Recommendations on energy efficiency in Ukraine

Developed by the partners of the ARCEE project, considering the research performed by other organizations

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Glossary

EBRD	European Bank of Reconstruction and Development
EPC	Energy performance contract
ESCO	Energy Service Company
EU	European Union
EUEA	European Ukrainian Energy Agency
GHG	Greenhouse gas
GIZ	Deutsche Gesellschaft für Internationale Zusammenarbeit
HOA	Homeowner association
HVAC	Heating, ventilation and air conditioning
IEA	International Energy Agency
IFC	International Finance Cooperation
MEPS	Minimum Energy Performance Standards
VAT	Value-added tax

1. Introduction

Ukraine is known to be one of the least energy efficient countries in the world. The residential sector consumes around 25 percent of the domestic electricity production and the share of heat consumption is reaching approximately 40 percent.

The housing stock in the country is obsolete and inefficient. Most of the buildings are poorly insulated, which leads to unacceptably high energy losses. This does not only create uncomfortable living conditions for the inhabitants and increases their energy bills, but also significantly contributes to the greenhouse gas (GHG) emissions of the country. However, the residential housing sector offers very good opportunities for achieving high energy savings. According to the estimations of the International Finance Cooperation (IFC)[1], investments with simple payback terms can result in heat energy savings of 30-40 percent, which would lead to a 25-30 percent reduction of gas consumption.

The main reasons for addressing the problem of low energy efficiency in Ukraine are therefore energy security, improved living comfort, and a reduction of GHG emissions.

Many national and international organizations are working on the topic of energy efficiency in Ukraine, doing independent research and providing practical recommendations on national, regional and local levels. In the context of the ARCEE project, a research on existing recommendations has been conducted in order to avoid duplication. This paper is partly based on the review of existing recommendations, but also includes recommendations developed by the partners of the ARCEE project, based on own experience and observation. To keep the paper concise, only those recommendations, which are regarded by the ARCEE project as the most crucial and realistic for implementation will be presented. A list of the used documents can be found at the end of the paper.

[1] See "IFC Ukraine Residential Energy Efficiency Project"

2. Preconditions necessary for implementing energy efficiency projects in Ukraine

In order to achieve progress on energy efficiency in Ukraine and finance residential energy efficiency projects, a lot of reforms have to be implemented in the country. In the existing recommendations, the following aspects are highlighted as particularly important:

- awareness raising programs and promotional campaigns on energy efficiency related topics,
- educational programs,
- legislative and institutional changes,
- technical reforms,
- improved possibilities to finance energy efficient modernization

One of the conclusions of the researched conducted in the frame of ARCEE project is that Ukraine shall urgently develop a **National Roadmap on Energy Efficiency** to set a cost-effective pathway for increasing energy efficiency. Since the topic of energy efficiency is relatively new in the country and there is no solid knowledge and experience in this area, it might be useful to consider knowledge of Western European countries in the development of efficient strategies and policies. Based on energy use, new technologies and efficiency opportunities, the government should **design and regularly update strategies and action plans on energy efficiency** improvements, with short, medium and long term targets for specific energy efficiency sectors. According to Pavliuk, efficient strategies should:

- consider the experiences and analysis of other countries and international organizations,
- set clear objectives and timelines, and establish evaluation methods,
- identify barriers to cost-effective efficiency investments and attempt to overcome or minimize them,
- evaluate opportunities for energy efficiency improvements and prioritize action plans for sectors and end-users in which the policies are likely to yield the largest, most cost-effective improvements.[2]

As highlighted in existing recommendations, the policies should be guided by the following principle:

- The effectiveness of policy and action plans should be monitored and evaluated during and after the implementation, with the results used as an input to upcoming decision making.

The problem of non-compliance shall be strictly defined in the legislation and violations must result in associated penalties.[3] Besides developing strategies and actions plans on energy

[2] See Pavliuk 2012.

[3] See Pavliuk 2012.

efficiency, a fundamental precondition for increasing energy efficiency is **accessible and transparent information**. One can easily notice that there is a problem in Ukraine with accessing relevant information. The statistical database is not properly organized and it is difficult to get access to reliable energy data. The partners of the ARCEE project find it extremely important to improve the availability and reliability of energy statistics in Ukraine, in order to facilitate the development of effective energy efficiency indicators. The statistical database of the IEA can serve as a good example for the development of statistical data templates and the lay-out of tables.

3. Information and education

For a successful implementation of policies on energy efficiency in the residential sector, it is very important to facilitate awareness raising and educational campaigns among the population. Informative and educational measures on energy efficiency are necessary both for energy consumers and for professionals in the construction and refurbishment sector.

Awareness raising campaigns

ARCEE partners find that one of the fundamental problems in Ukraine is the extremely low level of the population's awareness on the topic of energy efficiency. Energy efficiency is a rather abstract topic and the population is often not aware of how simple measures like efficient ventilation and the use of a lid while cooking food can significantly reduce their energy bill at the end of the month.

Comprehensive, but at the same time simple and user-friendly informative materials on efficient energy consumption may stimulate the citizens' interest on energy-related topics and ensure steady improvements in their habits and lifestyles with regard to energy consumption.

Among the topics, which need to be covered in information materials are:

- the energy performance of a building in general as well as the energy performance of building components,
- the benefits of an energy efficient modernization,
- existing energy efficient equipment and home appliances,
- financing options for energy efficient modernization.

A lot of different recommendations can be offered in order to improve the situation. The partners of the ARCEE project find the two following aspects particularly important:

- In order to introduce the concept of energy efficiency already to very young citizens, it would be very useful to start **mandatory educational programs** at schools. The educational materials shall present the basics for environmental education with a particular focus on energy saving life-styles. Very important topics to be covered in the curricula are simple measures how to save energy in the household, waste management (including generating energy from waste), renewable sources of energy, wise resource consumption and many

others. The information shall be offered in a very simple form supported by visual materials, using simple understandable examples, complemented with nice illustrations. This is regarded as a first step to raise an environmentally conscious generation, and will also help to distribute knowledge among parents and other family members.

- In order to reach more people from different target groups, energy efficiency advertising campaigns (including in mass-media) should be conducted all over the country. It is also recommended to organize round tables, workshops, and annual energy efficiency exhibitions.

Education and training of specialists

In the context of their work on the ARCEE pilot projects on energy efficient refurbishment, the partners from the ARCEE project have noticed another obstacle for progress in the energy sector: the lack of specialists in the area of energy efficiency and often not appropriately qualified professionals, including architects and managers of homeowner associations. Therefore, it is highly recommended to establish educational programs for energy auditors and business planners. Additionally, training programs for the key personnel from different relevant organizations (e.g. house owner associations) can be developed. This will ensure better skilled professionals in all sectors.

4. Legal and institutional changes

The current national legislation is another potential obstacle for increasing energy efficiency in Ukraine. Although energy related issues have in the past years been discussed a lot, so far energy efficiency measures are not properly regulated and supported by the legislation.

Energy efficiency should be comprehensively covered in the national legislation and has to be mandatory for all parties involved in the municipal construction sector. Weaknesses, i.e. a non-proper consideration of energy efficiency, can be found all over the legislative framework. The weaknesses have been pointed out by organizations such as the Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ), the IEA, the European Bank for Reconstruction and Development (EBRD) and local Ukrainian institutions, which are working on energy efficiency in Ukraine. A wide range of recommendations has been developed with regard to improving the legislative basis. Some of the most important and urgently needed actions from the ARCEE project's point of view are the following:

- Clearly defining the legal status of home owner associations (HOAs)

Once an agreement of all house owners to conduct an energy efficient renovation has been made, the project financing is one of the first questions to be resolved. Besides the financing possibilities there is also a legal aspect of this problem. Currently, the legal status of HOAs is not clearly defined in the legislation. Therefore, HOA cannot become a customer of a bank to borrow the money needed for a renovation project. As the IFC and the EBRD highlight, it is necessary to

establish a legally viable homeowner client base, which will enable the creation of new credit facilities for HOAs through commercial banks[4].

- Supporting activities with regard to energy audits

The experience of the ARCEE project shows that normally the citizens of Ukraine are not willing to hire energy auditors to make an energy performance analysis. This is partly due to the lack of financial possibilities and partly due to the very low level of awareness on energy efficiency. Therefore, we strongly recommend that the government should support activities related to energy audits and energy efficiency assessments, which would include reliable technical assistance on energy efficiency opportunities in the residential sector through networks or energy advisory services. This will introduce inhabitants to the issue of energy efficiency and will help to identify the most promising energy saving options and provide recommendations on the best financing choices.

- Supporting establishing specialists' resource centers to assist HOAs

Very often, the building modernization planed by a HOA does not comprehensively consider energy efficiency measures. In other cases, energy efficiency is considered, but the result at the end of the project is not satisfactory. This often happens due to the fact that HOAs do not possess sufficient knowledge on energy efficiency topics, and often do not have or are not willing to spend money to hire external specialists. As pointed out in section 3, training programs for HOAs are necessary to increase their own knowledge. Additionally, it might be very effective if the government initiates programs supporting the establishment of external specialists' centers to consult and advice HOAs on different aspects with regard to energy efficient refurbishments.

- Supporting and promoting Energy Service Companies (ESCOs)

A wide introduction and support of ESCOs would provide a very good opportunity for Ukraine to increase its energy efficiency in the residential sector in a cost-efficient way. ESCOs are companies that deliver energy services such as energy audits and management, operation, monitoring and evaluation of savings at the clients' home. The contract signed between the client and an ESCO is called energy performance contract (EPC) and is supposed to ensure future energy savings. The ESCO profit is therefore based on an improved energy performance at the customer's home. As a consequence, ESCOs are motivated to execute a project professionally and achieve the maximum energy savings.

Due to a lack of legal regulations, implementing such projects is not possible in Ukraine. To improve the situation, the government should legally define ESCO and EPC in the legislation, as viable option for the contracting of energy services and design mechanisms to launch ESCO projects.[5]

[4] See IFC/ EBRD/ Swiss Confederation 2013.

[5] See Berlin Economics GmbH 2013.

- Phasing out subsidies for fossil-based energy, providing support to groups at-risk

The prices for gas are still subsidized in Ukraine. This hampers the progress with regard to energy efficiency, lowering the motivation for inhabitants to invest in energy efficiency technologies. The subsidies for gas, coal and electricity have to be gradually removed, relocating the money instead to subsidizing energy efficient measures. This will provide benefits, although being difficult for particular social groups. Therefore the reforms related to phasing out of energy subsidies shall be accompanied by support programs for vulnerable groups of the population, in order to protect them from the full impact of increased energy bills.[6]

- Reducing VAT for products with energy-saving potential

A good support for residences and a motivation to invest in thermal refurbishment could be to decrease the value-added tax (VAT) for products, which have a significant potential to decrease the energy consumption in buildings. Examples of such products are energy efficient windows, insulation materials, modern heating, ventilation and air conditioning (HVAC) systems and heating technologies.[7]

5. Technical reform

A technical reform of the current regulations on buildings is necessary in Ukraine. This must include a comprehensive set of measures, including the introduction of technical standards, which shall comply with the EU's Directive on Energy Performance of Buildings (Directive 2010/31/EU). Ukraine has to further elaborate the law on energy efficiency in the residential sector, which remains under discussion and has not yet been enforced. Energy efficiency should be one of the priorities of the national energy strategy, as it is in the member states of the European Union. The following aspects are regarded as particularly important:

- Improving building energy codes with minimum energy performance standards (MEPS)

In basically all analysis and recommendations developed by international organizations reviewed for this paper, the need to improve the building energy codes was pointed out. So far, a high share of newly constructed buildings in the country shows an energy performance which does not differ a lot from the buildings constructed in the Soviet Union era. The government of Ukraine should adopt legally binding requirements for all new buildings as well as buildings that undergo a refurbishment process to comply with the minimum energy performance standards (MEPS). The standards shall be specifically applied to different components such as, for example, the building envelope and equipment.[8]

[6] See IEA 2012.

[7] See Kiva 2009.

[8] See IEA 2011 .

- Introducing mandatory building energy labels and certificates

One of the difficulties the partners of ARCEE project faced in Ukraine was the absence of proper documentation, providing energy information on existing buildings in Ukraine. Neither inhabitants nor the management of HOAs were aware of what is the realistic energy consumption of the building. Therefore, the ARCEE partners highly recommend, that building energy performance labels and certificates shall become mandatory in the country. The main purpose of such labels and certificates is to provide information on buildings' energy performance to owners of the flat as well as to buyers and renters. The energy consumption of a flat should be one of the criteria that influence the decision of a resident to choose a home to live in. So far, in Ukraine only new buildings are required to have energy certificates. This is a good sign, although for the moment only a very small share of the building stock is covered, and it is still not clear whether all new buildings have proper energy documentation.

- Focusing on more efficient appliances and equipment

One of the problems in the country is the use of inefficient home appliances and equipment. As the IEA highlights, in order to improve the situation, all appliances and equipment should undergo mandatory MEPS and labels. Furthermore, the government of Ukraine should demand and promote improvements in the design and management of lighting products and systems. One of the important steps in this regard is to ensure that updated building codes contain MEPS for lighting products and promote natural lighting. In order to achieve progress in this area, the government shall ensure that the test standards and measurements protocols for lighting products are regularly updated and comply with international test standards. As soon as it becomes technically feasible and economically viable, the government should phase out inefficient lighting products and systems, based on MEPS.[9]

- Improved energy performance of new and old buildings, focusing on critical components

There is an urgent need to establish policies designed to improve the energy performance of new and old buildings. The government shall design a package of policies focusing on critical components. The IEA recommends paying particular attention to the following aspects[10]:

- promote energy management to reduce energy consumption in the residential sector to reduce energy consumption and explore more energy-saving opportunities,
- improve the overall energy performance of windows and other glazed areas,
- improve the insulation layer of the outer wall,
- reduce the energy demand from HVAC and heating systems

According to the IEA, the policy packages should include performance-based requirements and guidelines, which would help to identify the best solution for different buildings types and maximize the energy performance of a building.[11] Also the requirements for product

[9] See IEA 2011.

[10] See IEA 2012.

[11] See IEA 2011.

manufacturers have to be provided, in order to make sure that products underwent sufficient testing and comply with the MEPS.

- Introducing consumption-based invoicing for the use of energy

In the current situation in Ukraine a lot of inhabitants do not exactly know how much energy is consumed for heating purposes. The heating costs are calculated according to the apartment size and do not always reflect the real consumption. As highlighted by the IFC, the EBRD and the Swiss Confederation, introducing metering systems would be a very important reform, which would help house owners to pay energy costs according to their real energy consumption and show them how energy saving measures can directly reduce the energy bill.[12]

- Aiming for net-zero energy consumption in buildings

Constructing buildings with zero energy consumption can be a good innovation, which should be encouraged and supported by the government of Ukraine. The IEA highlights that the policy package should include targets for the market share of zero energy buildings in all new constructions by at least 2020.[13] This building concept shall also be properly defined in legislation and considered in building codes.

6. Financing

Energy efficiency measures often require significant investments. So far, the loans provided by local banks are too expensive for the population, and sometimes the savings from improved energy efficiency will be nullified due to very high investments. Therefore, one of the most important aspects in the development of energy efficiency in Ukraine is the establishment of a reliable financing system in the country, which will ensure affordable financing opportunities for the population. The topic is very complex and should include the development of financing options not only for individuals, but also for house owner associations. In particular, the followings aspects regarding financing are recommended:

- Simplifying the bank borrowing procedure

The current regulations must be changed to enable domestic banks to finance thermal modernization in residential buildings. Among the changes there shall be a simplified list of the documents required by the bank, clearer conditions for borrowers and less stringent requirements regarding the security of expended loans. [14]

- Developing an understandable and accessible system of financial support for thermal upgrade programs, based on cheap loans

[12] See IFC/ EBRD/ Swiss Confederation 2013.

[13] See IEA 2011.

[14] See IFC/ EBRD/ Swiss Confederation 2013.

The ARCEE partners involved in the refurbishment pilot projects in Ukraine reported that one of the main arguments for not implementing energy efficient modernization was the fear to take a bank loan. Residences are very sceptic about banks and try to avoid extremely high interest rates. The suggestion from the ARCCE projects is that the Ukrainian government in co-operation with international and local financial institutions and municipalities, shall design effective mechanisms for financing energy efficient refurbishments and stimulate private-public cooperation. Credits from the EBRD and other international organizations could be a great source for financing the thermal upgrading of buildings. Nevertheless, the government of Ukraine should develop own strategies on how to establish the cooperation with banks, for ensuring reliable, affordable financing possibilities for the population based on a low interest rate.

- Providing funds to encourage upgrading

A high share of the population still cannot afford an energy efficient refurbishment, even when considering lowered interest rates. As shown by Pavliuk, the establishment of specially designed funds to encourage upgrading could be a good support for homeowners.[15] Funds need to be set up with specific sources of revenue and defined principles of spending. Ukraine could follow the example of Poland, and set up a thermal upgrade bonus for the buildings that undergo a thermal upgrading, based on the previous energy audit. The Polish Ministry of Finances covers 25% of the bank loan sum returning the money directly to the lending bank.

- Creating oblast eco-funds

A solid source for thermal upgrades can be oblast ecological funds. So far the nature of these funds makes it very complicated to use the available capital for energy efficiency projects. Due to different formalities around 20% of the money remain unused and are consequently transferred to the state budget. As highlighted among others by Pavliuk, this situation needs to be changed by simplifying the formalities and defining the energy efficient projects as one of the purposes of oblast eco-funds.[16]

- Introducing new untraditional financing mechanisms

An example for alternative sources of revenue for financing energy efficiency projects was provided by Pavliuk. He suggests that the owners of buildings can sell the roof areas for the construction of penthouses, lofts or other purposes. Depending on the received amount of money, it can be used to cover expenses for energy audits, exchange of inefficient heating systems and other equipment or other energy efficiency related measures.[17]

[15] See Pavliuk 2012.

[16] See Pavliuk 2012.

[17] See Pavliuk 2012.

7. Conclusion

The conducted research clearly indicates that in order to achieve significant progress with regard to energy efficiency, a lot of reforms have to be implemented in Ukraine. A lot of support is required from the government. The legal background for implementing energy reforms has to be in place. In order to ensure that the policy and strategies are consistent and efficient, a National Roadmap on energy efficiency has to be developed. Examples of Western European countries, which have solid experience in dealing with energy efficiency issues, can be a great support.

Financing energy efficient refurbishments seems to be one of the most critical issues for Ukrainians. Available bank loans have extremely high interest rates, which sometimes nullifies the monetary benefit of energy savings. Therefore, creating financing mechanisms and providing cheap reliable credits for the population shall be one of the priorities for the government in establishing pleasant conditions for the development of energy efficient programs in the country.

Along with the legislative and institutional changes, there is another aspect that requires careful consideration. Currently the majority of Ukrainian citizens have very little knowledge on the topic of energy efficiency. This results on the one hand in life-styles that do not consider energy saving as an issue and on the other hand in strong resistance to energy reforms. Here an important role is assigned to Civil Society Organizations. They can act as a support to the government, initiating educational programs at schools, organizing round tables, seminars and exhibitions. If done successfully, many different target groups can be reached and introduced to the energy efficiency topic, explaining why reforms are necessary, and at the same time providing simple suggestions on how to save energy at home and in business, directly reducing the energy bill.

Although the energy sector in Ukraine is currently not very stable, the residential sector provides a lot of opportunities for achieving significant energy savings. Solid reforms undertaken on the state level in combination with private initiatives will create a lot of new opportunities and will insure a steady energy-efficiency progress in the residential sector.

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