

Financial Mechanisms for Energy Efficiency - A comparative Study of Austria/India/Ukraine

A Master's Thesis submitted for the degree of
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supervised by
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Affidavit

I, **KONSTANTIN MAXIMILIAN OEDL**, hereby declare

1. that I am the sole author of the present Master's Thesis, "FINANCIAL MECHANISMS FOR ENERGY EFFICIENCY - A COMPARATIVE STUDY OF AUSTRIA/INDIA/UKRAINE", 75 pages, bound, and that I have not used any source or tool other than those referenced or any other illicit aid or tool, and
2. that I have not prior to this date submitted the topic of this Master's Thesis or parts of it in any form for assessment as an examination paper, either in Austria or abroad.

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Signature

Abstract

The objective of the paper is to present and elaborate existing financial mechanisms promoting energy efficiency in three case countries: Austria (representing the EU), India and Ukraine. Based on each countries legislation and policy plans, existing instruments are presented with a focus on the time period between 2010 and 2020. Furthermore, the funding environment of these countries is discussed and compared to each other. Funding mechanisms are elaborated based on financial resources, financial instrument used, economic sector it applies to and various national and international stakeholders involved.

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Abbreviations

ADB	Asian Development Bank
BEE	Bureau for Energy Efficiency (India)
BMK	Ministry for Climate Action, Environment, Energy, Mobility Innovation and Technology (Austria)
DECA	Dachverband Energie-Contracting Austria
E5P fund	Eastern Europe Energy Efficiency and Environment Partnership
EAFRD	European Agricultural Fund for Rural Development
EASME	Executive Agency for Small and Medium-sized Enterprises
EBRD	European Bank for Reconstruction and Development
EC Act	Energy Conservation Act (India)
EEF	Energy Efficiency Fund (Ukraine)
EEEF	European Energy Efficiency Fund
EEEP	Energy Efficiency Enhancement Project
EFSI	European Fund for Strategic Investment
EPBD	Energy Performance of Buildings Directive (EU)
ESCO	Energy Service Company
ESIF	European Structural and Investment Funds
ESPC	Energy Saving Performance Contracting
ERDF	European Regional Development Fund
EPC	Energy Performance Contracting
FI	Financial Institution
GEFund	Global Environment Fund
GOI	Government of India
HOA	Homeowner Association
IEA	International Energy Agency
IFC	International Finance Corporation
JBIC	Japan Bank for International Cooperation
JICA	Japan International Cooperation Agency
KPC	Kommunal Kredit Public Consulting
MoP	Ministry of Power (India)

NEEAP	National Energy Efficiency Action Plan
NEFCO	Nordic Environment Finance Corporation
NMEEE	National Mission for Enhance Energy Efficiency (India)
OEGUT	Austrian Society for Environment and Technology
PACE-D	Partnership to Advance Clean Energy
PAT	Perform Achieve and Trade Scheme
PRGFEE	Partial Risk Guarantee Fund for Energy Efficiency
PRSF	Partial Risk Sharing Facility
SAEE	State Agency for Energy Efficiency (Ukraine)
SECF	State Energy Conservation Fund
SEFIPA	Sustainable Energy Financing Platform Austria
SIDBI	Small Industries Development Bank of India
SME	Small and Medium sized Enterprise
UFI	Umweltförderung im Inland (Austria)
USAID	U.S. Agency for International Development
VCFEE	Venture Capital Fund for Energy Efficiency

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1. Introduction

As the world is facing never before experienced climate change, there is a common and global attempt to transform energy systems into CO₂-neutral ones. There are two main strategies for this transformational process. The general idea is to transform the CO₂-rich energy production system into renewable energy production, with wind, solar and hydropower. The second strategy is to increase energy efficiency. This means to receive the same result, like travelled distance, keeping houses warm in winter or keeping offices cool in summer, by using less primary energy. As primary energy is mostly fossil fuels, a higher energy efficiency means also less CO₂ emissions. Legislation uses different ways to enhance the desired enhancement of energy efficiency. Besides legislative restrictions, “(i)nvestments in energy efficiency (EE) are being increasingly recognized as the most cost-effective options, in the short- to medium-term, to reduce costs, deliver increased economic productivity and competitiveness, increase energy security, and mitigate emissions of greenhouse gases” (MoP and USAID, 2013).

As a result, countries are increasingly recognizing the potential of energy efficiency. The European Union has created the key principle of putting energy efficiency first: “Energy efficiency needs to be considered whenever decisions relating to planning the energy system or to financing are taken. Energy efficiency improvements need to be made whenever they are more cost-effective than equivalent supply-side solutions” (EU Directive 2018/2002). Furthermore, there are additional benefits resulting from investment in energy efficiency, such as improvements in the state of environment, public health, security of supply, reduced energy costs, additional jobs and sustainable growth. In 2015, the international community concluded in the Paris Agreement to make “finance flows consistent with a pathway towards low greenhouse gas emissions and climate-resilient development” (Paris Agreement, Art. 2/1). This includes substantial investments in energy efficiency as it is expected that energy efficiency will be responsible for 57 percent of CO₂ emissions reductions worldwide between 2002 and 2030 (IEA, 2011). To achieve climate change goals, sufficient financial resources need to be provided. This cannot only be reached by public funds alone, and therefore, financial instruments should be used to incentivize private investments into this field (ERDF, 2019).

The IEA tracks global energy efficiency trends annually. In its latest report from 2019, the IEA concluded that the rate of improvements was falling within the last five years. The reasons for this deceleration are: intensity in industrial production, cooler winter and warmer summers, im-

provements in technology versus changes in mobility and more building floor area per person. “Levels of investment targeting efficiency have remained largely unchanged since 2014. At \$240 billion, incremental efficiency investments across the buildings, transport and industry sectors were about 0.6 percent higher in 2018 than in 2017 but still well below the levels required to capture the cost-effective opportunities available” (IEA, 2019a).

A major challenge is to decide which instruments are most efficient for achieving various aims. This depends on the policy objectives and on the target audience. Instruments may be used to leverage investments and can be e.g. debt based, equities or funding by grants (ERDF, 2019).

1.1. Why these Cases?

This paper discusses three different economies and their approach to enhance energy efficiency. The cases represent a developed country - Austria, one developing - India, and one economy in transition - Ukraine. This choice was made to create a comprehensive picture of global development of energy efficiency development. These countries are very different according to their GDP and therefore their ability to invest. Population, geographical size and energy production and total energy usage also vary. This paper shows how the state of the economy in a given country influences their activity in this area and finally how similar approaches are, despite their very difference.

The case of Austria as a European country is examined to give a better understanding of how energy efficiency financing strategies are implemented in the EU and on a country level. It still depends on which country of the EU is analysed, as it is more likely that foreign investment takes place in a relatively low-income country, e.g. an eastern European country, compared to a central European country like Austria. Therefore, it should be noted that Austria does not represent a comprehensive picture of EU states. Rather, Austria has to be seen as a single example of a high-income EU member state (GDP per capita EUR 44,187 (USD 50,000)). Further research is necessary to create an overview of energy efficiency measures and finance over the whole EU region. Furthermore, the EU's activity in European member states, including Austria and other countries, must be differentiated, e.g. EU programmes and institutions in Ukraine are mentioned within the financial mechanisms chapter of Ukraine.

Ukraine is seen as an economy in transition, with a GDP per capita of EUR 3,270 (USD 3,700). Its geographical position and its membership to the Energy Community constitutes its close economic and political relation to the EU, which has a huge influence on energy efficiency development within the country.

India has the second biggest population. It has a GDP per capita of EUR 1,855 (USD 2,100) (World Bank Data, 2020a).

The high differences of GDP per capita already shows a high disparity in development and financial resources between these countries.

GDP per capita (current US\$) - Austria, Ukraine, India

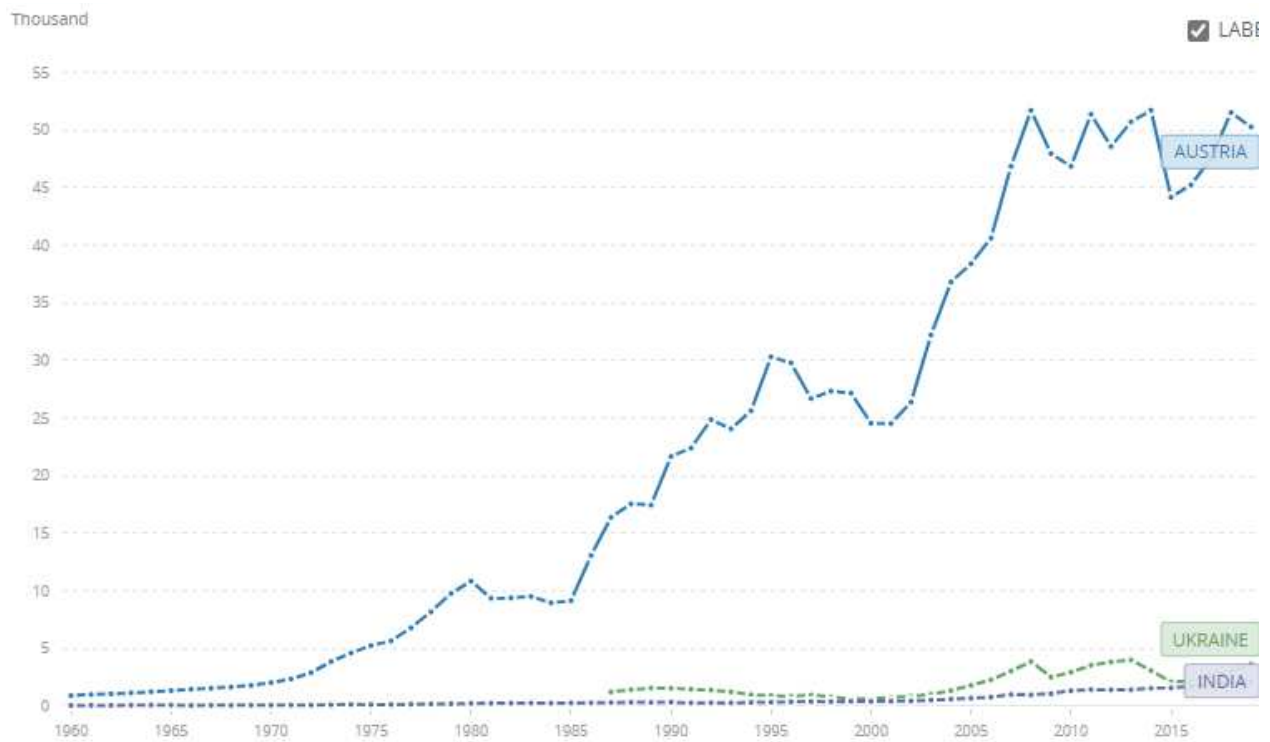


Figure 1: GDP per Capita (World Bank Data)

Looking at CO₂ emissions per capita, the difference between these countries is getting smaller. An Austrian is emitting about 7,000 metric tons per year. In the Ukraine¹ it is 4,500, whereas in India it is just 1,800 metric tons per year (World Bank Data, 2020b). Considering the differences in population size, this picture changes respectively.

¹ „The economic decline that followed the collapse of the USSR in 1991 led to a significant reduction of production, energy consumption, and thus to lower CO₂ emissions.“ (Ministry of Ecology and Natural Resources of Ukraine, 2019)

CO2 emissions (metric tons per capita) - Austria, Ukraine, India

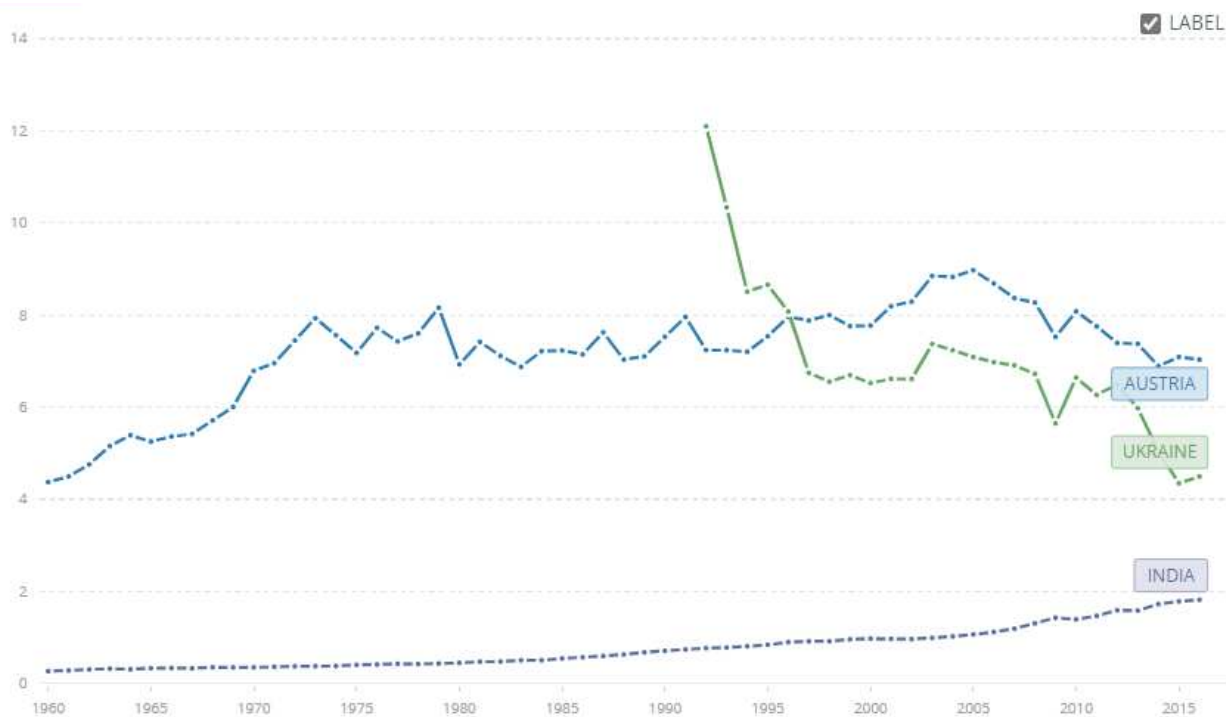


Figure 2: CO2 emissions (metric tons per capita) (World Bank Data)

1.2. Relevance of the study

Analysing investment mechanisms of different countries, previously undertaken research on selected countries give an overview of existing financial mechanisms. As a result of the rapidly changing environment of investment flows and the complexity and amount of existing instruments, adequate research is rare. Additionally, there are not many comparative studies addressing this issue. Especially, there is none known so far to compare such an example of countries in such a different state of economic development as represented within this paper.

1.3. Methodological Approach & Sources

This work constitutes a comparative study of existing financial mechanisms for energy efficiency within these countries. Generally, it is based on a literature research of primary sources, as directives and programmes of different stakeholders, and secondary sources. The focus period ranges from year 2010 until 2020.

Beside implemented mechanisms from governments, there are various international financing programmes, e.g. the International Finance Cooperation (IFC), the World Bank and others, in-

cluding bilateral ones. This needs to be considered into an overall assessment of progress of energy efficiency within the case countries.

Multiple sources provided the necessary data. First of all, the general primary and secondary literature on legislation, policy and implementation from the responsible national ministries, agencies and involved institutions are discussed. Furthermore, resources are provided by various organizations, companies, agencies or scientific research dealing with energy efficiency. As many programmes and their most current data is not easily available in an adequately published form, this study uses some direct sources from institutional websites presenting their ongoing programmes and current developments. Economic data and amounts of funding are used, if available, and processed in an overall assessment of total investments made.

1.4. Definitions

Energy Service Company (ESCO) is “a natural or legal person that delivers energy services and/or other energy efficiency improvement measures in a user's facility or premises and accepts some degree of financial risk in so doing. The payment for the services delivered is based (either wholly or in part) on the achievement of energy efficiency improvements and on the meeting of the other agreed performance criteria” (EU Directive 2006/32/EC).

Energy Performance Contracting (EPC) is “a contractual arrangement between the beneficiary and the provider (normally an ESCO) of an energy efficiency improvement measure, where investments in that measure are paid for in relation to a contractually agreed level of energy efficiency improvement” (EU Directive 2006/32/EC).

Financial Mechanisms or Financial Instruments: The terms financial mechanisms and financial instruments are being used interchangeably within this paper. They define a technical way governmental or institutional bodies are funding (energy efficiency) programmes and projects. This can be in various forms. Most seen are grants, loans, guarantees, or even EPC through ESCOs.

1.5. Structure of the paper

In the following chapter, the fundamental legislations dealing with energy efficiency are presented for each country, including EU legislation, which is highly relevant in the case of Austria and Ukraine. Furthermore, implemented policies targeting the issue are discussed. This should create a general understanding of what is happening in the legal and political field. As energy laws, may be regulated by state law, this paper will focus on federal law and programmes. These programmes are also applicable for local activities, however, addressing regulations and funding pro-

grammes of each state in these three cases goes beyond the scope of the present paper. Where necessary, references will be made to legislation and policy in the third chapter on the financial mechanisms.

The main part of this work presents how existing mechanisms address the issue of financial implementation and support of energy efficiency in each country. This includes supporting instruments of the EU and other International Financial Organizations (IFOs). These measures are elaborated, and funding mechanisms are analysed by purpose, source and stakeholders involved, the financial instrument used, the sector in which it applies and, if available, the investment volume. This will present a general overview over the most important existing financial mechanisms.

Within the next chapter, the key knowledge gained from the individual analysis is elaborated and addresses the following questions: How do these mechanisms and processes look in an international comparison? What makes them similar, and where are the main differences of these country approaches? To make this complex structure and mechanisms more understandable, they will be summarized and presented within a table.

In the last chapter, the key findings of the analysis of the financing environment for energy efficiency within these three case studies are presented.

2. Legislation and Policy

2.1. European Union

2.1.1. Energy Efficiency Directive

In 2012, the EU implemented its first binding measures within the Energy Efficiency Directive (EED) (EU Directive 2012/27/EU) aiming at increasing energy efficiency by 20 percent by 2020. Thereby all EU member states must promote more efficient energy usage from its generation to its end-use consumption. Following the directive, the EU adopted additional measures, including renovations of state-owned and occupied buildings, long-term renovation strategies for the building stock, the implementation of national energy efficiency action plans (NEEAPs), energy efficiency standards and labelling schemes, reduction of national energy sales and obligation schemes for energy companies.

In 2018, the EED was amended for the long-term development of energy efficiency (2018/2002) to 2030 and beyond. This was undertaken under the *Clean Energy for all Europeans package* in 2019. The 2030 target is to reach at least 32.5 percent relative to year 2007. In another amending decision, the EU commission has taken the withdrawal of the UK into account, which reduces the total target for all EU member states respectively. In case of economic and technological developments, which allow a substantial cost reduction, an upward revision may be implemented. This amending directive dictates energy savings of 0.8 percent per year of final energy consumption between 2021 and 2030 for each EU country. The directive must be implemented into national law within 2020. Additionally, member states are obliged to set up integrated 10-year national energy and climate plans (NECPs), presenting how they intend to meet the targets. Furthermore, there will be a general revision of the directive by 2024 (European Commission, 2016).

Under the required implementation of energy efficiency obligation schemes, member states “may also take other policy measures to achieve energy savings”, including “financing schemes and instruments or fiscal incentives that lead to the application of energy-efficient technology or techniques and have the effect of reducing end-use energy consumption” (EU Directive 2012/27EU, Art. 7/9).

According to EU law, the specific implementation to achieve the targets set up in the directive depends on resulting national law. The obligated NEEAPs should be supportive in this matter.

2.1.1.2. Energy Performance of Buildings Directive

In 2010, the European Union implemented the Energy Performance of Buildings Directive (EPBD) (Directive 2010/31/EU), which set up standards for energy efficiency of buildings, as well as the implementation of an Energy Performance Certificates system. In 2018, the EU amended the directive, sending signals to EU member states to modernize the building sector (Directive 2018/844/EU). Within this directive, EU member states are obliged to establish national roadmaps to decarbonize the building sector, encouraging smarter controls systems of buildings energy performance and mobilizing more financing for renovations.

2.2. Austria

2.1.2.1. Energy Efficiency Act

Energy consumption and saving targets in Austria are founded on the baseline established through the EU EED. In Austria, energy efficiency is addressed by the Energy Efficiency Act (EEffG), which was implemented in 2015 to comply with the EU directive and enhance overall efficiency. Energy suppliers are thereby obliged to undertake energy efficiency measures at their own, their customers or other end users of their energy (WKO, 2018). Therefore, various measures were implemented to support their efforts, such as “regional residential building grants, energy and environmental grants and federal funding instruments” (BMK, 2018).

In September 2018, an evaluation process for the reconfiguration for post-2020 started. Certain measures are to be taken into account, including “funding schemes, will be needed to support the implementation of energy management systems in SMEs (small- and medium-sized enterprises)” and “investments in thermal building renovation, high-efficiency building services and energy management systems in buildings,” as well as “the possibility of shorter amortization periods for investments in certain energy efficiency measures” (BMK, 2018).

2.1.2.2. Climate and Energy Strategy

In 2018, *Climate and Energy Strategy (#mission2030)* was created to ensure compliance with EU regulation and the government programme in the environmental and energy sector. “This applies to requirements, targets and guide values laid down in EU directives on renewable energy, energy efficiency and the performance of buildings and in regulations on effort sharing, land use and governance of the Energy Union. These requirements must be taken into account in specific measures and during preparation of the Integrated National Energy and Climate Plan” (BMK,

2018). Besides, the necessary development of the renewable energy sector in general, as developing infrastructure and further storage facilities, increasing investments in energy efficiency are necessary to reach 100 percent of total national electricity consumption by 2030 (BMK, 2018).

In general, energy efficiency has to be promoted in all relevant sectors, such as buildings, industry, small- and medium-sized enterprises and transport. Thereby, the *#mission2030* should mobilize investment and enhance the development of the necessary economic framework.

The general aim is that energy services stay economically affordable for Austrian businesses. Price incentives should therefore be supportive in achieving a transformation of the energy system. “Competitive pricing mechanisms that take account of tax, duty and incentives should be used to minimize market distortions. Households, commerce and industry should be able to participate actively in the energy market and to react to price signals” (BMK, 2018).

2.1.2.3. Integrated National Energy and Climate Plan

In December 2019, the Republic of Austria finalized its Integrated National Energy and Climate Plan for Austria for the period 2021-2030. In this document, Austria lays down a detailed policy and strategic plan to achieve EU climate and energy targets by 2030. In regards toward energy efficiency, this plan presents target, objectives and planned policies for improving within this field. This includes developing investment and financing strategies (BMK, 2019a).

2.1.2.4. Environmental Subsidy Act

The 1993 implemented Environmental Subsidy Act (Umweltförderungsgesetz) aims to protect the environment and includes energy and resource efficiency measures. It regulates measures, objectives and resources used by respective ministries. Applicable measures can be financial or investment subsidies or in the form of purchased emission reduction units. Amended regularly within the last decades, the Act aims to support objectives and the implementation of the EEEffG (UFG, §§1-6).

2.3. India

2.2.1. Energy Conservation Act

In 2001, the Energy Conservation Act (EC Act) was implemented, aiming to reduce the energy use of India's economy. Within this process, the Bureau of Energy Efficiency (BEE) was established in 2002 to coordinate the implementation of the act. Besides, various standards, labelling and other procedures, the act shall enable the government and the BEE to promote and facilitate energy

efficiency within the Indian economy. Within the amendment of the EC Act in 2010, the issuing of energy savings certificates was specified, which should enhance market activities in the field of energy efficiency. Today “India's mandatory energy efficiency policies cover 23 percent of its energy use” (IEA, 2018).

2.2.3. Energy Conservation Building Code

India enacted a National Building Code in 1970, however, energy efficiency aspects were never “covered clearly although some provisions may indirectly lead to energy efficiency improvements” (Chandel et al., 2016). To address energy efficiency explicitly, the Energy Conservation Building Code (ECBC) was implemented in 2006. The BEE revised the Code, supported by USAID (USAID, 2017). The ECBC contains performance-based and prescriptive energy efficiency guidelines for commercial and residential buildings. Nonetheless, this does not cover small residential buildings, which constitute a major part of the sector. Therefore, a few states have included certain energy efficiency provisions within their respective regulations (Chandel, et al., 2016).

2.2.2. National Mission for Enhanced Energy Efficiency

In 2008, the Indian government implemented a National Action Plan on Climate Change (NAPCC), including the National Mission on Enhance Energy Efficiency (NMEEE) (GOI, 2008). The NMEEE is one of the eight missions under the NAPCC. “The mission focuses on encouraging use of energy efficient appliances, demand side management and developing fiscal instruments to promote energy efficiency” (Chandel et al., 2016). Within the NMEEE, the market for energy efficiency is estimated at USD 12.4 billion (GOI, 2008).

Significant commitments were also made. India’s New Climate Plan improves “energy efficiency and reduce transmission and distribution losses as part of its drive for a cleaner energy supply” (Ahmad et al., 2017). Generally, the NMEEE aims to strengthen the market for energy efficiency by creating conducive regulatory and policy regime and has envisaged fostering innovative and sustainable business models to the energy efficiency sector (IEA, 2019b). The BEE and the Ministry of Power (MoP) jointly have set up various energy efficiency programmes “in the areas of household lighting, commercial buildings, standards and labeling of appliances, demand side management in agriculture/municipalities, SME's and large industries, and others” (MoP, 2020).

Under the NMEEE, four initiatives were included, the Perform Achieve and Trade (PAT) scheme, a Market Transformation for Energy Efficiency (MTEE) programme, an Energy Efficiency Financing Platform (EEFP), as well as a Framework for Energy Efficiency Economic Development

(IEA, 2019b). “The highest coverage in industry is due mainly to the Perform, Achieve, and Trade (PAT) scheme” with about 40 percent (IEA, 2018).

The 12th national plan was approved in 2014 ,with a total amount of about EUR 100 million (INR 7.75 billion). “The Mission seeks to upscale the efforts to unlock the market for energy efficiency, which is estimated to be around EUR 9.5 billion (INR 740 billion)” (MoP, 2020).

2.4. Ukraine

2.3.1. Applicable Law for Energy Efficiency

Ukraine's law on energy efficiency is based on the 2004 implemented Law on Energy Conservation, which was never amended. In 2011, the Ukraine joined the Energy Community, which was established “to extend the EU internal energy market rules and principles” to neighboring countries (Energy Community, 2020a). “By signing the Energy Community Treaty, the contracting Parties committed to implementing key EU energy law,” and Ukraine is therefore bound by its legislation. “In the area of energy efficiency, the Contracting Parties implement the EU *acquis* on energy efficiency (framework directive), energy performance of buildings and labelling of the consumption of energy by energy-related products” (Energy Community, 2020b). As part of the Energy Community, Ukraine must also develop a National Energy Efficiency Action Plan (NEEAP), which it has not done for the period after 2020. Nevertheless, in compliance with EU law, Ukraine aims to reduce its final energy consumption by 20 percent in 2020.

2.3.2. (Draft) Law on Energy Efficiency

In 2015, the Ukraine government started to draft a new law on energy efficiency based on the legislative standards of the Energy Community. However, the procedure was stopped during the presidential elections in 2019, and Ukraine has “not transposed the Energy Services Directive nor the Energy Efficiency Directive to date” (Energy Community, 2020c). Several legislative attempts were made to meet the EED, such as e.g. a Law on Commercial Metering of Heat Power and Water Supply. Nevertheless, Ukraine is still behind on full compliance with EU energy efficiency laws, required by the EED (Energy Community, 2020c).

2.3.3. Law on Energy Efficiency of Buildings

However, in 2017, the Ukrainian Parliament passed a law “On the Energy Efficiency of Buildings”, to establish a new framework for energy efficiency in the building sector. It is another step to implement European energy efficiency law and correlates with the requirements under the

EU Directive 2010/31/EU. Additionally, it includes a mandatory certification system equal to Energy Performance Certificates within the EU (SAEE, 2018/CMS, 2017).

2.3.4. ESCO market development and financing

A law amending legislation on energy services was concluded, in 2017. This focuses on the development of a mechanisms for Energy Service Companies (ESCO), creating new investment programs, supporting businesses for thermal energy modernization projects and enhancing an ESCO market in the Ukraine. As a result, ESCO projects are progressing for buildings renovation, with the first energy performance contracts signed for both central government buildings and residential ones (UNDP, 2017/EC, 2020).

2.3.5. Energy Efficiency Fund

The “Law on Energy Efficiency Fund” to support energy efficiency measures in the residential sector was adopted by Parliament in 2017. The Energy Efficiency Fund was registered as a legal entity in June 2018, and the necessary secondary legislation for launching the Fund was passed. Through this fund, the Government of Ukraine provides funds for the development of energy efficiency in the building sector (UNDP, 2017/EC, 2020).

2.3.6. Energy Strategy

The latest Energy Strategy of Ukraine was adopted in 2017. The key objectives of this strategy is “a sectoral transformation that will improve Ukraine’s energy efficiency, security, competitiveness and integration with the EU energy space” (OECD, 2020). Within this strategy enhancing funding for energy efficiency, increasing investment attractiveness and improving the business climate is addressed. Besides reducing its dependence on energy imports, it also considers the possibility of a further integration into the European energy market.

3. Financial Mechanisms

Financial mechanisms and instruments are playing a key role in reaching necessary and desired energy targets. Therefore, governments and other international and national stakeholders are trying to enhance energy efficiency development by offering a wide variety of financial products and resources. These are presented within this chapter.

3.1. European Union

As already mentioned, the EU wide legislation on energy efficiency is created on the EU level, whereas actual implementation of these regulations has to be made by each member state respectively. To support member states in implementing and funding energy efficiency measures, several EU institutions are actively involved in the process of funding energy efficiency projects and should provide financial support through financial instruments to achieve energy efficiency goals on the member states' level.

Various financial institutions and instruments within the EU have to be distinguished. On the one hand, there are grant-based mechanisms, where financial means do not have to be paid backed, from European Structural and Investment Funds (ESIF) and specific EU programmes. On the other hand, loans and guarantees come mainly from the European Energy Efficiency Fund (EEEF) and the European Investment Bank (EIB) (Auer et al., 2015). One of the main focuses of these institutions and financing is to encourage overall investments and the creation of new funds.

List of the main Financial Mechanisms

- 3.1.1 European Structural and Investment Funds
- 3.1.2. European Regional Development Fund
- 3.1.3. European Agricultural Fund for Rural Development
- 3.1.4. Investment plan for Europe
- 3.1.5. European Funds for Strategic Investment
- 3.1.6. Private Finance for Energy Efficiency
- 3.1.7. Connecting Europe Facility
- 3.1.8. European Investment Bank
- 3.1.9. European Local Energy Assistance
- 3.1.10. JASPERS and JESSICA
- 3.1.11. European Energy Efficiency Fund
- 3.1.12. Intelligent Energy Europe
- 3.1.13. Horizon 2020
- 3.1.14. LIFE program
- 3.1.15. Project Development Assistance

- 3.1.16. Energy Performance Certificates
- 3.1.17. Smart Finance for Smart Buildings
- 3.1.18. Energy Performance Contracting

3.1.1 European Structural and Investment Funds

The ESIFs are managed by EU countries and the European Commission and consist of five different funds. Funding for energy efficiency projects, especially the ERDF, is playing a key role. Additionally, there is the Cohesion Fund, which funds environmental and transport projects in EU countries with relatively low gross national income. However, as our case study Austria falls out of this category, this fund is not explicitly addressed within this chapter.

Financial Instruments (FIs), in general, function as structures that enable the ESIFs to offer financial products, such as equities, guarantees and loans, enhancing projects, which promote general European policy objectives. These European financial instruments are “managed by the Managing Authorities of the ESIFs, who can place funds into a pooled Fund of Funds, or allocate funds directly to a financial intermediary” (EIB, 2020a).

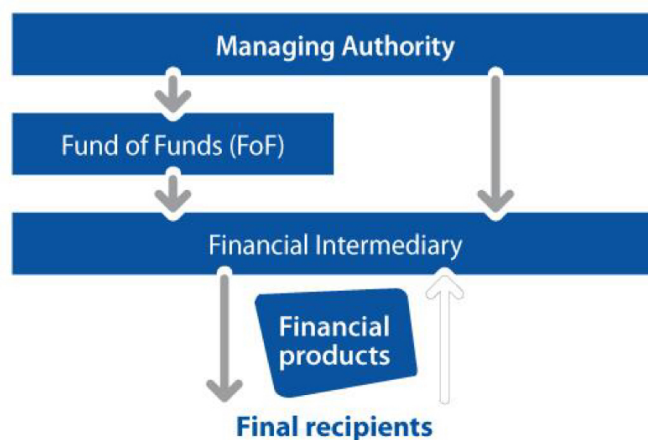


Figure 3: ESIF Financial Instruments (EIB)

After implementing the Energy Union Strategy, the ESIF received an annual budget of €18 billion in the period of 2014-2020. In the new period from 2021 to 2027, the EU sets on a new *Cohesion Policy*, relatively changing the focus of its funding scheme. Therefore, regional development investments of the ERDF and Cohesion fund shall focus on two main objectives by allocating 65 to 85 percent of their resources (European Commission, 2020a). The exact budget is still under negotiation, but it is very likely to increase for the following period.

The “ESIFs will have five main priorities, including, ‘a smarter Europe and a greener, carbon-free Europe’. As of the time of writing, the exact total budget of the ESIF to be allocated to energy efficiency is not yet clear. The total budget for the ERDF and Cohesion Fund is expected to amount to €273 billion” (ERDF, 2019), of which 65 to 85 percent should be allocated to renewable energy and energy efficiency programmes. However, the recent economic downturn in 2020 will show its influences on the upcoming funding budget for energy efficiency.

In general, we can see a trend of steadily increasing “the amount of public funds for energy efficiency projects.” Nonetheless, there are estimated “€177 billion per year necessary to reach EUs climate and energy targets 2030” (European Commission, 2020b). Therefore, private investment has to increase substantially. Within the *Clean Energy for All Europeans package*, the Commission points out certain focus areas of investment, such as the bulk of investment has to be delivered by the private sector and to achieve a “change in energy efficiency investment on the demand side (e.g. renovations of buildings) ... energy using equipment” (European Commission, 2016). However, a recent study on companies’ investment into energy efficiency, made by the EIB, concluded that “(e)nergy efficiency investments are a low priority for EU firms” (EIB, 2020b). Nevertheless, there is a certain trend of increasing investment in this area. Unfortunately, the rate of increase lies far under the necessary rate of growth (IEA, 2019a).

Incentivizing necessary investments cannot solely be addressed by grants alone. Complementary instruments with a leverage effect should incentivize new investments. Member states are now able to transfer resources “to the new, centrally managed InvestEU fund, to access the guarantee provided by the EU budget” (European Commission, 2020a). New provisions, aiming to attract more private resources and the combination of financial instruments and grants, is seen as a comprehensive model for increasing investments. Especially for the case study on Austria, the following two specific funds are mainly relevant (Auer et al., 2015).

3.1.2. European Regional Development Fund

The European Regional Development Fund (ERDF) was implemented for the development and correction of imbalances between European Regions. Its main priorities are to enhance “the competitiveness of SMEs” and the creation of “a low-carbon economy in all sectors”. Within the period of 2014-2020, the ERDF had a total budget of more than EUR 250 billion to invest in priority areas (European Commission Glossary, 2020a).

3.1.3. European Agricultural Fund for Rural Development

The European Agricultural Fund for Rural Development (EAFRD) is the responsible European authority for policies for rural development of member states and European regions. Through guarantees, equities, loans or microcredits, the EAFRD may fund projects in the rural areas if they are in compliance with its priority areas. If funding a regional development project, at least 30 percent of the funding must be relevant for climate change or the environment, including energy efficiency projects (European Commission Glossary, 2020b).

3.1.4. Investment plan for Europe

The Investment Plan for Europe, so called *Juncker-Plan*, was initiated within the Juncker-Commission and aims to increase overall public and private investment. The new InvestEU program, which succeeds the Juncker-Plan, will start in 2021 and runs until 2027. It combines 14 EU financial instruments to improve accessibility and effectivity of funding. EUR 650 billion are planned to be mobilized for the EU budget within this time period (European Commission, 2018a).

3.1.5. European Funds for Strategic Investment

The European Funds for Strategic Investment (EFSI) is a joint initiative of the EIB group, aiming to increase the overall level of investment within the EU. It plays a main role in the Investment Plan for Europe. Focus of this investment plan lies on sectors central for the European economy. This includes renewable energy and energy efficiency. Forty percent of the investments in the energy sector goes into energy efficiency projects. By providing first loss guarantees, it enables the EIB to invest generally higher amounts and in higher risk projects. Already approved agreements and projects, covering EUR 75 billion to EUR 82.5 billion, under EFSI “are expected to mobilise €514 billion in investment, supporting over 1.4 million start-ups and SMEs across the EU” (European Commission, 2020c/EIF, 2019).

3.1.6. Private Finance for Energy Efficiency

The Private Finance for Energy Efficiency (PF4EE) instrument is the result of an agreement between the European Commission and the EIB aiming to “address the limited access to adequate and affordable commercial financing for energy efficiency investments” (EIB, 2019). The PF4EE is targeting projects supporting NEEAP of member states or other programmes on energy efficiency. This Agreement was signed in December 2014, establishing the PF4EE. Between 2014 and 2017, PF4EE provided EUR 480 million (European Union, 2015)

3.1.7. Connecting Europe Facility

The Connecting Europe Facility (CEF) provided instruments designed to enhance private investment by addressing market failure conditions. The total budget of the CEF in the period 2014-2020 was EUR 33 billion and will increase to EUR 42.3 billion in the period between 2021-2027. Necessary loans are being guaranteed by the Connecting Europe Facility or the EFSI. These financial instruments can improve financing conditions to make projects more bankable (European Parliament, 2020).

3.1.8. European Investment Bank

Loans can be acquired directly from the EIB, at anytime time, with an investment volume of more than EUR 30 million. These loans are provided under relatively cheap conditions.

3.1.9. European Local Energy Assistance (EIB)

European Local Energy Assistance (ELENA) is a technical assistance initiative of the EIB for investment programs in energy efficiency with a total investment of up to EUR 30 million. For approved projects, 90 percent of development costs can be covered by the ELENA initiative. Final Beneficiaries for the ELENA grants are local or regional authorities and other public bodies (KfW, 2020a).

3.1.10. JASPERS and JESSICA

The Joint Assistance to Support Projects in European Regions (JASPERS) programme provides technical assistance improving projects in multiple sectors throughout Europa. It is a co-operate program between the European Commission, the EBRD and the EIB. Its measures include providing EU grant finance, strategic support and capacity building. Total investments of projects including JASPERS exceeded EUR 72 billion (EIB, 2019), However, this programme is only available for member states that joined the EU between 2004 and 2007 and therefore is not available for Austria (European Commission, 2020c).

The Joint European Support for Sustainable Investment in City Areas (JESSICA) is a joint programme of the European Commission the EIB and the Council of Europe Development Bank. ERDF funds are used as equity, loans or guarantees for sustainable urban development projects, including improvement projects in the energy efficiency field. Funds by JESSICA are additionally used in funding ESCO projects (Boza-Kiss et al., 2017).

“As well as the European Structural and Investment Funds, the European Union provides both financial and technical support for the creation of new financial instruments” (ERDF, 2019). Measures, like JASPERS and JESSICA financial instruments, are co-financing energy-efficiency projects. These two instruments are not applicable for Austria.

3.1.11. European Energy Efficiency Fund

The European Energy Efficiency Fund (EEEF) supports EU member states with project financing aiming to fulfill the 20-20-20 goals. This could be in the form of regular or subordinated loans, guarantees, assets or other instruments. This financing method takes place with usual market prices but has to run through a foreign bank, which makes this possibility relatively unattractive for Austrian stakeholders. “As of 31 December 2018, more than EUR 170 million have been allocated to 16 projects that have generated EUR 301.5 million of total investments” (European Commission, 2019).

3.1.12. Intelligent Energy Europe

Until 2013, the European Commission *Intelligent Energy Europe* program had a “budget of € 730 million and was available to fund projects and put into place a range of European portals, facilities and initiatives” (European Commission, 2020d). Intelligent Energy Europe mainly funded projects in the sectors of energy efficiency and renewable energy. It also assisted in project development.

3.1.13. Horizon 2020

Overtaking the Intelligent Energy Europe work, the Horizon 2020 program was funded. Under Horizon 2020, the *Secure, Clean and Efficient Energy* programme was initiated to transform the European energy system based on seven objectives:

1. Reducing energy consumption and carbon footprint
2. Low-cost, low-carbon electricity supply
3. Alternative fuels and mobile energy sources
4. A single, smart European electricity grid
5. New knowledge and technologies
6. Robust decision making and public engagement
7. Market uptake of energy and ICT innovation.

These objective are being followed within three focus areas: energy efficiency, low carbon technology, and smart cities and communities. Therefore, EUR 5.9 billion were allocated through the pro-

gramme from 2014-2020 (European Commission, 2020e). Within 2018 and 2019, EUR 212 million were budgeted for energy efficiency calls (European Commission, 2020f).

3.1.14. LIFE programme

Under the LIFE programme, the EU is funding projects under the two sub-programmes: environmental (75 percent of funds) and climate action (25 percent). Within the current funding period, 2014-2020, LIFE was the climate action programme that “provides action grants for best practice, pilot and demonstration projects that contribute to the reduction of greenhouse gas emissions, the implementation and development of EU policy and law, best practices and solutions” (European Commission, 2020h). Project costs are covered up to 55 percent.

3.1.15. Project Development Assistance

The Executive Agency for Small and Medium-sized Enterprises (EASME) developed the Project Development Assistance (PDA) program, in which up to 100 percent of project development costs were covered. This project is part of the Horizon 2020 program. The main goal was to demonstrate that large-scale sustainable energy investment projects can be economically viable. Every million Euro invested in the programme should trigger more investments of at least EUR 15 million. The financial products can be in the form of “loans, energy performance Contracts (EPC), public ESCOs” or others (European Union, 2016).

Buildings

In the European Union, the renovation of buildings is seen as the “main challenge, being responsible for 36 percent of total CO₂ emissions” (ERDF, 2019) and accounts for 40 percent of final energy consumption in the EU (EPEC, 2012). Within a recent assessment, the European Commission has estimated that 75 percent of the housing stock is not efficient. To reach CO₂ reduction targets, long-term strategies have to be implemented by each member state according to the already mentioned updated Energy Performance of Buildings Directive. Therefore, an annual renovation rate of 3 percent is required to reach EU goals (ERDF, 2019).

Due to uncertainty of economic viability or sufficient access to finance, the EPBD obligates member states to include financial aspects within their long-term strategies. Certain aspects are to be considered, as follows (ERDF, 2019):

<p>To support the mobilisation of investments into the renovation needed to achieve the goals referred to in paragraph one [<i>decarbonisation by 2050</i>], Member States shall facilitate access to appropriate mechanisms for:</p> <ul style="list-style-type: none"> (a) the aggregation of projects, including by investment platforms or groups, and by consortia of small and medium-sized enterprises, to enable investor access as well as packaged solutions for potential clients; (b) the reduction of the perceived risk of energy efficiency operations for investors and the private sector; (c) the use of public funding to leverage additional private-sector investment or address specific market failures; (d) guiding investments into an energy efficient public building stock, in line with Eurostat guidance; and (e) accessible and transparent advisory tools, such as one-stop-shops for consumers and energy advisory services, on relevant energy efficiency renovations and financing instruments 	<p>Directive (EU) 2018/844 (EPBD), Article 2a§3</p>
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Figure 4: EPBD Art. 2 (Directive 2018/844/EU)

Supporting the implementation of the Directive, the Union’s European Structural and Investment Funds (ESIFs) and the European Fund for Strategic Investments (EFSI) have increased their investments into energy efficiency (ERDF, 2019). On the member states level, most “countries have offered grant-based systems using ESIFs to contribute partly, or completely, to the costs of renovations” (ERDF, 2019). However, the immense amount of financial resources required for complying with the ambitious EPBD “show that we need to move from grant-based funds in ERDF operational programmes, towards more sustainable financial instruments” (ERDF, 2019).

3.1.16. Energy Performance Certificates

Energy Performance Certificates are instruments to document the energy performance of buildings in a standard procedure. This gives a performance number in kWh/year/m² used. This number becomes a significant influence to the value of buildings and is highly rated for evaluation of selling or renting prices of buildings. The EPBD asks EU member states to undertake Energy Performance Certificates and additionally provides information on how to improve the energy performance of buildings (Heijmans and Loncour, 2019).

3.1.17. Smart Finance for Smart Buildings

The Smart Finance for Smart Buildings Facility (SFSB) is an instrument by the EIB to increase private investment in the building sector. EU grants are used as guarantees, aiming to enhance the market for energy efficiency projects. Together with some other EU initiatives in the building sector, the SFSB initiative aims to incentive EUR 10 billion of public and private re-

sources, by de-risking investments in this sector. This initiative, additionally, offers support in the project development phase (European Commission, 2018b).

3.1.18. Energy Performance Contracting

Energy Performance Contracting (EPC) is an organizational instrument for effective management of financing in the energy efficiency sector. Energy Performance Contracting includes an Energy Service Company (ESCO), which function as provider of finance and guarantees energy savings (Hilke and Ryan, 2012). Within the *Clean Energy for All Europeans*, EPC is named as playing a key role in increasing energy efficiency investments. Energy Performance Certificates, addressed within Article 11 of the EPBD, are seen as an important driver for ESCO contracts.

Various measures are important for ESCO funding on the EU level. Such as the multi-annual Financial Framework, which aims at leveraging private funds for ESCO markets. The European Energy Efficiency Fund is one of the most important funding sources for projects in the public sector. Several EPC projects were funded by the Intelligent Energy Europe programme. Lately, guarantees by the EIB are being used to support ESCO projects. Guarantees successfully mobilize and leverage funding, minimizing risk and increasing trust in investment projects. Therefore, providing guarantees is often seen as being more effective than only providing grants. Moreover, various other initiatives, such as PDA, ELENA or JESSICA, are supporting the development of projects in various ways. Additionally, the European Energy Service Initiative is promoting contracting by organizing capacity-building on various levels (Boza-Kiss et al., 2017).

3.2. Austria

Within Austria, there are a couple of energy efficiency investment instruments in place. Some come directly from the state or provincial governments, managed by the Ministry for Climate Action, Environment, Energy, Mobility Innovation and Technology (BMK). However, the most investment is going through and is managed by the Kommunal Kredit Public Consulting (KPC). There are four main mechanisms, which cover the biggest portion of investments into energy efficiency.

List of the main Financial Mechanisms

- 3.2.1. Environmental Funding
- 3.2.2. Thermal Rehabilitation program „Sanierungsoffensive“
- 3.2.3. Climate and Energy Fund
- 3.2.4. Energy and environmental subsidies from provinces
- 3.2.5. Tax reductions
- 3.2.6. Energy Management Systems
- 3.2.7. Sustainable Energy Financing Platform Austria
- 3.2.8. Innovative Business Models for Single-Family House Renovation
- 3.2.9. Energy Efficiency and Contracting
- 3.2.10. European Regional Development Fund
- 3.2.11. European Agricultural Fund for Rural Development
- 3.2.12. ELENA and EIB
- 3.2.13. Horizon 2020

3.2.1. Environmental Funding

In 1993 the Umweltförderung im Inland (UFI) was established. It is a funding program from the Ministry of Agriculture, Regions and Tourism. Through the UFI, the Ministry promotes investments in eco-friendly projects within private and business sector, based on non-repayable grants. Implemented under the Environmental Subsidy Act, it is managed by the KPC. Within the period of 2011 to 2014, EUR 90 million were granted to the non-residential sector per year (Atanasiu, 2013). Within the period 2014-2016, the Austrian Government granted EUR 198.6 million (Adensam, 2018). In 2018, EUR 64 million were granted for almost 8,000 projects, which resulted in an overall investment of EUR 650 million. In 2019, EUR 42.7 million were granted to a similar amount of projects, leading to an overall investment of EUR 343.6 million (BMK, 2019b). In 2020, the BMK increases its grant-based financing mechanism by EUR 20 million to EUR 90 million (KPC, 2020b).

3.2.2. Thermal Rehabilitation program „Sanierungsoffensive“

The Austrian government provides resources for the thermal rehabilitation of buildings, under the so called *Sanierungsoffensive*. The main area of activity is heat insulation of buildings and heating system adjustment projects. This programme applies for private and municipal residential and commercial buildings. The management responsibility is with the KPC. Within 2014-2016, the total amount invested was EUR 194.6 million (WKO, 2020). The funding for the following years increased, in 2017 to EUR 433 million, in 2018 to EUR 358 million and in 2019 to EUR 383 million. Within the recently implemented Sanierungsoffensive 2020, the BMK provides EUR 142.7 million as grants for boiler replacement and thermal renovation. For the replacement of environmental harmful fossil boilers, EUR 100 million are available and EUR 42.7 million for thermal renovation (WKO, 2020/KPC, 2020a). The total sum disbursed from KPC for 2020 amounts to EUR 242 million (as from 07.09.2020) (Austrian Ministry of Finance, 2020a).

3.2.3. Climate and Energy Fund

The Climate and Energy Fund provided EUR 356.2 million for energy efficiency projects in the period 2014-2016 (Adensam, 2018). In the most recently released annual program for 2020, the fund provides EUR 158 million, which represents an increase of EUR 57 million in comparison to 2019 (BMK, 2020). KPC is in charge of processing resources from the fund. Additionally, the Climate and Energy Fund provides EUR 1.4 million for heating systems based on renewable energy production and enhancement of energy efficiency in 2020.

3.2.4. Energy and environmental subsidies from provinces

However, the biggest share of funding in Austria for residential building renovation comes from energy and environmental subsidies from provincial support programs. Total amount of resources invested is EUR 7.3 billion in the period 2014-2016 (Adensam, 2018). Through the so called *Wohnbauförderung*, EUR 2 billion of loans are provided annually (Atanasiu, 2013).

Four Main Austrian funding programs

Table 1: Austria Funding Programmes (Adensam, 2018)

Jurisdiction	Name of policy / programme / measure	Type of incentive / support / funding	Economic sector	Amount of expenditure	Currency	Period of expenditure	Benefits achieved
State/Provincial	Residential building, energy and environmental subsidies	Grant/subsidy	Residential buildings	7.343,5	Mio. EUR	2014-2016	7.300,4 TJ energy saving 2014-2016
National	Environmental funding	Grant/subsidy	Cross-sectoral	198,6 (28)	Mio. EUR	2014-2016 (2016)	5.169,4 TJ energy saving 2014-2015
National	Climate and Energy Fund	Grant/subsidy	Cross-sectoral	356,2 (44,73)	Mio. EUR	2014-2016 (2016)	1.277,1 TJ energy savings 2014-2015
National	Thermal rehabilitation "Sanierungsoffensive"	Grant/subsidy	Cross-sectoral	194,6	Mio. EUR	2014-2016	807,3 TJ energy savings 2014-2016

3.2.5. Tax reductions

Another incentive for promoting energy efficiency measures is tax reductions. In Austria, this measure is mainly used for insulation of windows, walls, doors and ceilings, as well as for equipment measures for heating and cooling, ventilation and lighting systems. This amounts to EUR 2,920 per year for ordinary tax payers, and additional EUR 1,460 may be granted if there are three children living in the household. "Only 25 percent of the amount may be deducted from the income" (Atanasiu, 2013).

3.2.6. Energy Management Systems

Additionally, the BMK supports the establishment of energy management systems for small- and medium-sized companies. Measures range from external consultancy to direct investments. Between 2018 and 2020, KPC disbursed EUR 447,000 under this programme (Austrian Ministry of Finance, 2020b).

3.2.7. Sustainable Energy Financing Platform Austria

The Sustainable Energy Financing Platform Austria (SEFIPA) is a EU-Horizon 2020 project. It was active until 2019. The general aim of this programme is a platform for promoting new financial instruments to increase overall investments within the energy sector. In total, nine different financial instruments have been developed under the SEFIPA project. The scope of this project goes from improvements of regulating laws, information measures, development of energy concepts for the building sector, included in the Smart-Cities-Demo project, "Smart Block II Energy" and the creation of a crowd investing platform. This platform continues to be in use for further projects even after the successful end of the SEFIPA project. The coordination of this project is with the Austrian Society for Environment and Technology (OEGUT) (Climate and Energy Fund, 2020).

3.2.8. Innovative Business Models for Single-Family House Renovation

Within the EU project COHERENO, OEGUT and other European stakeholders were developing innovative and cooperative business solution for the transformation of buildings of single family houses, to zero-energy houses. The project was initiated by the European Commission Program Intelligent Energy Europe. Within the period 2013-2016, companies and public stakeholders were developing innovative financing programs for *Nearly-Zero Energy* renovations.

3.2.9. Energy Efficiency and Contracting

In 2005, various Austrian energy efficiency service companies funded the umbrella organization *Dachverband Energie-Contracting Austria* (DECA). Today, DECA combines multiple stakeholders in the energy service and contracting sector. Its general goals are promoting energy efficiency measures, developing new business models and providing information about energy efficiency contracting (OEGUT, 2020). After DECA was founded, there was a steady increase of contracting projects from 2010 and 2014. This was followed by a market declined, which varies from region to region.

In general, even if Austria is seen as a successful example of ESCO markets, there is still untapped potential for energy savings, including financial savings, through energy efficiency services and contracting models. Especially within the public building, service companies and SMEs sector, only few projects have been undertaken (Windsperger et al., 2014). The EPC market size in Austria is approximately EUR 10 million annually, whereas the potential is seen as about EUR 12 billion per year. Promotion of EPC are supported by an EPC contract developed by the Federal Ministry of Science, Research and Economy and the Federal Property Contracting program (Boza-Kiss et al., 2017).

European Funding

As we can see above, there is a wide variety of programmes active within the EU. However, only a part is available to be acquired in Austria. Within this section just the relevant funding mechanisms for Austria are considered. For the period of 2014-2020, Austria received a budget for approximately EUR 5.18 billion out of ESIF funds (Auer et al., 2015). According to EU rules, these resources have to be co-financed with national budget, which substantially increases the leverage effect for investments.

3.2.10. European Regional Development Fund

Originating from ERDF, Austria received approximately EUR 116 million for the creation of a low CO₂ economy between 2007 and 2013. From this, EUR 16.97 million were invested into thermal buildings renovation. Within the same period, EUR 9.67 million were invested into energy savings in firms (Auer et al., 2015). Within the period 2014-2020, Austria received about EUR 110 million by ERDF for CO₂ reduction and energy efficiency measures. After recent changes within the administrative process, the Austrian Conference on Spatial Planning is now the only managing authority. However, funding for projects comes from different intermediaries. This varies depending on the region. In some provinces, it is the local authority that is responsible; in others, it may be the KPC (EFRE, 2020).

3.2.11. European Agricultural Fund for Rural Development

Between 2014 and 2020, EUR 1.1 billion were provided annually for rural development in Austria. Half of these resources originated from EAFRD budget (BMLRT, 2020). However, in the end, only a negligible fraction of this is allocated to actual energy efficiency measures.

3.2.12. ELENA and EIB

There have not been any projects with costs of more than EUR 30 million acquiring loans from EIB within this time in Austria. Therefore, only investments through the ELENA funding programme, with respectively smaller project size, total in EUR 2.43 million. The big investment requirements for obtaining loans directly from EIB can be seen as the biggest obstacle (Auer et al., 2015).

3.2.13. Horizon 2020

Under the Horizon 2020 project, a considerable amount of financing projects have been implemented. The total EU financial contribution to Austria amounted to EUR 789.83 million, of which 147.73 million were allocated to small- and medium-sizes enterprises (eCorda, 2018). Nonetheless, as energy efficiency is just one of many targets addressed under Horizon 2020, only a fraction of this is actually contributed to this sector. Contact points within Austria for the Horizon 2020 are the respective ministries (European Commission, 2020e).

Table 2: Funding mechanisms in Austria (own processing)

Mechanisms in Austria					
Project	Sector	Financial Instrument	Source	Management/ Administrator	Amount of Funding*
„Umweltförderung im Inland“	Cross-sectoral	Grants	Government	KPC	665.3
„Sanierungsinitiative“	Buildings	Grants	Government	Ministry	1610.6
Climate and Energy Efficiency Fund	Cross-sectoral	Grants	Government	KPC	616.6
Energy and Environmental subsidies from Provinces	Buildings	Grants	Government (national&local)	KPC and regional authorities?	15343
Energy Management Systems	Small & Medium sized Companies	Consultancy/ Grants	Government	KPC	0.447
SEFIPA	Cross-sectoral	Information/ Platform	European Union	OEGUT	No funding
Single-Family House Renovation	Buildings	Platform	European Union	Intelligent Energy Europe	No funding
ESCOs	Cross-sectoral	EPC	ESCOs	ESCOs	100
ERDF	Industrial	Grants	European Union	Ministry and regional authorities	81.64
EARDF	Cross-sectoral	Grants	European Union	Ministry and regional authorities	No reliable data
ELENA	Public Authorities	Grants + Loans	European Union	KfW	2.43
Horizon 2020	Cross-sectoral	Grants	European Union	Ministry and regional authorities	No reliable data
				Sum	18420.017
				Sum without provinces funding	3077.017
	* in EUR million				

3.3. India

Financing adequate climate change action in India, there is an estimated demand of EUR 919 billion (US\$1.04) trillion in the period up to 2030. If India is required to scale up actions, the estimated financial requirements go up to EUR 2.2 billion (US\$2.5 trillion) (Ahmad et al., 2017). India is showing great potential for cost-effective investments in energy efficiency. Within a report of the Ministry of Power (MoP) presented in 2013 for the Planning Commission of the Government of India (GOI), it was estimated that India has an energy-saving potential of 124-255 billion kWh, which can be valued as approximately EUR 9.7-19.4 billion (USD 11 to 22 billion) in regard to average tariffs (MoP and USAID, 2013). Due to the population and economic growth happening in India, energy use increases substantially. Especially, the energy demand for space cooling, the building sector is likely to quadruple until 2040, driven by a population increase and rising living standards. This will be a major challenge for India. Therefore, Minimum Energy Performance Standards are critical to regulate energy use for this sector.

Beside the building sector, the largest opportunities for scaling up energy efficiency are seen in the less energy intensive industry sectors where energy intensity may be halved. An essential policy driving energy efficiency gains in industry is the Perform, Achieve and Trade scheme. An additional contribution to improve overall efficiency gains will be improvements in electric motor-driven systems (IEA, 2018). Under the MoP, the Bureau of Energy Efficiency (BEE) is the responsible authority for coordinating and developing energy efficiency development and instruments in India.

In India there is a huge variety of financial instruments and mechanisms for energy efficiency coming from the national and state level, as well as from international donors and private banks. These instruments include mechanisms driven by policy, such as fiscal instruments, government-led funds that focus on energy efficiency and government-initiated market-based mechanisms; mechanisms based on debt or equity financing; and mechanisms related to energy savings performance contracts (ESPC) and ESCOs. Addressing the limiting factors, various different financial instruments have already been introduced in India. Additional ones are still being developed and are planned to be implemented within the upcoming years.

Existing instruments and mechanisms (MoP and USAID, 2013)

- Debt-based financing mechanisms for EE
- Fiscal instruments facilitating energy efficiency project implementation

- Equity based financing for EE
- Grants to facilitate energy efficiency implementation
- Energy Saving Performance Contracting (ESPC)
- Government Energy Efficiency Funds and Schemes

List of the main Financial Mechanisms

- 3.3.1. Instruments under the NMEEE
- 3.3.2. The State Energy Conservation Fund Scheme
- 3.3.3. Energy Service Companies
- 3.3.4. Partial Risk Sharing Facility
- 3.3.5. Technology Innovation Fund
- 3.3.6. Commercial Energy Efficiency Financing Programs
- 3.3.7. Japan International Cooperation Agency Credits
- 3.3.8. Indian Renewable Energy Development Agency Financing Scheme
- 3.3.9. ADB - Industrial Energy Efficiency Project
- 3.3.10. ADB - Demand Side Energy Efficiency Sector Project
- 3.3.11. USAID - Energy Conservation and Commercialization
- 3.3.12. USAID - Partnership to Advance Clean Energy - Deployment
- 3.3.13. Indo-German Solar Partnership
- 3.3.14. UK-India Partnership
- 3.3.15. Accelerated Depreciation
- 3.3.16. Tax Rebates
- 3.3.17. Energy Efficiency Enhancement Project
- 3.3.18. National Clean Energy and Environment Fund
- 3.3.19. National Industrial Energy Efficiency Fund
- 3.3.20. Credit Linked Capital Subsidy Scheme for Technology Upgradation for MSMEs

3.3.1. National Mission for Enhanced Energy Efficiency Instruments

Under the National Mission for Enhanced Energy Efficiency (NMEEE), the Indian government created four main instruments to scale up energy efficiency.

1. Perform Achieve and Trade Scheme (PAT), a market based mechanism to enhance the cost effectiveness in improving the Energy Efficiency in Energy Intensive industries through certification of energy saving which can be traded.
2. Market Transformation for Energy Efficiency (MTEE), for accelerating the shift to energy efficient appliances in designated sectors through innovative measures to make the products more affordable.
3. Energy Efficiency Financing Platform (EEFP), for creation of mechanisms that would help finance demand side management programs in all sectors by capturing future energy savings.

4. Framework for Energy Efficient Economic Development (FEEED), for development of fiscal instruments to promote energy efficiency (MoP, 2020).

a) Perform, Achieve and Trade

The NMEEE established the PAT scheme in 2012. It is a market-based instrument to increase cost effectiveness by tradable energy saving certificates (ESCerts) for energy intensive industries. ESCerts are given to companies surpassing their target and can be sold to under-performing enterprises. The price of ESCerts is defined by supply and demand. The BEE is managing and developing the ESCert trading (IEA, 2019b/MoP, 2020). The mandatory PAT scheme led to reductions of 23 million metric tons of CO₂e, “roughly the equivalent of the output of five coal-fired power plants” (MoP, 2020).

Table 3: PAT Scheme (MoP and USAID, 2013)

Program title	PAT Scheme
Sponsoring agency	BEE, Ministry of Power
Type of program	Innovative, market-based mechanism to enhance cost effectiveness of improvements in EE in energy-intensive large industries through tradable energy savings certificates (ES-Certs).
Implementing agency	BEE is setting up the overall framework for the scheme and Energy Efficiency Services Limited (EESL) will work as an implementation and monitoring agency for the entire scheme.
Start date/end date	Project design completed in 2010; program launched in 2012.
EE/GHG Goals	According to GOI, the estimated size of this entire scheme will be about INR 700 billion (USD 11.33 billion), and will lead to 98 million tons of GHG mitigation.
Sectors targeted	Designated consumers (large energy-intensive users) - aluminum, cement, chloralkali, iron and steel, fertilizer, pulp and paper, textile, thermal power plants. Targets set for 428 industrial units.
Barriers addressed	Lack of a market mechanism to incentivize large energy users to implement EE projects.
Financing mechanism(s)	Market-based trading of energy savings certificates.
Eligibility criteria	EE projects in designated consumers.
Total funding	There will be no direct funding from BEE for the PAT operations. Instead, there will be market-based trading.
Major activities	Feasibility and design studies have been completed. Implementation is expected soon.

b) Market Transformation for Energy Efficiency (MTEE)

The MTEE was implemented to incentivize market actors to increase overall energy efficiency. Therefore, two different programmes were installed and funded by the BEE.

a) Bachat Lamp Yojana (BLY) functions as a public private partnership of energy distribution companies, private investors and the BEE. BLY was developed to promote energy efficient lighting. The BEE continues to support large-scale adaption of LED lights throughout India.

b) Super Efficient Equipment Program (SEEP) tries to set financial incentives for energy efficient equipment. A special focus is given on the fan manufacturing sector, incentivizing the production of super-efficient fans, which can halve energy usage. SEEP aims at stimulating technological upgrades in energy efficiency, while staying at a competitive price level.

c) Energy Efficiency Financing Platform

Under the Energy Efficiency Financing Platform (EEFP), the BEE has signed memorandum of understandings with PTC India Ltd, SIDBI, the HSBC Bank, Tata Capital and IFCI Ltd to increase financing for energy efficiency projects. The EEFP promotes the interaction of various different stakeholders, as project developers and financial institutions, to overcome informational barriers (IEA, 2017).

d) Framework for Energy Efficient Economic Development

The Framework for Energy Efficient Economic Development (FEEED) has initiated two substantial funds in 2012. These funds should increase funding opportunities for market participants, especially for ESCOs.

a) Partial Risk Guarantee Fund for Energy Efficiency (PRGFEE) is a mechanism to share the risk of commercial banks providing loans. The PRGFEE partially covers risk of investments for energy efficiency projects. The PRGFEE does not cover any fees, including interest fees and equals an agreed-upon percentage. The amount shall not exceed 50 percent of the loan or INR 3 crore. This program began by only providing to governmental and municipality buildings and was later extended to SMEs and industry. In total, the GOI has approved more than EUR 38.4 million (INR 300 crore) within the beginning of the program (BEE and USAID, 2016).

b) The Venture Capital Fund for Energy Efficiency (VCFEE) provides equity capital for projects, not exceeding INR 2 crore. It is limited to 15 percent of total required equity and limited to municipalities and governmental buildings. GOI has approved EUR 26.87 million (INR 210 crore) for VCFEE (BEE and USAID, 2016).

For the effective funding of energy efficiency development, the creation of funds creates the possibility to produce an overview and aim-related allocation of financial resources. Therefore, other funds were established in India additionally.

3.3.2. The State Energy Conservation Fund Scheme

For coordination, regulation and enforcement of the Energy Conservation Act 2001, each state has established a State Energy Conservation Fund (SECF). These should coordinate energy conservation on the state level and overcome barriers for energy efficiency projects. Therefore, the BEE provides financial assistance for “the efficient use of energy and its conservation” (BEE, 2020).

The contribution came in two installments with a maximum of EUR 255,000 (2.00 Crores) each. The second installment was authorized when state governments successfully implemented BEEs requirements of the first installment. The contribution amount slightly varies between states (MoP and USAID, 2013). SECF tries to increase the amount of energy efficiency projects by influencing the market. Parts of the resources are earmarked to revolving funds, directly financing and supporting energy efficiency projects (BEE, 2020).

Table 4: State Energy Conservation Fund (UNDP, 2013)

Agency	The Bureau of Energy Efficiency (BEE) is the nodal agency at the Central state level and the State Designated Agencies (SDAs) Out of 35 states 32 SDAs are established. These institutions are empowered with regulatory, promotional and enforcement roles under the Act. BEE and SDAs provide the institutional, policy and regulatory framework
	BEE certifies also after rehabilitation through EESL the building
Owner or related to	Super ESCO: Energy Efficiency Services Limited (EESL) under the Ministry of Power Joint venture company promoted by four Central Public Sector Undertakings (CPSUs), namely - National Thermal Power Corporation Limited (NTPC Limited), - Power Grid Corporation of India Limited (PGCIL), - Power Finance Corporation Limited (PFC Limited) and - Rural Electrification Corporation (REC). EESL has been set up to provide public sector leadership in the implementation of energy efficiency projects
Donors	Super ESCO, but also 80 ESCOs have been accredited and rated by market rating agencies to provide credibility
Task of fund	Implementation of energy efficiency projects in the private sector EE building, LED, Municipality EE program, E-mobility, trigeneration, etc.

3.3.3. Energy Service Companies

Further financial resources may be provided in the form of equity funds to promote efficiency efforts. Generally, these come from private equity funds or venture capital funds. Equity funds from the public sector are generally established to finance ESCOs or invest in ESCO projects.

As most FIs and commercial banks only partly provide debt finance for energy efficiency projects (max. 70 percent), ESCOs may be used to generate the remaining equity required for project implementation, if developers are unable to finance (“Last mile” equity). This partnership of private venture funds and public equity funds can be seen in the establishment of the BEE - Venture Capital Fund for Energy Efficiency (mentioned above). Generally, private equity funds participation is still low, as mostly efficiency projects do not reach the minimum investment size requirements of large private funds and are not particularly focusing on energy efficiency. Nonetheless, two of these equity funds concentrating on efficiency are the a) Green India Venture Fund, with a funding capital of approximately EUR 48.6 million (USD 55 million) in 2013, contributing 10 percent of the capital for projects ranging from EUR 0.28 to EUR 4.28 million (USD 0.32 to USD 4.85 million) and the b) Global Environment Fund (GEFund), which invested USD 104 million into cost-effective solutions in clean technology and emerging markets, in natural resource management, clean energy, efficient transportation and environmental services. Investments into the GEFund range from the IFC, JBIC, ADB and others (MoP and USAID, 2013).

Energy Efficiency Services Limited

As India has faced a lack of implementing agency, which successfully created required new business models, the MoP has created Energy Efficiency Services Limited (EESL). EESL is a joint venture of POWERGRID, NTPC, REC and PFC, to administrate the implementation of energy efficiency projects. EESL works as an ESCO, a consultancy for energy efficiency and clean development mechanism projects, resource centre for increasing capacity building and supporting financial institutions and utilities (MoP, 2020).

3.3.4. Partial Risk Sharing Facility

A similar project to the PRGFEE has been implemented by the Small Industries Development Bank of India (SIDBI) to assist in mobilizing commercial funding and involvement of ESCOs. The Partial Risk Sharing Facility (PRSF) should develop energy efficiency markets and grant Sub-Guarantees to Sub-Financiers, as well as provide technical assistance and capacity building. The management of the PRSF is with SIDBI and EESL, whereas the funding comes partially from the Global Environment Facility, with a backstopping by the Clean Technology Fund. This project was developed to enhance market conditions for energy efficiency and increase incentives for finance (World Bank, 2020). The PRSF runs until 2022 and has total funding of EUR 38 million (USD 43 million), whereas EUR 32.7 million (USD 37 million) are provided for partial credit guarantees “to

cover a share of default risk faced by Participating Financial Institutions in extending loans to eligible energy efficiency projects implemented through ESCOs” (IEA, 2019c/SIDBI, 2020a).

Debt-based financing

There are several debt-based financing mechanisms in place. Regularly, these are based on three different types of financial providers: governmental support, commercial bank lending, or donor financing from bilateral or multilateral institutions (MoP and USAID, 2013).

3.3.5. Technology Innovation Fund

The GOI has established the Technology Innovation Fund in 2011, which is a governmental backed commercial lending mechanism. Therefore, the Ministry of Science and Technology has put EUR 3.84 million (INR 300 million) into SIDBI as a revolving fund, which provides loans to Micro, Small and Medium Enterprises (MSME). These resources are used to develop and commercialize technological innovations in MSMEs, including energy efficiency projects and promote high-risk innovations. Project costs can be covered by up to 80 percent by the fund, with a maximum of EUR 140.000 (USD 0.16 million). In certain cases, higher volumes could be acquired, however the project developers contribution should be about 20 percent of total costs (MoP and USAID, 2013).

3.3.6. Commercial Energy Efficiency Financing Programs

There are many energy efficiency projects financed by FIs or commercial banks. Unfortunately, if no specific energy efficiency program exists, they are not tracked properly. Therefore, not enough data is available in this financing sector. Nevertheless, some banks have implemented financial instruments focusing on energy efficiency (MoP and USAID, 2013).

The State Bank of India (SBI)

The State Bank of India (SBI) was one of the first banks to provide finance to energy efficiency projects in India. SBI is financing energy efficiency in industry and MSME sector by providing loans. However, as already mentioned, there is no data available on how many projects and the amount of loans financed. Additionally, SBI had a loan scheme providing loans for the building sector. Because of limited visibility of the program, this scheme was not very successful.

Other banks, like the ICICI bank have also been involved in providing loans to MSMEs and private homeowners. The Yes Bank had an initiative focusing on retrofitting the industrial sector, financing industrial boilers, cogeneration and waste heat recovery, providing EUR 6.4 million (INR

500 million). However, information is also very limited for these programs (MoP and USAID, 2013).

The general story of these initial energy efficiency financing programs is a not very successful one. Reasons for that may be a weak development assistance and marketing planning, insufficient concessions and low capacity building (MoP and USAID, 2013).

Donor and multilateral financing

For already more than a decade, multilateral and bilateral institutions and donors have financed energy efficiency projects in India. Besides general support by technical assistance, the most has been in the form of loans provided by banks in India and other FIs.

3.3.7. Japan International Cooperation Agency Credits

Micro, Small and Medium Enterprises (MSME) play a crucial role for increasing energy efficiency in India, as they consume approximately 25 percent of the total energy used by the manufacturing sector within the country. However, MSMEs adoption for energy saving is relatively slow, and compared to larger companies, their energy consumption is rather inefficient (JICA, 2019). To support this sector, the Japan International Cooperation Agency (JICA) has provided three lines of credit to the Small Industries Development Bank of India, with Official Development Assistance loans of approximately EUR 768,000 (INR 6,000 core). This has happened between 2008, 2011 and 2014, supporting more than 5,000 projects to increase energy efficiency of MSMEs in India (JICA, 2019/ SIDBI, 2020b).

The investments under the JICA-SIDBI cooperation shows the large potential and attractiveness of efficiency projects within the MSME sector. Furthermore, it demonstrates how simplified procedures, as the application process including, a list of eligible equipment, may increase measurements implementation within the sector (MoP and USAID, 2013).

3.3.8. Indian Renewable Energy Development Agency Financing Schemes

The Indian Renewable Energy Development Agency (IREDA) was established in the late 1980s. It was initiated as a Public Limited Government Company, managed by the Ministry of New and Renewable Energy. IREDA funding comes partly from the GOI. Additional funding is provided by various IFOs, including the French Development Bank, the KfW, the EIB, JICA, ADB and the World Bank. The total budget of IREDA in 2010 was EUR 568 million (USD 643 million). Resources from international lenders were provided as loan, grants or credit lines, and make up 40

percent of the total budget of IREDA. Energy efficiency is one of the many eligible sectors IREDA does invest. This is concentrated on the industrial and the building sector (Center for Clean Air Policy, 2013).

Financial Instruments under IREDA

Concessional loans

Interest rate rebates

Financial assistance

Credit lines for commercial banks

Tax benefits

(Center for Clean Air Policy, 2013)

3.3.9. Industrial Energy Efficiency Project (ADB)

Already in the last decade of the previous century, the Asian Development Bank (ADB) started financing energy efficiency development. The ADB was crucial in funding and implementing the Industrial Energy Efficiency Project (IEEP), with a total funding of EUR 132.5 million (USD 150 million), which was provided as a loan to the Industrial Development Bank of India. The project was initiated to increase investment into energy efficiency and sustainable measures for the energy intensive industry of India. Interest rates were between 15 and 20 percent. “The internal rate of return for sub-projects varied from 12 to 51 percent, and the overall investment made through the IEEP, including ADB investments, was EUR 884 million (USD 1 billion) (MoP and USAID, 2013).

Eligibility of projects funded

- „Modification of existing production processes by installing energy-efficient equipment;
- Technological restructuring of existing production facilities;
- EE-related licensing or other technology acquisition sub projects; and
- Cogeneration projects, including waste heat recovery and conversion of biomass waste into heat/electrical energy.“

(MoP and USAID, 2013)

3.3.10. Demand Side Energy Efficiency Sector Project (ADB)

In 2016, the ADB gave a loan to EESL for a Demand Side Energy Efficiency Sector Project, which was used for implementing efficiency lighting systems and appliances. In 2019, the ADB has approved a new loan to the EESL, worth EUR 221 million (USD 250 million). This loan is being guaranteed by the GOI, targeting the untapped energy efficiency potential of India. EESL uses these funds for energy efficiency projects not targeted by traditional ESCOs “investments, such as smart meters, distributed solar photovoltaic systems, and e-vehicles.” Project completion should be by 2025. Total costs are USD 592 million. The „Clean Technology Fund will provide \$46 million, to be administered by ADB, and the EESL will contribute \$296 million“ (ADB, 2019).

3.3.11. Energy Conservation and Commercialization (USAID)

The U.S. Agency for International Development (USAID) has undertaken three Energy Conservation and Commercialization Projects (ECO-I,II,III) in India. USAID funds were going through the ICICI Bank to energy efficiency projects, in the form of loans. Up to 50 percent of costs were covered. Interest rates were at a commercial rate. The ICICI was financing considerable number of projects, including the first ESCO project for municipal street lighting. A key lesson learned from this effort was that a bank truly interested in financing energy efficiency projects can develop innovative financing schemes in cooperation with host facilities or an ESCO (MoP and USAID, 2013).

3.3.12. Partnership to Advance Clean Energy - Deployment (USAID)

Under the bilateral Partnership to Advance Clean Energy (PACE-D) that started in 2012, USAID supports the MoP in enhancing the clean energy environment in India. At the heart of this project stands the implementation of “energy efficient technologies and decentralized renewable energy systems, such as distributed solar power, by strengthening policy and regulatory institutions, increasing access to finance, and enhancing institutional and human capacity” (USAID, 2017). In the energy efficiency focus area of this program, USAID supports the GOI and the BEE especially in promoting net-zero energy buildings and smart grid development.

3.3.13. Indo-German Solar Partnership

For the last decade, the German *Kreditanstalt für Wiederaufbau* (KfW), a state-owned development bank, is funding energy projects in India. This happens through a credit line offered by SIDBI. In 2011, the credit line already had a total funding of EUR 357 million (USD 404 million)

(MoP and USAID, 2013). In 2015, the Government of Germany and the GOI signed an agreement contributing EUR 1 billion through the KfW. Parts of this joint programme supports “Indian companies and households to increase energy efficiency in production processes and in residential buildings”, as well as reducing power losses (KfW, 2020b).

3.3.14. UK-India Partnership

Within India's efforts to increase energy efficiency an India-UK energy efficiency partnership was established. “The partnership jointly commissioned advocacy, technical assistance and outreach initiatives, based on UK experience and expertise that has supported innovations and deployment of EE” (CDKN, 2017). The main goal of this project are to increase energy efficiency of buildings and industry, introduce standards and labelling measurements, and enhance the use of demand side management. This partnership generally enhanced India’s energy efficiency sector and finance in this field. Indian companies, technology providers, financial investors and consultant firms gained long-term benefits by UKs involvement within this development.

Fiscal Instruments

There are some fiscal instruments in place incentivizing investments in energy efficiency.

3.3.15. Accelerated Depreciation

Within Indian income tax law, all costs of assets must depreciate, including machinery and power plants. To increase benefits of investments in energy efficient devices and equipment, the GOI supports accelerated depreciation, which incentivizes investments in this sector and increases economic rentability. These can be applied to “(i) specialized boilers and furnaces; (ii) instrumentation and monitoring systems for monitoring energy flows (e.g., digital heat loss meters, infra-red thermographs, waste heat recovery equipment, and cogeneration systems); (iii) electrical equipment (e.g., automatic voltage controllers, time-of-day energy meters, and power factor controllers for alternating current motors); and (iv) EE manufacturing devices (e.g. burners, thin film evaporators, fluid drives and fluid couplings, gas cylinders, glass manufacturing equipment, and RE devices)” (MoP and USAID, 2013).

3.3.16. Tax Rebates

Another successful fiscal instrument was implemented by several municipalities around India. Tax rebates, a refund for taxpayers for making specific purchases, may apply for property taxes

of owners and development fees by the developers. This incentivizes investment into green residential buildings and has already been implemented in some regions. These rebates only apply for certified green buildings or eco-housing projects (MoP and USAID, 2013).

3.3.17. Energy Efficiency Enhancement Project

Already in the early 2000s, the BEE implemented the Energy Efficiency Enhancement Project (EEEP) with the ADB. This project aimed at creating an efficient energy efficiency market in India, with focus on the involvement of ESCOs in the public sector. Therefore, the EEEP initiated an approach for using Energy Saving Performance Contracting (ESPC) in this sector. After a relatively difficult start, which was negatively impacted by low knowledge of stakeholders about energy efficiency and this scheme, more and more municipalities implemented such projects. Within this time, multiple municipalities spent about 50 percent of their operational budget toward lowering spending on energy. This was often allocated toward upgrading street lighting or upgrading pumping systems (MoP/UNDP, 2013).

3.3.18. National Clean Energy and Environment Fund

The National Clean Energy and Environment Fund (NCEEF) was established in 2011. It was implemented for funding and enhancing clean energy projects. Within the period from 2010-2018, the NCEEF had a total budget of EUR 3.8 billion (INR 296,5 billion), of which about 50 percent were used for project financing. The fund is mainly financed by taxes on coal (Indian-Ministry of Finance, no date).

3.3.19. National Industrial Energy Efficiency Fund

The National Industrial Energy Efficiency Fund (NIEEF) is a fund established to enhance energy efficiency within the industrial sector, decrease costs, transform the energy efficiency market and make India more competitive. It is a sub-fund under the NCEEF and is still within its implementation phase. Parts of the budget of the NCEEF is allocated to the NIEEF. It mainly focuses on MSME and large companies in industry (IIEC, no date).

3.3.20. Credit Linked Capital Subsidy Scheme for Technology Upgradation for MSMEs

There are several funding schemes for promoting energy efficiency within the MSME sector. By far the largest one is the Credit Linked Capital Subsidy Scheme for Technology Upgradation. Under the 12th five-year plan of the GOI, it received a total budget of EUR 217.5 million (INR

17 billion) (Biswas et al., 2018). It provides an upfront subsidy for 15 percent of implementation costs. “The scheme advocates the use of energy efficient technologies in manufacturing units so as to reduce the cost of production and adopt clean development mechanism” (Ministry of Micro, Small and Medium Enterprises, 2020).

Table 5: Funding mechanisms in India (own processing)

Mechanisms in India					
Program Name	Sector	Financial Instrument	Source	Management/Administrator	Amount of Funding*
Performance Achieve and Trade	Industry	Certificates	Government	EESL	No reliable data
Market Transformation for Energy Efficiency	Cross-sectoral	Grants/Loans	Government	BEE	No reliable data
Energy Efficiency Financing Platform	Cross-sectoral	Information/Platform	Government	BEE	No reliable data
Partial Risk Guarantee Fund for Energy Efficiency	Cross-sectoral	Guarantees	Government	PRGFEE	38.4
Venture Capital Fund for Energy Efficiency	Public Buildings	Equity Capital	Government	VCFEE	26.87
State Energy Conservation Fund Schem	Cross-sectoral	Grants	Government	Local Authorities	0.510
ESCOs	Cross-sectoral	EPC	ESCO funds	ESCOs	152.6
Partial Risk Sharing Facility	Cross-sectoral	Guarantees	SIDBI	SIDBI&EESL	38
Technology Innovation Fund	MSMEs	Loan	Government	SIDBI	3.84
State Bank of India	Industry/MSMEs	Loan	SBI	SBI	No reliable data
ICICI Bank	Buildings/MSMEs	Loan	ICICI	ICICI	No reliable data
Yes Bank	Industry	Loan	Yes Bank	Yes Bank	6.4
Japan International Cooperation Agency Credits	MSME	Loans	JICA	SIDBI	0.768
Industrial Energy Efficiency Project	Industry	Loans	ADB	Industrial Development Bank	884
Demand Side Energy Efficiency Sector Project,	Cross-sectoral	Energy Service Contracts	ADB	EESL	592
Energy Conservation and Commercialization	Cross-sectoral	Loans	USAID	ICICI	No reliable data
Partnership to Advance Clean Energy	Cross-sectoral	Grants/Loans	USAID	BEE	No reliable data
Indo-German Solar Partnership	Industry	Loans	German Government	KfW	678.5
UK-India Partnership	Cross-sectoral	Consultancy/Loans	UK Government	BEE	No reliable data
				Sum	2421.888
	* in EUR million				

3.4. Ukraine

Financial mechanisms for energy efficiency in Ukraine are still under development. Especially, essential mechanisms for improving the energy use of the building sector are lacking from its huge potential. Overall, there is a big gap between available and required financial resources for energy efficiency projects. The potential for reduction of energy consumption through modernization of public and residential buildings in the Ukraine lies at about 50 percent. This implies a great possibility for enlarging the energy efficiency performance of the Ukraine. Therefore, large investments are required. Nonetheless, the greatest part of already invested financial resources from international organizations provided (more than 80 percent) moves into the modernization of thermal energy supply systems (UNDP, 2017).

The overall investment needed for exhausting the potential of energy efficiency in thermal supply systems lies at about USD 6 billion, for which USD 700 million were already available in 2017. In contrast, the building sector requires a total investment of USD 51 billion, for which just USD 200 million were accessible in the same year (UNDP, 2017). The main reasons for that were elaborated as a “lack of coordination between all market players, ... imperfect legislation” and the priority of funding available for energy producers compared with energy consumers (UNDP, 2017). To overcome these differences, a more effective coordination between stakeholders and a more representative balance between producers and consumers may be required.

Within Ukraine the general authority responsible for energy efficiency development is the Ministry of Energy and Environmental Protection. Under its coordination, the executive authority is the Ukrainian State Agency on Energy Efficiency and Energy Saving (SAEE), which is responsible for the implementation of policies and various instrument within these areas.

In the Ukraine, several different mechanisms are in place offering financial support for energy efficiency projects. These differ by number of players involved, providing sources, volumes and target area. Most resources come from donors and IFOs, whereas the government of Ukraine mainly plays the central coordination and distribution role, through the SAEE for finance from IFOs, as well as some direct national resources.

The structure of finance allocation can differ according to its providers and programs. Some resources go directly from an IFO to a distributing bank or further directly to providers. As the go-

vernment function as the connecting part between IFO resources and providers, often national banks are involved in the financing scheme.

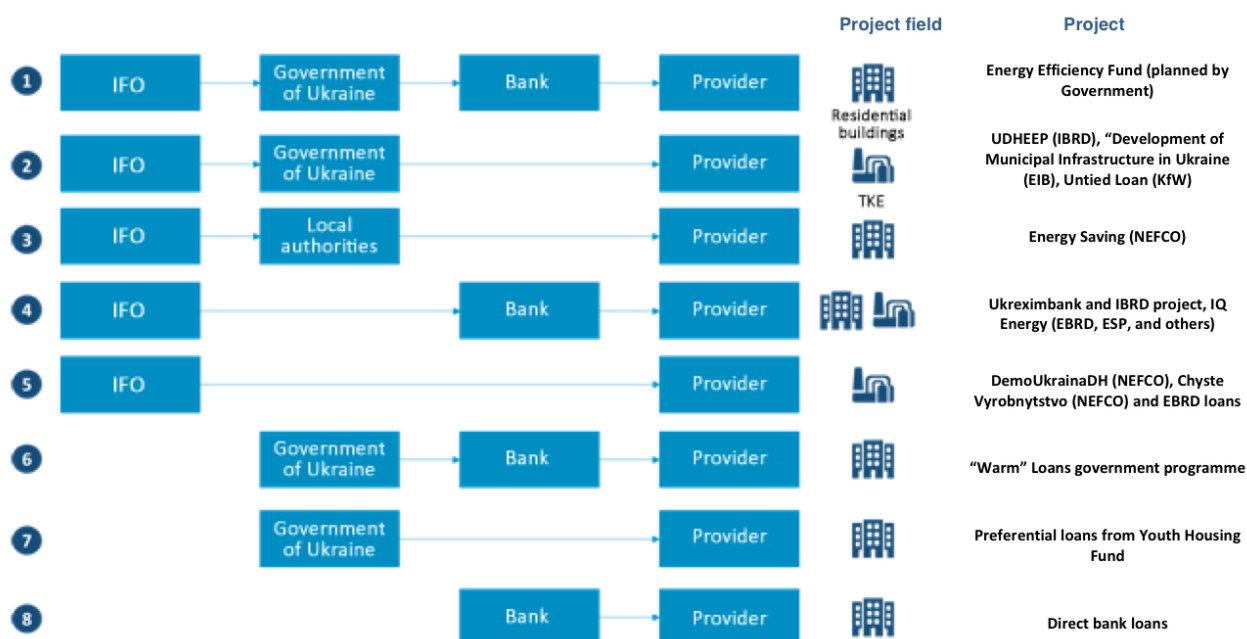


Figure 5: Financing Scheme in Ukraine (UNDP, 2017)

List of the main Financial Mechanisms

- 3.4.1. Warm Loans
- 3.4.2. Energy Efficiency Fund
- 3.4.3. Multi-donor Trust Fund
- 3.4.4. IQ Energy program
- 3.4.5 Nordic Initiative for Energy Efficiency and Humanitarian Support
- 3.4.6. Preferential loans from the State Fund for Supporting Youth Housing Construction
- 3.4.7. Commercial Banks Programs
- 3.4.8. Local Authorities Programs
- 3.4.9. Energy Service Companies
- 3.4.10. Ukraine District Heating Energy Efficiency Project
- 3.4.11. EIB program "Development of Municipal Infrastructure in Ukraine"
- 3.4.12. KfW program "Untied Financial Loan for Reconstruction of Eastern Ukraine"
- 3.4.13. Project of Ukreximbank and the IBRD
- 3.4.14. EBRD Financing
- 3.4.15. NEFCO projects
- 3.4.16. Funding by suppliers own fund
- 3.4.17. State Energy Efficiency Program
- 3.4.18. Eastern Europe Energy Efficiency and Environment Partnership

Building Sector

Buildings in Ukraine, which were mainly built in the time when Ukraine was part of the Soviet Union, do not perform in a high energy efficient way. As a result of that, most of the thermal energy produced is lost. The IFC estimates the annual economic losses at about EUR 1.59 billion (USD 1.8 billion), at 2016 prices. In total, this sector represents more than 60 percent of the total thermal energy use (UNDP, 2017). Therefore, it should be considered as the priority area of action.

The ministry for regional development made an estimation of the reduction potential of overall gas consumption. It estimated the required investment in the building sector in total to EUR 45 billion (USD 51 billion). The saved amount of gas would be equal to 9 billion m³. However, the available financial support for energy efficiency measures is EUR 689 million, which is under 2 percent of the actual required finance for meeting the energy efficiency potential.

3.4.1. Warm Loans

The Warm Loans programme by the Ukrainian government tries to set incentives to undertake energy efficiency measures using a loan from a bank. After measures are carried out, the State partially pays back part of the loan. This is bound to specific energy efficiency measures, which are mentioned within the Cabinet of Ministers Resolution No. 1056. This programme was implemented in the year 2014 and is applicable for associations of co-owners of apartment buildings (ACAB) and natural persons. The Warm Loans program focuses on individual energy projects and most financed measures are replacement of windows (UNDP, 2017). Four banks may provide Warm Loans: Ukreximbank, Oshchadbank, Urkgazbank and Privatbank.

In the years 2015 and 2016, about EUR 90 million (UAH 2.7 billion) were provided, for which about EUR 33.5 million (UAH 1 billion) were reimbursed by the government (UNDP, 2017).

3.4.2. Energy Efficiency Fund

In 2019, the Energy Efficiency Fund (EEF) was established by the Government of Ukraine, the IFC, the Deutsche Gesellschaft für Internationale Zusammenarbeit and the UNDP, to increase the level of energy efficiency within Ukraine. This was made to reach European standards and to assure compliance with national and international legislation. The EEF is focusing on the renovation of private buildings and the residential sector, by funding projects and incentivizing further investments. Grants are given to Homeowner Associations (HOAs) commonly managing their prop-

erty and energy efficiency renovation. UNDPs Home Owners of Ukraine for Sustainable Energy Solutions project supports home owners in establishing a HOA and making use of EEF funds (UNDP, 2020). For financing the project, the EEF “envisions partial compensation of costs incurred during implementation of energy efficiency measure” (EEF, 2020).

The fund is financed by the state budget with additional support from other international donors. In 2018, the Fund had a total budget of EUR 50 million (UAH 1.5 billion). In 2019, it was EUR 40 million (UAH 1.2 billion). The EU and the government of Germany allot additional EUR 100 million to the programme. A successful programme is EnergoDim, which "provides for partial cost recovery for energy efficiency measures of 40 percent of the cost of acceptable measures/works for the Light package and 50 percent for the Integrated package” (Cabinet of Ministers, 2019).

3.4.3. Multi-donor Trust Fund

In parallel, a multi-donor trust fund managed by the International Finance Corporation (IFC) was set up; this is funded by a contribution from the EU of EUR 104 million, and from IFC of approximately EUR 214 million. In addition, the Swiss Government offered EUR 1.8 million to finance technical assistance. Both instruments, the EEF and the Trust Fund, co-finance energy efficiency renovation projects in collective apartment buildings through grants and loans (UNDP, 2017).

3.4.4. IQ Energy program

The IQ energy programme, started in 2016 and managed by the EBRD, was implemented to support households by grants and loans to undertake energy efficiency measures within their buildings. It is to be geared toward private households, with a total amount of EUR 79.5 million (USD 90 million) until 2020. Almost 85 percent of this comes from the EBRD for loan provision and 15 percent for grants. The distribution of this funds come through three national banks: the Ukrsibbank, Raiffeisen Bank Aval and OTP Bank. This loan is bound to the purchase of specific hardware from the IQ energy catalogue of energy efficient technologies.

3.4.5 Nordic Initiative for Energy Efficiency and Humanitarian Support

The Nordic Environment Finance Corporation (NEFCO), an international finance organization founded in 1990, provides financial resources for green projects. They focus especially on projects in eastern Europe, including Ukraine. Through the NEFCO energy efficiency programme, municipalities may acquire funds and undertake improvements regarding to thermal energy efficiency

of state or communal buildings. These funds are given under the premise of energy savings, which reduce costs by 25 percent. Regularly, these measures would be the “modernisation of individual heating systems, installation of heating regulators, replacement of doors and windows etc.” (IFC, 2019). To receive a loan, agreements are made between NEFCO and local authorities. Upon acceptance, funds are directly transferred to the recipient's local bank account. The implementing agency is NEFCO, whereas funding for this project comes from a share of NEFCO and the Governments of Finland, Norway and Sweden. The total amount allocated is EUR 15 million, partitioned between grant financing for Ukrainian municipalities and a combined version of grants and loans for some specific projects (NEFCO, no date).

3.4.6. Preferential loans from the State Fund for Supporting Youth Housing Construction

Within the State Fund for Supporting Youth Housing Construction the government provides loans for renovation projects in the housing sector. These loans are given to legal entities, such as ESCOs or associations of co-owners of apartment buildings. This takes place without the participation of commercial banks.

3.4.7. Commercial Banks Programs

A widely not used funding instrument in the Ukraine are loans from commercial banks. The small uptake of these funding mechanisms results mainly from the small and slowly developing loan products for such projects. High interest rates and no reimbursement of these makes commercial products not competitive with above mentioned programs and are therefore not really used.

3.4.8. Local Authorities Programs

Various projects are directly financed from local authorities. This can be done by providing the local authority budget, participation in governmental programmes, such as the Warm Loans programme, or even mobilizing resources from IFOs. The total budget for these projects in 2016 and 2017 were EUR 4.8 million (UAH 144 million)

There are also some other successful local energy efficiency programs, as e.g. the Kyiv program the Rivne program and the Vinnytsia programme. These programmes are mainly focusing on the building sector.

3.4.9. Energy Service Companies

A relatively new mechanism in Ukraine builds on contracts with ESCOs to implement energy efficiency projects. Under the scheme of energy service contracts of any energy customer, (households, enterprises or authorities) and ESCOs, the customer does not invest in the project itself, but the ESCO (SAEE, 2018). The resulting savings from energy consumption is repaying the investment and paying the profit of the ESCO. Within this scheme, the consumer does not pay and the ESCO makes its profit. The regular payback period is about 5-7 years. Within the last years some EPC projects have been implemented.

Thermal Energy Supply Systems

Beside investments into the building sector, there are also certain mechanisms supporting the energy efficiency development within the energy supply system. Thermal energy production in the Ukraine is mainly in ownership of the municipalities. The distribution and production system is in bad condition. The IFC estimated 30 percent of thermal energy loss within these two sectors in 2016. If the modernization of this sector would be completely funded, EUR 42.4 million (USD 48 million) worth of gas consumed would be saved annually. The IFC estimated a necessary total amount of EUR 5.3 billion (USD 6 billion) to be invested into the sector, whereas a portion of EUR 755 million are supplied already (UNDP, 2017).

3.4.10. Ukraine District Heating Energy Efficiency Project

The largest investment in Ukraine in this field is the Ukraine District Heating Energy Efficiency Project (UDHEEP). It was initiated in 2014 and will be finished in 2020. Its total funding amounts to EUR 337.6 million (USD 382 million), which comprises of funding from the IBRD and the Clean Technology Fund.

Participants were chosen prior to the project implementation. The project is organized by a Central and a Regional Project Management Group. Local authorities are excluded from the implementation process. Funds are managed by the Ukraine Ministry of Finance.

3.4.11. EIB program “Development of Municipal Infrastructure in Ukraine”

The EIB programme, Development of Municipal Infrastructure in Ukraine, was implemented in 2016. The total amount provided is EUR 400 million. The biggest part of the funds, EUR 160 million is for energy efficiency heating projects and EUR 40 million for modernization of buildings

(UNDP, 2017). The management of this program is the Ministry of Regional Development and the EIB.

3.4.12. KfW program “Untied Financial Loan for Reconstruction of Eastern Ukraine”

The “Untied Financial Loan for Reconstruction of Eastern Ukraine” is a joint programme of the Government of the Ukraine and the German development bank, KfW. Total amount of invested funds is EUR 16.792 million (UAH 500 million) obtained by the Ukrainian Ministry of Finance. Implementation, monitoring and management of the programme is with various stakeholders, including central and regional working groups, the Ukrainian government and the KfW.

3.4.13. Project of Ukreximbank and the IBRD

Within this project, the Ukrainian Ukreximbank received a loan from the IBRD, guaranteed by the Ukrainian government. The bank itself decides which projects to finance. Therefore, its technical role is to function as a local intermediary between projects and other banks and the IBRD. Requirements for these projects is having a real internal rate of return of 10 percent or more and a debt service ratios of 1.3 (UNDP, 2017).

3.4.14. EBRD Financing

The EBRD is a key player in financing programmes and projects throughout Europe. Within its Green Economy Transition program, the bank supports countries in building low carbon economies. Most countries in which the EBRD is active are middle-income economies in political and economic transition, as is Ukraine. In the last two decades, the EBRD has undertaken more than 450 financing projects within Ukraine, whereas many are still running or within implementation phase.

Financial products are loans, equity financing and guarantees. The EBRD also works in close cooperation with other donors as the European Union, the Green Climate Fund, the Climate Investment Fund and the Global Environment Facility and is going to increase its green investments after 2020.

Commercial projects by municipalities or private companies, including energy efficiency projects, may obtain a loan or other products from the EBRD. Borrowers have to pay regular interest rates, plus other fees and charges. Additionally, a guarantee must be provided for the EBRD. This may be company shares or mortgage of assets. EUR 25 million is the average amount of loans

provided by the EBRD (UNDP, 2017). In total the EBRD, has invested a cumulated amount of EUR 14.4 billion within Ukraine (EBRD, 2020).

EBRD financial instruments applicable in the Ukraine

- a) Loans: are provided for meeting specific project requirements. The risk is taken by the EBRD or partly moved to the market.
- b) Equity investments: may be made by the EBRD, expecting an appropriate rate of return.
- c) Guarantees: Through the Trade Facilitation Program, the EBRD also supports projects by offering guarantees to increase access to finance for projects.

One of EBRDs focuses is the development of SMEs. Financing may go from direct loan or equity facilities to including intermediary banks with EBRD involvement (EBRD, 2020).

3.4.15. NEFCO projects

NEFCO has two additional projects within Ukraine dealing with energy efficiency in the thermal energy supply system. Under this scheme private companies may obtain direct loans from IFOs. However, there must be a guarantee provided by local governments.

a) The DemoUkrainaDH programme is involved in projects in 24 cities in the Ukraine. Some of them are already finished, whereas most projects are still running or are in the implementation phase. Funding for the programme comes from NEFCO, the government of Sweden, the Swedish International Development Cooperation Agency and E5P (UNDP, 2017). This program is available for thermal energy supply companies.

b) The Chyste vyrobnytstvo is a funding programme for municipalities and private companies. It aims at reducing the environmental impact of industrial projects. This may result from reducing energy consumption and general energy modernization. To receive a loan, the project must have a return on investment of 25 percent and a collateral or guarantee of 125 percent (UNDP, 2017).

3.4.16. Funding by suppliers own fund

Local thermal energy producers may also use their own funds for energy efficiency programs. These programmes have to be approved by the Energy and Utilities National Regulatory Commission. The total amount approved has been EUR 31.158 million (UAH 927,760,000).

3.4.17. State Energy Efficiency Program

In 2015, the government of Ukraine reinforced the State Energy Efficiency Program. Within this programme, the Ukraine government offers soft loans applicable for households implementing energy efficiency measures. It covers 20 percent of loans for replacing gas boilers with electric or solid fuel boilers, with a maximum ceiling at EUR 400 (UAH 12.000). Additional energy efficiency projects in individual households and condominiums are financed between 30-40 percent with a maximum of EUR 470 (UAH 14.000) per flat. In 2015, EUR 43.66 million (UAH 1.3 billion) of loans were made and EUR 26.53 million (UAH 790 million) in 2016 were allocated to the programme (OECD, 2018).

3.4.18. Eastern Europe Energy Efficiency and Environment Partnership

The Eastern Europe Energy Efficiency and Environment Partnership (E5P) started being active in the Ukraine in 2010. It is a fund for investments in environmental and energy efficiency projects in the Eastern Partnership of the EU. Funds are coming from the EU and participating countries. For the project duration 2011-2019, EUR 180 million were provided, from which EUR 78 million were coming from the EU. These resources come in the form of grants and are used to attract more funding from IFOs and national funds. District Heating modernization, wastewater treatment, LED street lighting or simply improving energy efficiency in buildings, are typical projects.

There are also other projects supporting energy efficiency by primary providing technical assistance and promoting legislation and creating funding tools. These are: the UNDP project “Ukraine Energy Efficiency Secretariat and Expert Hub”, the USAID Municipal Energy Reform in Ukraine, IFC Residential Energy Efficiency Projects and the GIZ projects: “Energy Efficiency in Municipalities” and “Establishing Energy Agencies”.

Table 6: Funding mechanisms in Ukraine (own processing)

Mechanisms in Ukraine					
Project	Sector	Financial Instrument	Source	Management/Administrator	Amount of Funding*
Warm Loans	Buildings	Loans (partially reimbursed)	Government	Ukreximbank, Oshchadbank, Urkgazbank and Privatbank	90
Energy Efficiency Fund	Buildings	Grants	Government/ IFOs/EU/ Germany	EEF	180
IFC Multi-Donor Trust Fund	Buildings	Grants/ Loans	IFC/EU/Swiss Government	IFC	319.8
IQ Energy program	Buildings	Loans/ Grants	EBRD/E5P fund	Ukrsibbank, Raiffeisen Bank Aval and OTP Bank	79.5
Nordic Initiative for Energy Efficiency and Humanitarian Support	Public Buildings	Loans/ Grants	NEFCO/ Finland/ Norway/ Sweden	NEFCO	15
State Fund for Supporting Youth Housing Construction	Buildings	Loans	Government	State Fund for Supporting Youth Housing Construction	No reliable data
Commercial Banks	Cross-sectoral	Loans	Banks	Banks	No reliable data
Local Authorities Programs	Buildings	Grants/ Loans	Government	Local authorities	4.8
ESCOs	Cross-sectoral	EPC	ESCOs	ESCOs	No reliable data
Ukraine District Heating Energy Efficiency Project	Industry	Loans	IBRD/Clean Technology Fund	Ministry	337.6
EIB program "Development of Municipal Infrastructure in Ukraine"	Industry	Loans	EIB	Ministry/EIB	200
KfW program "Untied Financial Loan for Reconstruction of Eastern Ukraine"	Industry	Loans	Government/ KfW	Multiple	16.792
The project of Ukreximbank and the IBRD	Industry	Loans	IBRD	Ukreximbank	No reliable data
EBRD Financing	Cross-sectoral	loans, equity financing and guarantees	EBRD and other funds	Government/Local authorities	No reliable data
NEFCO projects	Industry	Loans	NEFCO/ Sweden/E5P	NEFCO	No reliable data
Funding by suppliers own fund	Industry	-	-	-	31.158
State Energy Efficiency Program	Buildings	Loans	Government	Ministry	70.19
Eastern Europe Energy Efficiency and Environment Partnership	Cross-sectoral	Grants	European Union	E5P	100
				Sum	1444.84
	* in EUR million				

4. Discussion

Concluding this work, there is barely any complementary overview of existing and other measurements addressing energy efficiency in each country. The only two more comprehensive works found is an approach by UNDP from the year 2017 for Ukraine and one in India from the MoP and USAID from 2013. However, as the very nature of the topic addressed appears to be generally volatile, programmes and, therefore, financial flows change on a regular basis and are difficult to assess in its completeness. In several cases, data on these flows are not existent and could not be displayed.

Overall, Comparing the financial mechanisms of the EU, India and Ukraine, various differences in their approach, structure of investments, sources and amounts are observed.

Sources and Stakeholders

In general, specifically defined financial instruments in all three countries were found, whereas the stakeholders involved and the origin of resources differ widely. There are much more public and private resources available in developed nations as Austria, while developing countries like Ukraine and India, are more limited with their own available budget and therefore more dependent on international funding. Therefore, more involvement of multilateral and bilateral institutions involved in energy efficiency financing is observed within the two later countries.

In the case of Austria, the greatest amount of money provided comes from national resources (over 90 percent). Additionally, financial institutions of the EU, as the bigger political and economic entity, supports the Austrian government and economy by allocating parts of the EU budget into energy efficiency projects.

India is the seventh largest country with the second largest population (1.366 billion), which makes a central approach of energy efficiency development more difficult in relation to the other countries. Therefore, a more federalistic way of managing energy efficiency based on provincial authorities from Indian states is seen. Additionally, there is enormous amounts of financial support for energy efficiency projects from international sources, including bilateral cooperation as the involvement of investments from the UK or Japan and IFOs (about 90 percent).

The geographical and economical closeness of Ukraine to the EU shows that international finance and stakeholder involvement in the country comes strongly from the EU and EU member states. This results also from Ukraine being a member of the Energy Community, being bound to

European laws, such as the EED, and the interest of Ukraine to get closer to the EU market. In Ukraine, funding for energy efficiency development originates approximately to 90 percent from EU funds and directly from its member states.

According to the source of finance, the procedures of obtaining fund regularly varies a lot. It depends on the structure of resources allocated and where the management and implementation responsibility lie. A general problem for obtaining funding from IFOs is that national laws do not always completely correspond with procedures of IFOs. This often makes it difficult to acquire international funding and generally takes a lot of time from initiation to implementation.

Investment Volume

Generally, the mechanisms analysed within this paper show a wide variety of resources invested, ranging from relatively small investment projects of a few EUR 100,000 to funding of big projects with more than EUR 50 million invested capital.

In total, Austria has shown to have the relatively highest amount of resources invested in energy efficiency compared to the other countries. Estimated resources amount to about EUR 18 billion. However, in Austria, we have included data from provincial funding. In the case of India and Ukraine, there is no such data. If granting of provinces in Austria were dismissed, the amount totals to EUR 3 billion.

In India, representing by far the biggest country in this case study, the total investment volume is approximately EUR 2.5 billion. In Ukraine, it is about EUR 1.5 billion.

The different stages of development in these countries and the differences in population size must be considered. Respectively, Austria has by far the highest relative investment volumes, followed, by Ukraine. India with a much bigger population than both is therefore lacking far behind in investments in energy efficiency measures. However, as already mentioned, comprehensive data on total amounts invested is hardly available. Especially in the case of commercial lending, there is not much documented and publicly accessible. Therefore, this comparison is made in relative terms.

Potential vs. supplied amounts

There is a huge possibility for investment in energy efficiency in regards to its energy saving potential and long-term economic returns. Nonetheless, actual investments are lacking far short under its potential in each case.

Instruments

Overall, similar approaches and instruments are used in all three cases. These range from general loans, grants, guarantees and project development support and technical assistance. However, the two most dominating ones are grants and loans. Some mechanisms are focusing on one type of product, as the VCFEE on equity, or others specifically on guarantees. Others offer a wider range of different products.

However, the Austrian funding environment is mainly focusing on grant finance. (90%) More innovative financial instruments are needed to leverage sufficient capital and reach required amounts of investment. Kick-starting funding and demonstrating the economic feasibility of energy efficiency projects should be the main goal of most economic instruments. This may increase investment flows of crucial private capital. In the other two cases, where funding comes mainly from international sources, the main financial instrument used are loans (India 85%, Ukraine 60%)

Looking at the amount funded by instruments, we notice that there is even a bigger discrepancy. More than 99 percent of funding in Austria is allocated through grants. In India more than 99 percent by loans, equity financing and guarantees. We can find a slight difference in Ukraine, where about 84 percent are provided by loans etc. and 16 percent by grants.²

Centralized vs. decentralized

A variety of mechanisms have been implemented within the last decade, especially in the case of India. These may result from the fact that in India there are many more actors involved (e.g. USAID, World Bank, JBIC or the UK). Beside the fact that most of these funds come from international sources, most of them are granted through local institutions and national banks.

Furthermore, this also must be seen in relation to the country and population size. As India is a much bigger country, it is more likely that a higher variety of institutions and therefore financial mechanisms for energy efficiency exists. If this means a higher effectivity and faster progress in overall energy efficiency development than in smaller countries, a more centralized system must be evaluated in further studies. However, also in Austria and Ukraine, there is not negligible degree of local authorities involvement in program coordination and funding.

² Calculations are based on accessible and reliable data.

Funding focus

All three countries have a special focus on developing energy efficiency in the building sector. This may result from the fact that this sector is generally seen as the one with the highest importance, according to energy loss and therefore the one with the greatest potential.

Within Ukraine, it seems that when it comes to energy efficiency it is mostly centered on reduction of energy use, especially measured in decreasing usage of gas. This includes the objective of getting more independent of gas imports, whereas in other countries the general transition into renewable energy seems to play a more important role and is therefore much more often mentioned in its programmes.

Legislation

Legislation on promoting energy efficiency plays a key role on further development of the sector. This process is within the responsibility of each country, whereas in some cases there are international stakeholders involved, promoting and influencing the development of national legislation. Austria is determined by legislative developments on EU level. Ukraine is heavily dependent on standards developed by the Energy Community and therefore also by the EU. Additionally, the IFC is also promoting the legislative process within the country. Within India, the influence of USAID is heavily witnessed within this process.

Informational limitation

A major challenge for increasing overall investments in energy efficiency is the missing knowledge and information of present or potential stakeholders. This results also from the complex structure and different sources of existing mechanisms. A slight difference in the case of Austria is observed, as a huge part of funding is managed by KPC and therefore easier to overlook than in cases as in India, where so many international programs coexist. If stakeholders in the energy sector are not aware of financial products available or the application process or resources are limited, the uptake of energy efficiency projects is limited respectively.

Further development

There is a wide variety and relatively comprehensive amount of different energy efficiency measures available in each country. However, there is also a general lack of resources, and existing mechanisms are far behind its potential. Especially, the use of more market-based approaches

should not be underestimated. This includes EPC by ESCOs, guaranteeing and de-risking measures. De-risking and market-based approaches seem to have a central role, as it became clear that public investment capacities are not able to reach energy savings requirements and potential. Therefore, incentivizing private capital is the main goal of future development of mechanisms. Furthermore, the uptake of energy audits for the building sector and other measures, such as tax rebates, especially for ESCOs investment may be very helpful for the further development of energy efficiency (IISD, 2014). Developing regulations demanding energy audits for certain companies would lead to a greater likeliness for firms to invest in energy efficiency. Additionally, a general increase of banks involvement and more diversified projects may be additionally necessary to reach energy efficiency objectives.

Moreover, consolidation and simplification of certain programmes may be recommended. For example, the new InvestEU programme aims to merge the dif-

ferent financial instruments to make them more efficient and flexible. Therefore, requirements and application processes will be unified to enhance overall investments.

Table 7: Cross-Country Comparison (own processing)

Cross-Country Comparison			
	Austria	India	Ukraine
Funding source			
International	10.0%	90.0%	90.0%
National	90.0%	10.0%	10.0%
Division of Funding Instruments			
Grants	90.0%	15%	40.0%
Loans/Equity Financing/Guarantees	10.0%	85%	60.0%
Total Funding amount excluding provincial funding (reliable data, amount in EUR millions)	3077.17	2421.888	1444.84
Funding amount by instrument (reliable data)			
Grants	>99%	<1%	16%
Loans/Equity Financing/Guarantees	<1%	>99%	84%
Population (in millions)	8,877	1366	44,622
(World Bank Data, 2020c)			
CO2 Emissions (in metric tons per capita)	7000	1800	4500
Energy Consumption (kWh per capita)	8355	804	3418
(World Bank Data, 2020d)			

5. Conclusion

Concluding this analysis, it has shown that financial instruments and the accessibility and availability of financial resources are key for the further development of energy efficiency. Especially the building sector, as a major contributor to energy loss, needs huge amounts of capital invested to reach desired outcomes. The energy sector additionally offers possibilities for improving energy efficiency and cut down on carbon emission. The scope goes from energy production and conversion facilities, including fossil fuels to energy transmission, distribution and end usage.

Within the global transformation process to CO₂ neutral economies and a global system based on renewable energy resources, investments must accelerate, especially as investments have not sufficiently increasing within the last years. Therefore, the inclusion and incentivizing of more private capital invested must become the central goal of present and upcoming financial mechanisms.

Additionally, it became clear that there are various instruments which are still hugely underestimated, especially due to its complexity and the lack of knowledge from market actors. This includes the involvement of ESCOs, EPC and financial instruments de-risking investments in the energy efficiency sector, especially for private capital.

Furthermore, it became obvious that developing countries as India and Ukraine have a much greater pressure transforming their economy, building sector and industry into energy efficient ones. This mainly results from a lack of sufficient financial resources, which cannot be achieved without international cooperation programme, and the general lack of information and security of investors. However, even in the case of a European and well-developed country, as Austria represents, sufficient financial resources are still lacking to meet its potential and the development of legislation and programmes leveraging vast amount of private capital must be intensified.

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Annex

Average Exchange Rates used

EUR/USD

2020 1.120628

2019 1.119475

2018 1.180955

2017 1.129686

2016 1.106903

Average

1.1315294

EUR/INR

2020 83.227737

2019 78.836140

2018 80.733238

2017 73.532835

2016 74.371692

Average

78.1403284

EUR/UAH

2020 29.631075

2019 28.922952

2018 32.155532

2017 30.030894

2016 28.293749

Average

29.775734