had their operations suspended.

At the moment, support for large RES installations generally is in question in Slovakia. For the time being, the Ministry of Economy is mainly interested in feasible auction designs, as it wants to be prepared for possible substantial changes in the support scheme. Auction-based support would be in line with State Aid regulation, which requires newly notified support measures for large RES to be based on a competitive mechanism. It would also help to address the concerns of many political players regarding support expenditures and the possibility of limiting supported volumes. A more detailed economic and legal evaluation would be necessary to determine whether keeping the current FIT scheme may also be an option, given State Aid regulation. The current support scheme is experiencing its own difficulties. No wind parks have been built in Slovakia since 2009. The main reason for this, according to project developers, are the severe administrative barriers with regard to grid access. Pre-developed wind projects are in the pipeline but cannot proceed because the grid authority has not granted any connection permits for several years. This barrier to grid access will not be removed by replacing the existing FIT scheme with an auction-based scheme. Instead, it must be removed from the existing support scheme independently of other changes. Nevertheless, any future auction scheme will have to be coordinated with grid permitting procedures. Opening a policy discussion on auction designs may therefore help to reopen the policy discussion on grid access and the associated barriers.[5]

Renewable energy sources are not only suitable for mass energy generation, but also offer an alternative for households to decrease their energy bills or fulfill their energy needs in more environment-friendly ways. Experts and market watchers, however, note that the use of renewable energy sources (RES) generally by households in Slovakia is low, blaming this on a general lack of information and unsuitable support schemes. Even the survey taken in 2014 gave a very clear picture that among households RES is associated mainly with solar heating, and that other options and available technologies are much less recognized, when people are asked to decide what kind of technology they would want to install.

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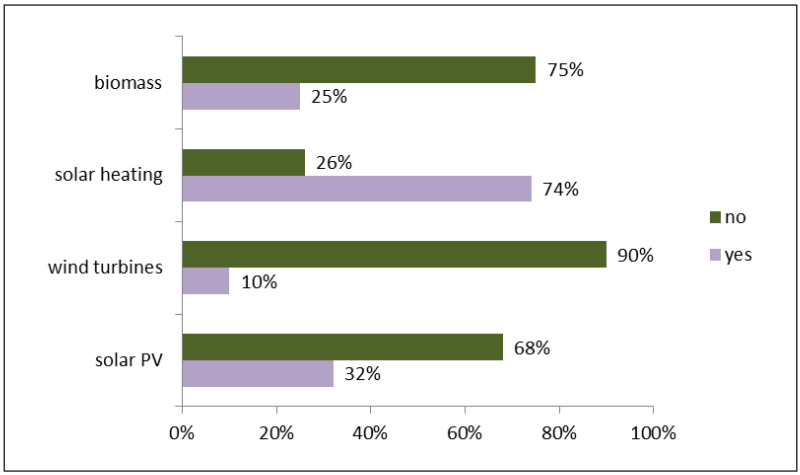
[5] "Implementation of auctions for renewable energy support in Slovakia: a case study," *Report* D7.1-SK, March 2016. Available online: http://auresproject.eu/files/media/documents/wp7_-_case_study_slovakia_3.pdf (accessed on October 20, 2016).

Figure 4. Slovak households – RES perception



Source: SIEA research carried out by GfK, summer of 2014

With the help of a little appropriate communication, this picture has changed dramatically. The Slovak Innovation and Energy Agency is administering a Green for Households project that allows for the subsidized installation of various forms of RES – heat pumps, solar PV, solar heat, biomass, and wind, up to 10 kW. Support for individual facilities will be calculated according to installed capacity with an estimated return on investment after up to ten years. Experts in renewable energy sources take the plan with a pinch of salt, referring to the bureaucracy imposed on ordinary people and some level of clientelism. Others claim that solar PV and other RES technologies are economically self-sufficient, and that EU support only distorts the market and delays investment by households. But current experience and the first five calls for grants have provided clear evidence: over 15 million euros have been allocated, and still the demand is higher than the particular calls are designed to handle. Currently over 3,000 installations are up and running. The first allocation of 45 million euros will be distributed up to the end of 2018, and afterward the next package of 50 million euros to the end of 2020 will be available. This approach should provide a substantial contribution to Slovakia's overall 2020 target. The Ministry of Economy perceives this financial support for households as an innovative approach that should increase energy self-sufficiency and reduce the impact of RES on the electricity grid.

According to the Ministry of Economy, it is important that there is sufficient information available so that renewables are not disdained and attacked by politicians.

This is the first time the European Commission has agreed to allocate EU funds directly to households.

In the past, the Ministry of Economy ran several support schemes. In 2009, it launched the first subsidy program of 6.6 million euros for solar collectors and biomass boilers. Within two years, 5,410 solar systems were installed in family houses and 39 apartment buildings. In total, 1,427 households received a contribution for the purchase of a biomass boiler. However, the program ended in 2011 after all the money had been spent.

Overview of the legislation related to renewable energy sources

Name of Act	Act No. 309/2009 on Support of Renewable Energy Sources and High Efficiency CHP
Date	December 1, 2014
Summary of Bill	Implements Directives 2004/8/EC and partially 2001/77/EC. The Act defines the conditions for support of RES and high efficiency CHP production (mostly electricity and biomethane production), the rights and duties of electricity producers, distribution network operators and producers of biomethane, the rules for issuing certificates of origin for electricity produced by RES and high efficiency CHP and biomethane, and pricing rules and obligations for state administration bodies. The Act targets all scales of RES electricity and CHP generation (up to 200 MW). Under the Act, RES and high efficiency CHP electricity producers would be entitled to preferential transmission, distribution and delivery of their electricity. System operators would also be required to buy RES and high efficient CHP electricity at a preferential fixed purchase price and for an investment period of 15 years. This price would be set by the Regulatory Office for Network Industries (RONI). The Act defines input data (general and technical parameters) that the application must include; the guarantee of origin is issued by the RONI after verification of the data and a relevant calculations evaluation. Among other provisions, the Act lays down a support system for electricity production from RES and high-efficiency CHP, as well as the production of biomethane (a biogas), and outlines electricity producer rights and obligations, as well as those of other market participants. Provisions for electricity production are: • Preferential connection and access to the grid, as well as preferential transmission, distribution and supply; Mandatory off-take by regional distribution system operator (DSO) for the price of electricity losses (stable prices for 15 years);A bonus price, stable for 15 years; Responsibility for deviations assumed by regional DSO; Certificates of origin Provisions for biomethane production are: • Right of a producer to conclude a contract regarding access, connection and transmission with DSO if certain technical and commercial conditions met;

Name of Act	Act No. 309/2009 on Support of Renewable Energy Sources and High Efficiency CHP
	• Preferential distribution and supply; • Certificates of origin; • Certification for quantity supplied Energy producers and DSOs can incur fines if they do not comply with the Act. For producers, false information regarding the origin of electricity from RES or failure to comply with other provisions, can entail fines ranging from 500–100,000 euros. A DSO that doesn't allow access, connection or transmission of green electricity can face fines of 10,000–200,000 euros. A DSO can also face fines of 500–100,000 euros for failure to comply with the Act.

Name of Policy	The Slovak Energy Efficiency and Renewable Energy Finance Facility (SLOVSEFF III)
Date	2014 (third stage of SLOVSEFF – SLOVSEFF III)
Summary of Bill	SlovSEFF III is a sustainable energy financing facility developed by the EBRD in collaboration with the Ministry of Environment of the Slovak Republic and the Ministry of Agriculture, Food and Environment of Spain, which are funding the program's incentive payments and technical assistance respectively. The incentive payments are financed from the proceeds of an innovative carbon credit transaction between the governments of the Slovak Republic and Spain. Under the terms of the agreement, the Slovak Republic has allocated the proceeds from the sale of emission permits towards additional greenhouse gas (GHG) emission reduction projects in the Slovak Republic (please click here for more information). Given the nature of the overarching carbon credit transaction, SlovSEFF III seeks to promote the reduction of GHG emissions by introducing a link between a project's GHG emission reduction potential and the incentive payment level for renewable energy and industrial energy efficiency projects. The program's focus will be on financing these investment categories. The incentive payment for residential energy efficiency projects is based on the environmental impact that the proposed measures combined are able to achieve. The SlovSEFF III participating financial institutions (banks) are Slovenská sporiteľňa, a.s. and VÚB, a.s.

Name of the policy	Framework for the development of electricity generation from small renewable energy sources in Slovakia (I. Stage)
Date	July 2013
Summary of the bill	The conception for the development of electricity generation from small renewable energy sources in SR brings, in the first phase, a coherent approach to legislative and financial support for the development of small sources of electricity and heat intended mainly to cover a household's own consumption, without compromising the stability of the distribution system or the effect of financial savings for operators of small resources and for distribution companies. At this stage, the following will be considered suitable sources for households: photovoltaic panels, small wind turbines, solar thermal collectors, heat pumps and biomass boilers.

Enforcement agencies and institutions responsible for EE and RES

The Energy Policy of the Slovak Republic is the strategic document defining the energy sector's primary objectives and priorities up to 2035 with a view to 2050. It is a component of Slovakia's national economic strategy, given that the ensuring of sustainable growth is conditioned by the reliable supply of affordable energy.

The Ministry of Economy of the Slovak Republic is responsible for completing the Energy Policy for a minimum period of 20 years, and updating it on a five-year basis.

Other players responsible for energy efficiency and RES:

The Ministry of Environment of the Slovak Republic

Functions as the central state administrative authority and supreme inspection authority in environmental affairs, nature and landscape protection.

The Ministry of Transport, Construction and Regional Development of the Slovak Republic

Responsible for implementing the National Regional Development Strategy, whose aim is to comprehensively define the strategic approach of the State regarding the promotion of regional development in Slovakia.

The Regulatory Office for Network Industries

Performs its mission pursuant to Act No. 250/2012 on regulation in network industries; determines prices and the conditions of their application in network industries, and the conditions for the performance of regulated activities.

Slovak Environment Agency

Responsible for analysis and assessment of the environment, providing of environmental services, environmental informatics and data management, implementation of the Operational programs Environment, and Quality of the Environment (as an intermediary body), programming and implementation of environmental projects.

Slovak Innovation and Energy Agency

This Agency handles the information service for the Ministry of Economy of the Slovak Republic, with a special focus on innovation and the energy sector. It gathers data and disseminates information related to the increase of energy efficiency; the use of renewable energy sources, combined heat, and power; and the development of innovation activities. Performs monitoring of energy efficiency measures and prepares the draft for the annual report on EEAP fulfillment.

Slovak Environment Inspection

Performs state surveillance over environmental matters.

Slovak Trade Inspection

On May 1, 2014 the State Energy Inspection was merged with Slovak Trade Inspection, and so now the SOI (State Trade Inspection) performs state supervision and control over business in the energy sector, by virtue of Act no. 251/2012 on energy and on amendments to certain laws, and subsequently in accordance with §89 of the Act, also according to Act no. 657/2004 thermal energy, Act no. 555/2005 energy performance of buildings, Act no. 314/2012 the regular inspection of heating systems and air conditioning systems, Law no. 476/2008 on efficiency in the use of energy (Energy Efficiency Act), and Act No. 309/2009 on the promotion of renewable energy sources and high efficiency cogeneration, as amended.

Success story

Since its establishment in 1996, the Slovak Housing Development Fund has provided support for 48,000 customers in the amount of over 2.7 billion euros. The State Housing Development Fund has been around now for twenty years.

During its twenty years of existence, the fund has shown the irreplaceable nature of its activities related to economic tools aid in the field of housing construction and the rehabilitation of housing.

We have contributed to the construction and restoration of 289,702 housing units. In addition, we provide support for 22 social service facilities with a capacity of 483 beds for the elderly. In the area of municipal rental flats, we have supported 1,938 projects in 1,638 cities and towns in the construction and purchase of 35,403 rental dwellings.

Thus reports CEO SHDF Juraj Kurňavka, who is also considering new development programs for the State Housing Development Fund such as the

reconstruction of student hostels, dormitories, etc. "Since these subsidies go to public buildings, we have not forgotten the elderly – even more than before, the fund can participate in the construction and reconstruction of social facilities, nursing homes, and other specialized facilities. We know that what is needed are parking spaces – so why not support them?" says Kurňavka.

The State Housing Development Fund is a financial institution, subordinated to the Ministry of Transport, Construction and Regional Development of the Slovak Republic. The establishment of the State Housing Development Fund in 1996, in accordance with the Policy Statement of the Government and the Draft of state housing policy, meant a decisive breakthrough in the recovery of residential construction in Slovakia.

Housing Development Support from the state fund focuses mainly on the construction of municipal housing and the renovation and insulation of housing stock. Support is provided to young families under the age of 35 for the acquisition of private housing, as well as to cities and municipalities for the construction and reconstruction of social facilities. Currently, the fund has 69 staff members and a support budget amounting to 389 million euros. In 2015, it supported the construction and renovation of 42,605 housing units.[6]

[6] "Štátny fond rozvoja bývania funguje už dvadsať rokov. Doposiaľ investoval viac ako 2,7 miliardy eur," State Housing Development Fund, November 10, 2016. Available online: https://www.sfrb.sk/sites/default/files/TS_2016_11_10_ŠFRB%2020.%20rokov%20web.pdf (accessed on November 10, 2016).

Energy efficiency donors in Ukraine

Energy Efficiency in Municipalities project in Ukraine, GIZ, duration September 2013–April 2017; 4 million euros. At the regional and local levels the project provides support to five consortia of municipalities, led by:

- Dnipropetrovsk Oblast Council – http://oblrada.dp.ua/
- Chernivtsi City Council – http://city.cv.ua /
- Poltava Oblast State Administration – http://www.adm-pl.gov.ua/
- Zhytomyr City Council – http://zt-rada.gov.ua
- Sievierodonetsk City Council – http://www.sed-rada.gov.ua/.

More information about the project is available online: http://eeim.org.ua/wp-content/uploads/2014/09/EE_Factsheet_EEiM_2016-04-19_en.pdf

Facility for energy saving credits is a loan program under the ***Nordic Environment Development Fund*** (NMF), which is intended to offer small scale financing primarily for energy saving measures in municipally owned buildings such as schools, day care centers, hospitals and sports facilities. The energy saving measures can, for instance, include refurbishment of heat subcentrals and installation of thermostatic valves together with the insulation of windows and doors. Loans may also be granted for the replacement of mercury-vapor street lamps with energy saving ones. In exceptional cases, small scale wind mills may be financed by the Facility.

More information on the project is available online: http://www.nefco.org/work-us/our-services/loans-and-equity/facility-energy-saving-credits

MERP project of USAID in Ukraine. September 2013–September 2017, 14.5 million USD. For municipalities and public utilities, educational programs on energy efficiency and SEAP, and the strengthening of legal and regulatory framework.

More information on the project is available online: http://www.merp.org.ua/index.php?option=com_content&view=category&id=50&Itemid=914&lang=us

The Eastern Europe Energy Efficiency and Environment Partnership (E5P). E5P is a 170 million euro multi-donor fund managed by the EBRD and designed to promote energy efficiency investments in Ukraine and other Eastern Partnership countries.

More information on the project is available online: http://ukraine.e5p.eu/about-e5p/history-rationale/

Residential Energy Efficiency Finance Facility (UREEFF). The Facility is funded with up to 100 million USD, which will be made available to qualifying Participating Financial Institutions (PFIs) in Ukraine, including new and existing clients, for on-lending to eligible private sector sub-borrowers for sustainable energy investments in the residential sector.

The first part, named IQ energy, will be implemented through partner-banks – UkrSibbank, OTP Bank and Megabank – which have a strong network of branches across Ukraine. The program will be supported by an extensive energy efficiency awareness campaign.

More information about the project is available online: http://www.ebrd.com/news/2016/ebrd-launches-ureeff.html

A ***Ukrainian state program for energy efficiency*** is being implemented through these partner-banks: Oshchadbank, Ukrgasbank, and Ukreksimbank. This is a loan facility that falls under a state support program for individuals, condominiums and housing associations, and is aimed at ensuring the implementation of energy efficiency measures and boiler replacements. The available budget is approved each year within the state budget. The program will be replaced by a state Energy efficiency fund in 2017, with the main goal of providing financial and technical support, as well as the monitoring of energy efficiency measures in the residential sector.

More information on the project is available online: http://www.kmu.gov.ua/control/en/publish/article?art_id=248909406 as well as an interactive map of regional and district support programs: http://saee.gov.ua/en/programs/map

International Finance Corporation (IFC) will support the development of Ukrgasbank's sustainable energy finance business. This is an emerging field in which banks provide credit to clients who want to invest in solar arrays, efficient water treatment systems, and other green technologies. This project is regarded as key within Ukraine, where the per-capita use of energy is among the highest in the world. Aging infrastructure and transmission losses mean the average Ukrainian uses 3.7 times more energy than the average German, and three times more than the average European.

More information on the project is available online: http://ifcextapps.ifc.org/IFCExt%5CPressroom%5CIFCPressRoom.nsf%5C0%5C1AB3F5169F4DE42485257FB70034A3B8

Small scale EE/RES projects may also receive financial support from the Embassies of Germany, Austria, Sweden, Denmark, and Norway.

Contributors

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