EU4Energy

Energy Community

EU4Energy Governance

FINAL DRAFT

of the energy efficiency target till 2020 calculation (including perspective until 2030)

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The EU4Energy Initiative covers all EU support to improve energy supply, security and connectivity, as well as to promote energy efficiency and the use of renewables in the Eastern Partner countries Armenia, Azerbaijan, Belarus, Georgia, Moldova and Ukraine. It does this by financing projects and programmes that help to reform energy markets and to reduce national energy dependence and consumption. Over the longer term, this makes energy supply more reliable, transparent and affordable, thus reducing energy poverty and energy bills for both citizens and the private sector.

Background

According to the Ministerial Council Decision D/2015/08/MC-EnC each Contracting Party (CP) shall transpose and implement Directive 2012/27/EU on Energy Efficiency (EED) with consideration of relevant adaptations. Article 3 of EED obliges CP to set an indicative national energy efficiency target, based on either primary or final energy consumption, primary or final energy savings, or energy intensity, and also to notify those targets to the Energy Community Secretariat (ECS) in accordance with Article 24(1) EED. Besides, Article 24(1) EED provides for annual reporting on the progress achieved towards national energy efficiency targets, in accordance with Part 1 of Annex XIV EED.

The 20% energy efficiency target by 2020 for the Energy Community contracting parties was set as a cap consumption of primary and final energy in 2020: 187 Mtoe in terms of primary energy consumption, and 133 Mtoe in terms of final energy consumption. Redistribution of 2020 targets on the national level was done and proposed by ECS in order to support CPs and simplify the process of EnC Secretariat monitoring and keeping the consumption below the cap.

To assess indicative energy efficiency target until 2020 for Ukraine with providing the longer vision on energy efficiency development till 2030, the comprehensive approach was proposed and implemented in the framework of the EU4Energy/ECS project. This approach is based on the use of TIMES-Ukraine model and scenario analysis to be performed to estimate reasonable energy efficiency targets and corresponding measures across sectors.

The detailed description of the scenario formulation process, results from scenario modelling exercises highlighting economic and sectoral effects, potential for energy saving across sectors within different types of target setting, and also deeper insights of the amendment scenario was given in the main Project Report. This paper summarises the key findings of the study to provide the basis for general understanding of the type and level of the EED target that could be set by Ukraine.

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General approach

The general approach of this study based on the scenario analysis framework. For this purpose the TIMES-Ukraine model was used, that is linear quasi-dynamic optimization perfect foreseen energy system model which provides a technology-rich basis for estimating energy dynamics over a long-term, multi-period time horizon.[1]

Prior to the assessment of different energy efficiency targets formulation, the exploratory scenario has to be developed with regard to macroeconomic scenario, which determines the dynamics of the main drivers of energy demands – GDP, value added, industrial production, other macroeconomic and demographic indicators. The next step is to check the possibilities and effects of meeting identified demand for energy services with the use of TIMES-Ukraine, considering budgetary and technological constraints also imposed by the macroeconomic assumptions. TIMES-Ukraine calculates the optimal combination of energy technologies throughout the chain of the energy use and by so directly forms the projected energy balance and calculates other important parameters of the forecast, such as marginal prices or emissions. These calculations are done having also assumed specific internal conditions of energy sector development form the energy policy scenarios.

The first policy scenario – **Baseline scenario (BAU)** – has been developed assuming that no fundamental changes in the energy sector have place, and in particular no energy efficiency measures are implemented during the projected period. The purpose of the calculations under BAU scenario is to create a basis for comparison with other policy scenarios – the **alternative energy efficiency target scenarios (EET scenarios)**. Considering that EET scenarios based on the baseline scenario that reflects the latest energy policies and available statistics data, but some of the EED targets are formulated refering to the baseline scenario formalized in the first NEEAP, the first baseline case further in the text is referred as ***New BAU***, while the baseline scenario presented in the first NEEAP is called ***Old BAU***.

In ***the macroeconomic scenario*** it is assumed (Table 1) that occupation of territories in Crimea and Eastern Ukraine would be settled not earlier than 2018-2019. From this perspective Ukrainian economy is not likely to be fully recovered during 2016-2018, and its GDP is not likely to reach the pre-crisis level of 2012-2013. The GDP average annual growth rate till 2030 will be at the level of 4% that is in line with the expectations of the IMF and the World Bank: IMF projects the GDP average annual growth rate of 2.9%[2] in 2016-2020, while according to the World Bank[3] there could be expected in average 2.0% for 2016-2018 (1% in 2016, 2% in 2017, and 3% in 2018).

[1] Podolets, R.Z., Diachuk, O.A. Strategic Planning in Fuel and Energy Complex Based on TIMES-Ukraine Model: Scientific Report/NAS of Ukraine; Institute for Economics and Forecasting. – Kyiv, 2011. – 150 pages.

[2] World Economic Outlook Database. International Monetary Fund. Available from: https://www.imf.org/external/pubs/ft/weo/2016/01/weodata/index.aspx

[3] Global Economic Prospects. Europe and Central Asia. The World Bank. Available from: http://pubdocs.worldbank.org/en/484281463605616745/Global-Economic-Prospects-June–2016-Europe-and-Central-Asia-analysis.pdf

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Table 1. GDP average annual growth rates, %

Sectors/Years	Average for the period		
	2016-2020	2021-2025	2026-2030
Agriculture, forestry and fishing	1.4	5.7	4.9
Extractive industries and quarrying	3.0	3.4	2.3
Processing industry	6.5	5.6	4.1
Supply of electricity, gas, steam and conditioned air	4.4	4.9	4.8
Construction	8.0	6.4	5.1
Commodity production sector – total	4.2	5.3	4.3
Services sector – total	2.5	5.0	4.2
GDP	**2.8**	**5.0**	**4.2**

Source: *prepared by the IEF/NASU within the framework of the USAID Municipal Energy Reform Project in Ukraine.*

Demographic assumptions (Table 2) in this study are based on the population projection made by the Institute for Demography and Social Studies of the National Academy of Sciences of Ukraine (IDSS/NASU)[4], which is in line with the projection developed by the United Nations Department of Economic and Social Affairs[5].

Table 2. Population projection for Ukraine till 2030, million people

Scenarios	Actual data			Projection		
	2012	2014	2015*	2020	2025	2030
IDSS - AAA scenario	**45.6**	**45.4**	**42.9**	**44.4**	**43.6**	**42.8**
UN Dep. of Economic and Social Affairs	45.6	45.4	42.9	43.7	42.4	40.9

** Excluding the temporarily occupied territory of the Autonomous Republic of Crimea and in Eastern Ukraine.*

Source: *State Statistics Service of Ukraine, Institute for Demography and Social Studies, NASU*

The energy price forecast (Fig. 1) is based on the projection prepared by the team of experts of the World Bank[6] published in the Commodities Market Overview (January 2017)[7].

The New Baseline Scenario (New BAU) was formulated basing on the following assumptions:

- Assumptions regarding technology costs (capital investment and O&M costs) are based on estimates of the International Energy Agency, Lappeenranta University of Technology and national experts;
- No environmental requirements and constrains;

[4] http://www.idss.org.ua/monografii/popforecast2014.rar

[5] http://esa.un.org/unpd/wpp/unpp/panel_population.htm

[6] Since pricing for the energy resources have almost completely been liberalized in Ukraine, it was assumed that internal prices would sharply correspond to the world prices.

[7] Commodities Market Overview. Investment Weakness in Commodity Exporters / World Bank Group, January 2017. Available at: http://pubdocs.worldbank.org/en/820161485188875433/CMO-January-2017-Full-Report.pdf

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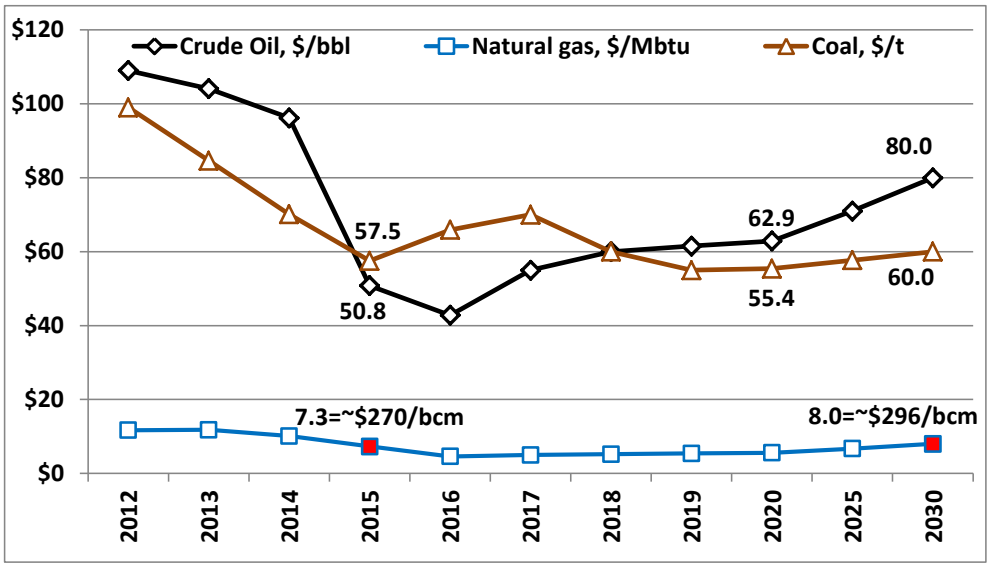

Fig. 1. Energy price projection (nominal prices)

Source: *The World Bank (http://pubdocs.worldbank.org/en/524241493046966255/pdf/CMO-April-2017-Forecasts.pdf).*

- No energy efficiency or energy saving measures are implemented, even economically attractive. Installation of advanced technologies is not considered as well. Efficiency of the end-user technologies is "frozen" at the level of 2012 (2015). Energy intensity of GDP decreases slightly as a result of structural economic changes in accordance with the macroeconomic assumptions and modest technological changes in the energy system;
- The feed-in-tariff for renewables is effective in accordance with the national legislation till 2030, but there are no environmental or other restrictions on the fuel use;
- No barriers for further development of the nuclear PPs, operation life time of the existing NPPs could be extended for a maximum of 20 years. The cost of new NPP units corresponds to the current European prices.

Energy efficiency target (EET) scenarios were developed as a set of additional assumptions as of EE target formulation that are imposed on the New BAU scenario. Besides, EET scenarios are based on the assumption of the perfect competition across sectors and energy markets, the feasibility of incentives for the implementation of energy efficiency and energy saving projects, as well as renewable energy and other economically attractive initiatives.

Article 4 EED stipulates that by March 30, 2017 EnC Contracting Parties shall establish a long-term strategy for mobilizing investment in the renovation of the national stock of residential and commercial buildings, both public and private, with a purpose to increasing their energy efficiency in the long run. Due to assumption that public authorities should serve as an example for other categories of energy consumers, ***Article 5 EED*** requires that from 1 December 2017 not less than **1%** of the total floor area of heated and/or cooled buildings with a total useful floor area over 500 m^2 owned and occupied by central government is renovated each year to meet at least the minimum energy performance requirements.

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Established by January 1, 2017 and publicly available inventory of such buildings as set out in Article 5(5) EED should have been provided an information bases for quantification obligations, as such was also facilitated by the Article 12 of Directive 2010/31/EU with regard to energy certification of buildings. Taking into account that the Law of Ukraine on the Energy Efficiency of Buildings was adopted only in June 2017, and hence the inventory of public buildings has not been established yet, additional assumptions were made to assess the implementation of Article 5 EED.

Renovation and thermal modernization of engineering structures of non-residential buildings, bringing their heating and lighting systems to proper conditions result in reduction of specific energy use, primarily for the needs of **heating, cooling and lighting**. As the State Statistics Services does not provide information on final energy consumption in Commercial and Residential sectors by end-use (for space and water heating, cooking etc.), such estimations were made on the basis of the modelling exercises and allocated actual volumes of consumed energy by final energy demands with an approach recommended by Eurostat[8]. The scenario assumptions relevant to requirements of Article 5 EED are drawn up in the following Table 3.

Table 3. Scenario assumptions for Art. 5 EED

Reduction of energy consumption by end-use demand comparing to the New BAU scenario	In 2020		In 2030	
	%	ktoe	%	ktoe
Space heating	0.387	11.725	1.354	47.352
Space cooling	0.212	0.673	0.742	2.464
Lightning	0.308	0.749	1.079	3.157

Article 7 EED points out that starting from January 1, 2017 each EnC Contracting Party shall set up an energy efficiency obligation scheme to ensure that energy distributors and/or retail energy sales companies implement relative measures targeted on reduction of at least 0,7% of the annual energy sales to their final customers (reduction of final consumption) comparing to the averaged over the most recent three-year period prior to January 1, 2016, for which the reliable statistical data is available (that is, the average for 2013-2015). The scenario assumptions relevant to requirements of Article 7 EED are imposed on the FEC (final consumption without non-energy consumption and final consumption in Transport sector) and formulated as follows:

- in 2020: FEC reduction by 1 304 ktoe comparing to new BAU;
- in 2030: FEC reduction by 4 565 ktoe comparing to new BAU.

Upon consultations there were several options chosen to formulate the overall EED target and to perform modelling analysis (Table 4).

[8] Manual for statistics on energy consumption in households. / Luxembourg: Publications Office of the European Union. http://ec.europa.eu/eurostat/documents/3859598/5935825/KS-GQ-13-003-EN.PDF/baa96509-3f4b-4c7a-94dd-feb1a31c7291

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Table 4. Assumptions of the Energy Efficiency Target Scenarios

Scenarios	Art. 5 Target	Art. 7 Target	EED Target
Scenario S1	✓	✓	None
Scenario S2A	✓	✓	Reduction of the final consumption comparing to the Old BAU scenario by 20% in 2020 and by 30% in 2030, resulting in FEC being not larger than 55 507 ktoe in 2020, and 57 199 ktoe in 2030
Scenario S2B	✓	✓	Reduction of the primary supply comparing to the Old BAU scenario by 20% in 2020 and by 30% in 2030, resulting in TPES being not larger than 101 843 ktoe in 2020, and 104 947 ktoe in 2030
Scenario S3	✓	✓	Annual reduction of the final energy consumption by 1% of the averaged level of 2005-2009, resulting in a reduction of FEC (excluding aviation and navigation) of 2 890 ktoe comparing to the New BAU scenario in 2020, and of 7 946 ktoe in 2030 (approach used in the first NEEAP)

Modelling results

Reduction of **Total Primary Energy Supply (TPES)** is observed in all EET scenarios within the range of 10-16% in 2020 and 20-29% in 2030 comparing to the New BAU scenario (Fig. 2), and the difference with an Old BAU scenario makes 24-29% in 2020 and 31-39% in 2030. The highest reduction is observed in S2B scenario where targets (constrains) are imposed directly on TPES

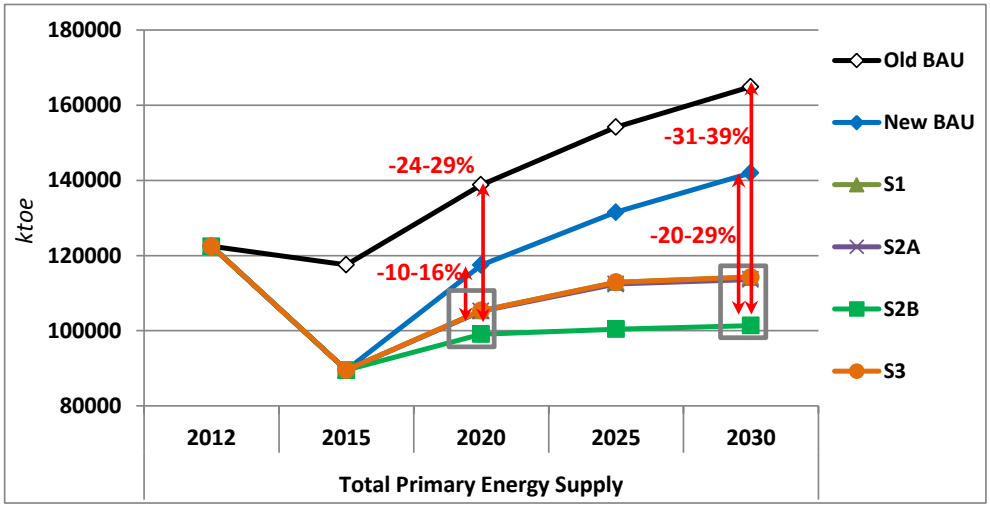

Fig. 2. Total Primary Energy Supply, ktoe

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Likewise TPES, **Final Energy Consumption (FEC)** also reduces in all EET scenarios but more uniformly – by 11% in 2020 and 20-23% in 2030 relative to New BAU scenario (Fig. 3) or by 25% in 2020 and 31-34% in 2030 comparing to Old BAU scenario. Absolute values among EET scenarios are very close in 2020 and the difference is just about 57-174 ktoe, although in 2030 such difference extends to 520-2123 ktoe.

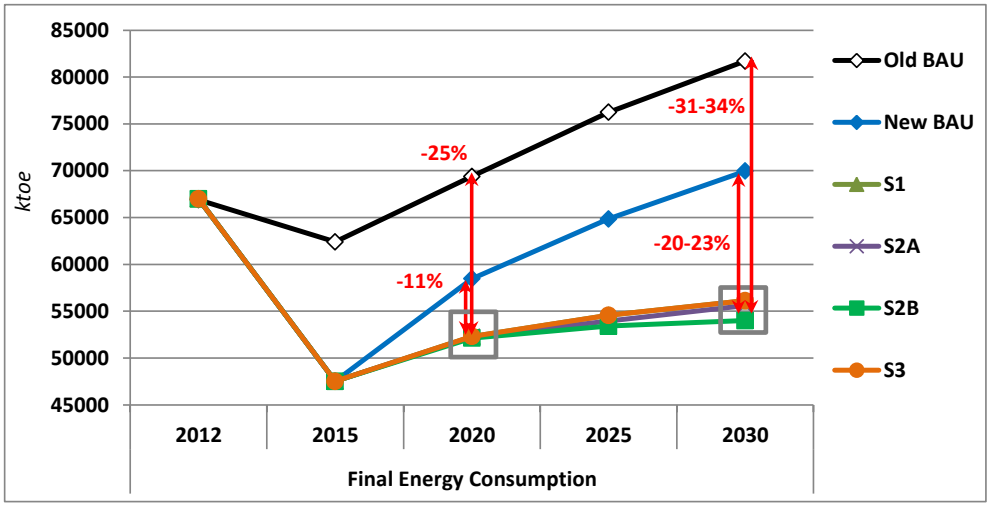

Fig. 3. Final Energy Consumption, ktoe

Comparing to the New BAU scenario **GHG Emission** will reduce in EET scenarios by 14-15% in 2020 and by 26-27% in 2030 (Fig. 4).

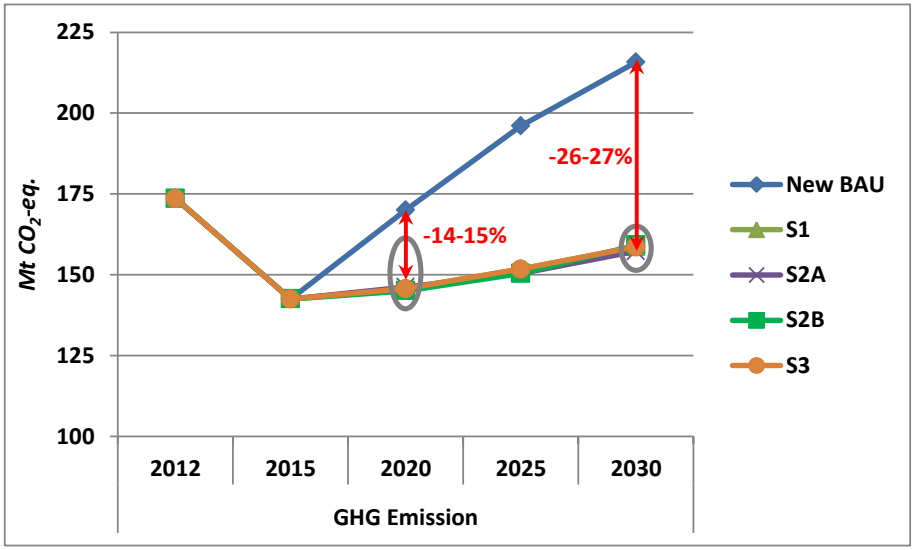

Fig. 4. GHG Emission from Final Energy Consumption, Mt CO2-eq.

Figure 5 provides a summary of *additional* investment that will be needed to achieve the EE target according to the way it was formulated. Presented values are the net present value sum of investments (purchases) over the 2017-2030 period and were estimated as a

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difference between cumulative investments in EET scenarios and New BAU scenario. The difference between S2B and other EET scenarios indicates that imposing constrain on final consumption will mostly stimulate final consumers to choose more efficient technologies and to switch from primary energy resources to more efficient sources (electricity, district heating), that will lead to increase of ratio between TPES and TFC.

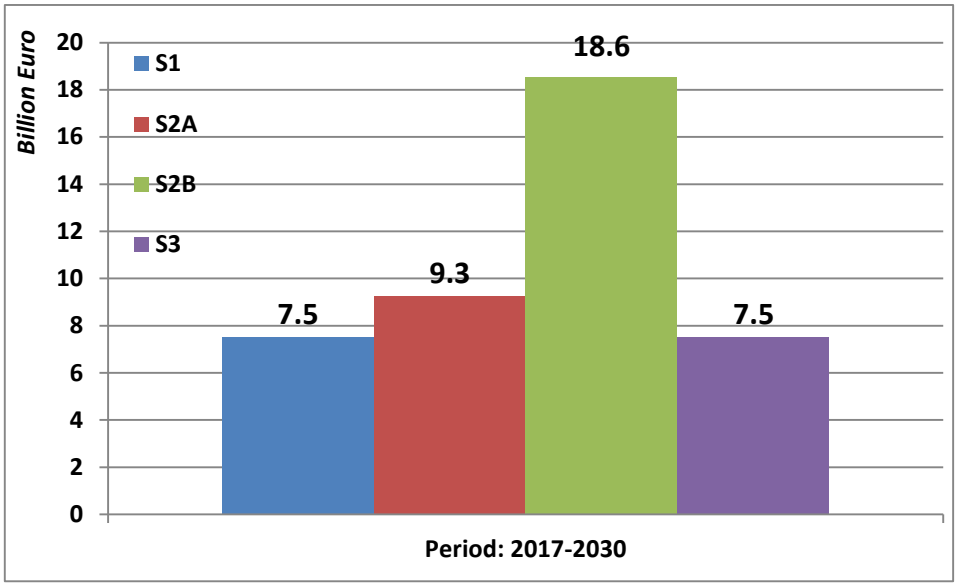

Fig. 5. Additional investments (cumulative) by EET scenario comparing to the New BAU scenario

*After discussion with key stakeholders it was agreed that **Scenario S2A** should be used for the EED target formulation as it is formulated entirely on the principles, promoted by the European Commission and Energy Community regarding overall target and its decomposition, and also sharply corresponds to the figures indicated in the Energy strategy and NEEAP.*

Detailed modelling results for Scenario S2A

The S2A Scenario assumes that the final energy consumption (excluding non-energy consumption) should be reduced by 20% in 2020 and by 30% in 2030 comparing to the baseline scenario developed for the first NEEAP (Old BAU), that means that FEC should not be large than 55 507 ktoe in 2020 and 57 199 ktoe in 2030. However, the modelling results showed that there is a potential of economically feasible energy efficiency measures that may lead to even greater reduction of final consumption. In absolute values FEC will be around 52.2 mtoe in 2020 and 55.6 mtoe in 2030, which is less by 25% in 2020 and by 32% in 2030 comparing to the Old BAU scenario (Fig. 6).

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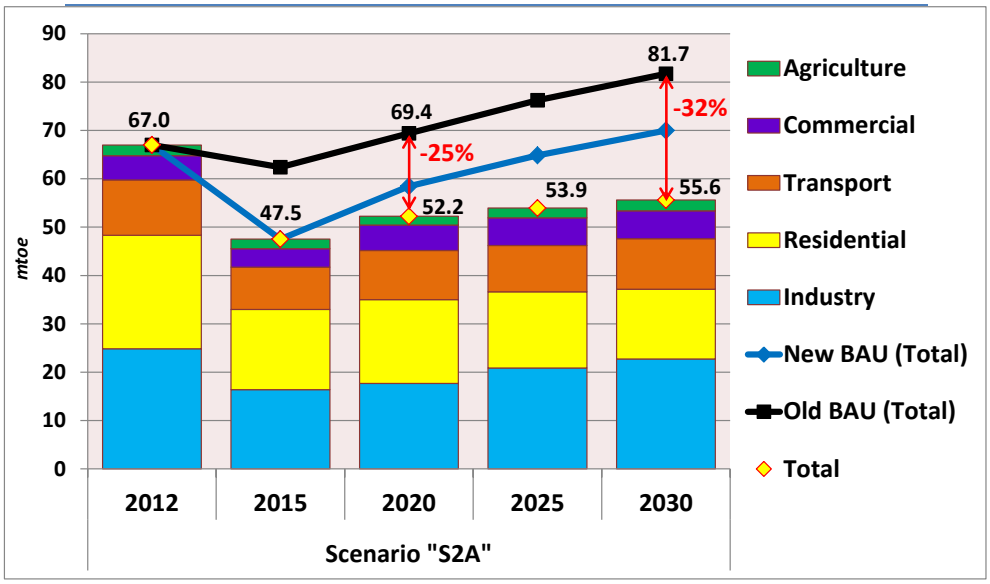

Fig. 6. Final Energy Consumption by Sector

Over the period of 2017-2030 cumulative energy savings in the Residential sector will be around 62.9 mtoe (or 48.9% of cumulative consumption), in Transport – 23.6 mtoe (18.4%), in Industry – 23.1 mtoe (17.9%), in Commercial sector – 13.2 mtoe (10.3%), and in Agriculture – 5.9 mtoe (4.3%) (Fig. 7).

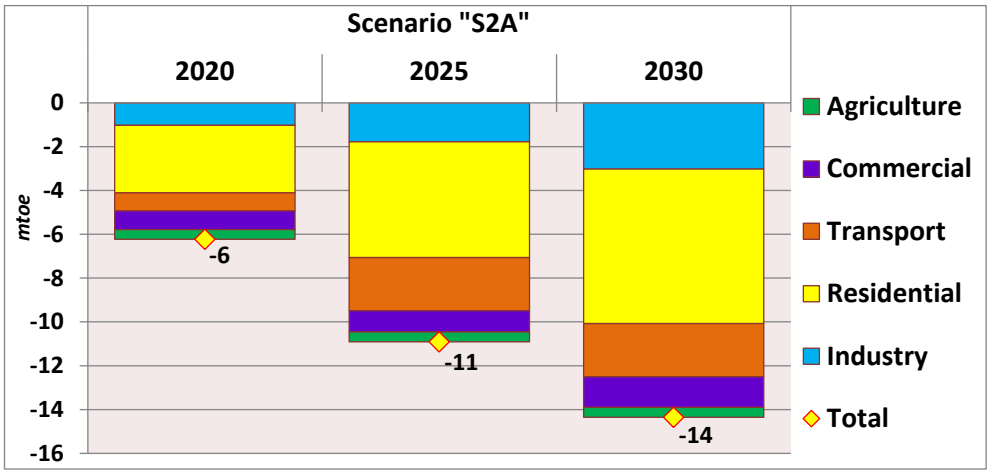

Fig. 7. Final Energy Savings by Sector comparing to New BAU Scenario

In absolute terms, consumption of gas and centralized heat will reduce the most, primarily as a result of insulation of buildings in the Residential and Commercial sectors. At the same time, electricity consumption may grow significantly. Without specific incentives on renewable energy promotion the use of biofuels and waste may even reduce. Cumulative reduction of gas in final consumption for the whole period will be around 62.9 mtoe, heat – 27.2 mtoe, biofuels and waste – 19.0 mtoe, oil products – 16.3 mtoe, coal – 11.5 mtoe, and electricity consumption will grow by 29.8 mtoe, solar energy – 1.8 mtoe (Fig. 8).

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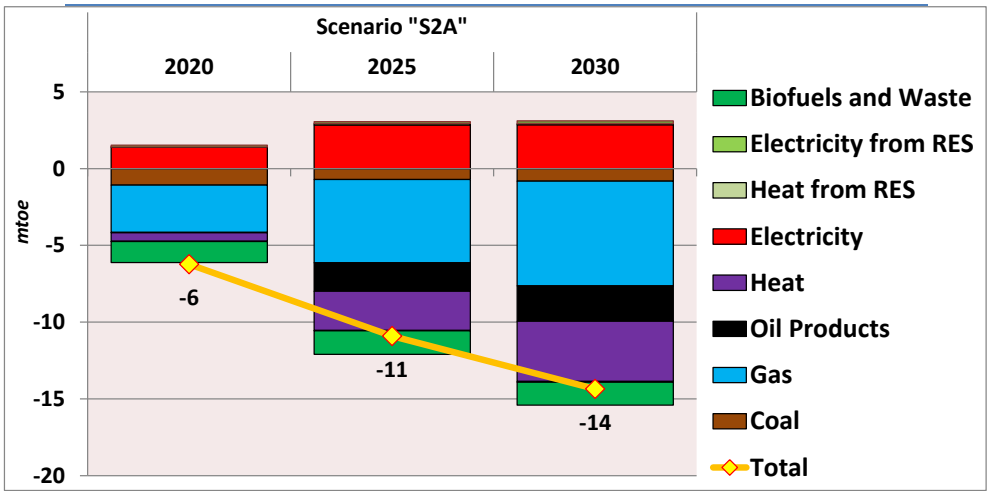

Fig. 8. Final Energy Savings by Fuel comparing to New BAU Scenario

Energy consumption in **Industry** after the significant decline in 2014-2015 is expected to increase supposing for incremental recovery of the Ukrainian economy (Fig. 9). Comparing to the New BAU Scenario, EE measures will allow to save 5% of final energy in 2020 and 12% в 2030. In Industry EE measures cover different engineering solutions aimed to increase the efficiency of energy use at the all links of production chain, waste heat utilization, as well as the electrification of technological processes.

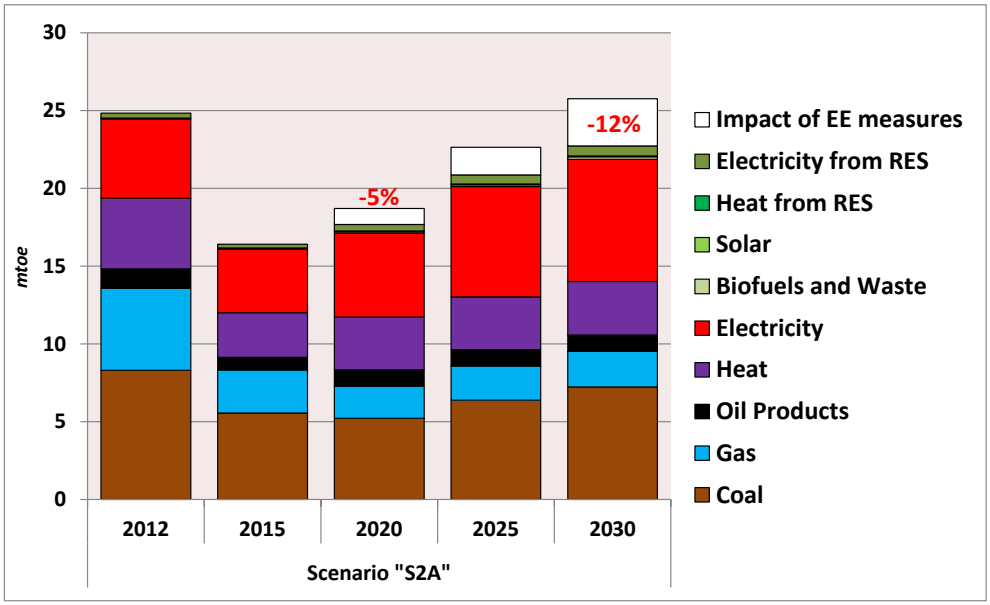

Fig. 9. Final Energy Consumption by fuel in Industry

The largest economically feasible potential for final energy reduction is observed in the **Residential sector** (up to 15% in 2020 and 32% in 2030, Fig. 10). After the slight increase in energy demand by 2020 resulted from the assumed restoration of the territorial integrity of Ukraine, final energy consumption is supposed to start evenly decline stipulated by the promotion of buildings renovation.

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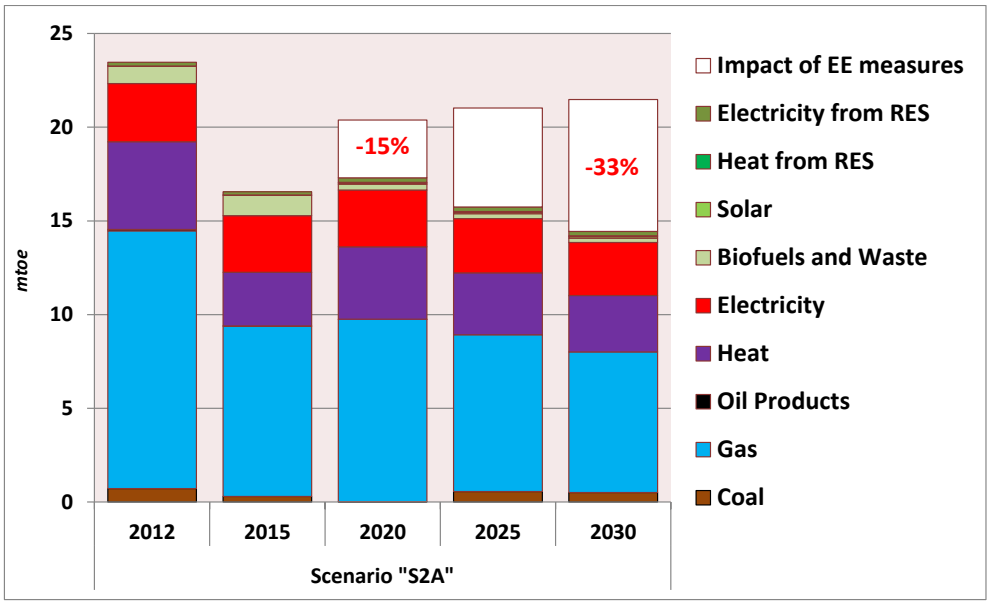

Fig. 10. Final Energy Consumption by fuel in Residential sector

Despite expected gradual increase of the freight and passenger transport work, final energy consumption in **Transport sector** will be stabilized during 2020-2030 (Fig. 11). Implementation of EE measures will save 8% of final energy in 2020 and 19% in 2030 in comparison with the New BAU Scenario.

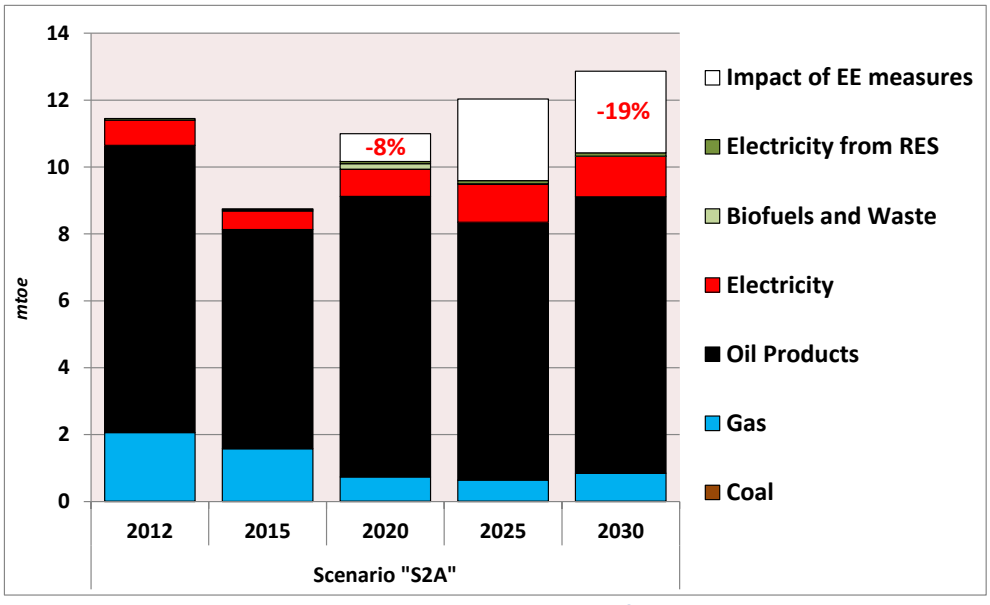

Fig. 11. Final Energy Consumption by fuel in Transport

The final energy consumption in **Commercial sector** will increase even under implementation of energy efficiency measures due to the fact that this sector has the highest projected growth rates (Fig. 12). Electricity and centralized heat will remain the main energy resources in this sector; consumption of other fuels during 2020-2030 will stay the same on the level of 2012, while demand growth will be covered mostly by renewables.

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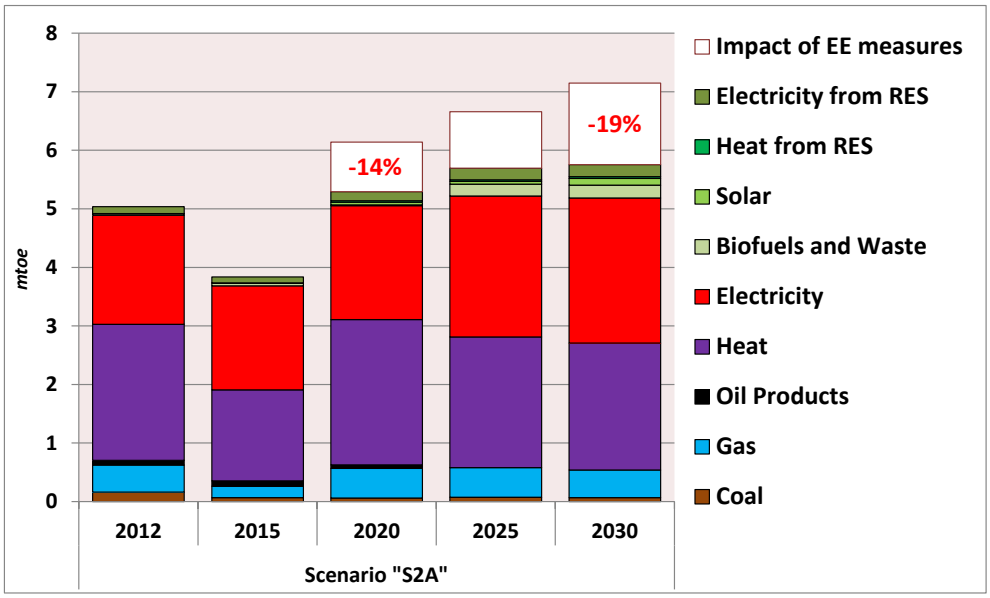

Fig. 12. Final Energy Consumption by fuel in Commercial sector

Agriculture has considerable potential for reduction of energy use. In case of implementation of energy efficiency projects, the final consumption in this sector could be reduced by 20% already in 2020 and 17% в 2030 comparing to the New BAU Scenario (Fig. 13), or less by 18% in 2020 and higher by 2% in 2030 in comparison with 2012 level.

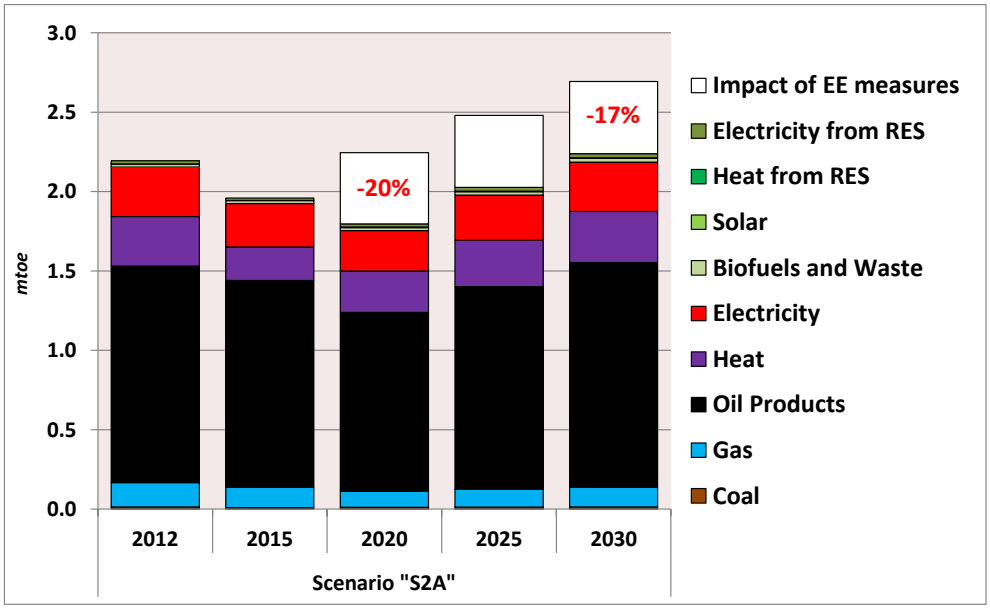

Fig. 13. Final Energy Consumption by fuel in Agriculture

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The share of **electricity** will increase in all sectors of final consumption. Meanwhile total electricity production in S2A Scenario will be roughly the same as in the New BAU Scenario (Table 5) with just the difference in slightly lower growth rates after 2025.

Table 5. Electricity production, TWh

Scenarios	2012	2015	2020	2025	2030
S2A Scenario	199	162	190	227	235
New BAU Scenario	199	162	194	219	240

Centralized **heat** production is supposed to be reduced by 1/3 comparing to the New BAU Scenario primarily owing to thermal modernization of residential buildings, although the need for centralized heat supply is reduced in other end-use sectors as well (Fig. 14).

Natural gas will remain the primary fuel for centralized heat production, although its share will shorten from 94% in 2012 to 68% in 2020 and 53% in 2030. Gas will be substituted by coal and biomass. The increase of coal use for heat production may occur if no specific environmental constrains would be imposed (for example, according to the Directive 2015/2193/EU on the limitation of emissions of certain pollutants into the air from medium combustion plants (1-50 MW)).

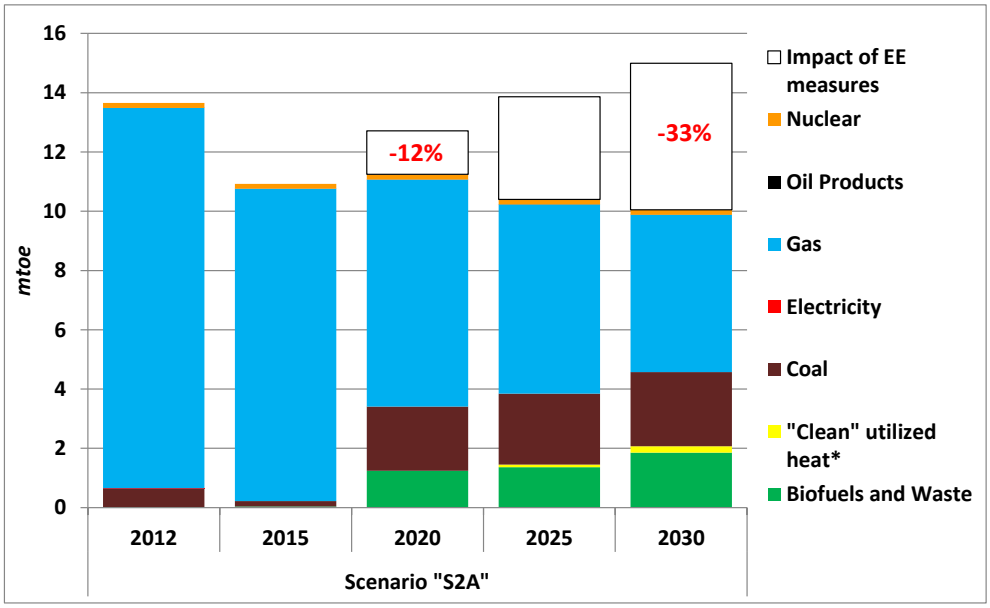

Fig. 14. Heat Production, mtoe

** "Clean" utilized heat is a heat recovered from the waste heat boilers, cooling installations, water heaters, etc. that work on the following energy resources: a) heat departed from the cooling systems of the production units (blast furnaces and open-hearth furnaces, pyrite furnaces, gas generators, heating furnaces, etc.); b) sensible heat of produced products including heat recovered at the intermediate stages of the technological process (heat of hot coke, heated metal, refinery and chemical products); c) waste-gas heat from industrial furnaces and boiler units, waste slag heat, etc.; d) heat of steam exhausted from the heat installations: presses, steam drives of pumps and compensators, etc.*

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Meeting the energy efficiency target formulated in S2A Scenario in terms of final consumption will result in somewhat less reduction of **Total Primary Energy Supply** by 10% till 2020 and 20% till 2030 (Fig. 15), although pre-crisis level still won't be achieved. The most reduction will be observed in gas supply – by 34% to 35 bcm in 2020 and by 40% to 30 bcm in 2030. As environmental constrains were not imposed, coal supply may increase during 2025-2030 by 10% to 47 mtoe, while nuclear energy and oil will stay on 2012 level.

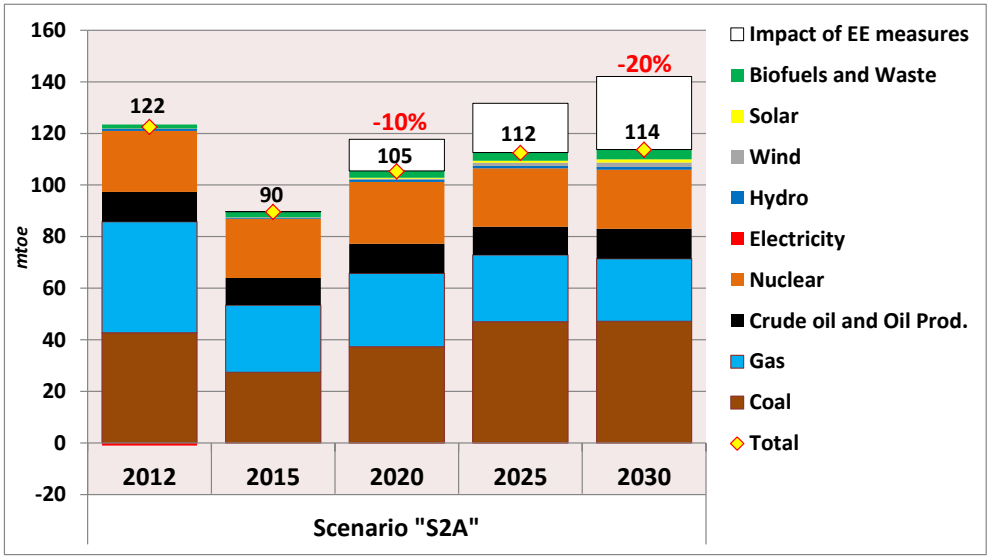

Fig. 15. Total Primary Energy Supply by fuel

Reduction of the fossil carbon intensive fuel consumption will result in a significant reduction and following stabilization of **greenhouse gas emissions** (Fig. 16). GHG emission from the final energy use will be less by 16% in 2020 and by 9% in 2030 than in 2012/

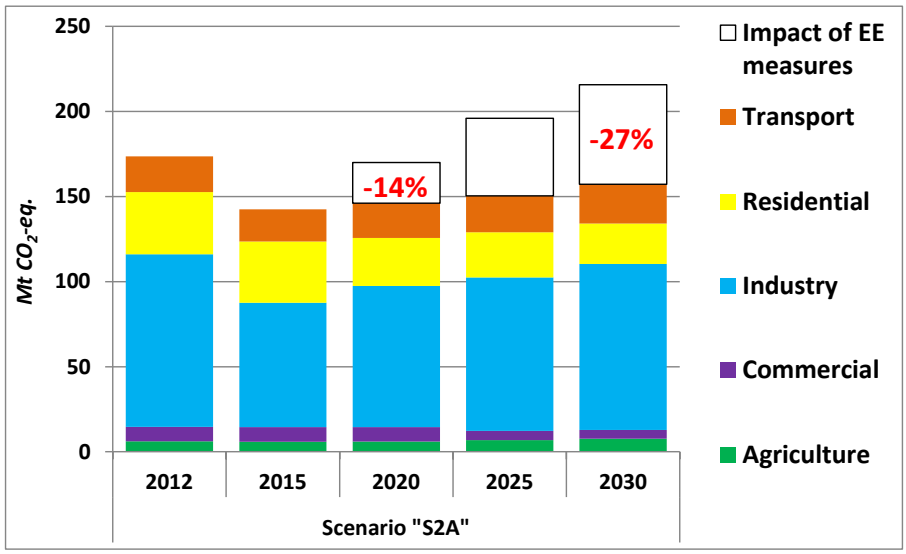

Fig. 16. GHG Emission by end-use sector

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General conclusions

Modeling exercises presented in this study have confirmed, that Ukraine still have economically feasible potential for final energy savings, and that it is even more than 20% in 2020 and 30% in 2030 comparing to the Old BAU (baseline scenario developed in NEEAP).

As it comes from the modelling results under S2A Scenario, the Residential sector may provide the most contribution for economically sound energy efficiency potential, with its share of 47% in cumulative FEC savings; Transport and Industrial sectors contribute with 21% and 18% respectively. Achievement of such potential would require additional investments of about 9.3 bln Euro for the period 2017-2030 in comparison to the case of no EE measures are implemented, as provided by New BAU Scenario. Meanwhile Industry provides the most contribution in GHG emission reduction with its share more than 60%.

Following the allocation of energy efficiency potential by sector, the correspondent allocation of policy efforts and governmental support could be expected, i.e. the most attention of the central and local governments on energy efficiency policy implementation is reasonably expected to see in the Residential sector.

The share of renewables in FEC would not increase if specific RE promotion measures are not implemented concurrently with EE policy. We can expect that renewable energy development should considerably contributes to rationalization of the energy use, and combination of these two policies will have a strong synergy effect.

The market pricing on natural gas will stipulate further reduction of its use in all sectors and its substitution by other fuels under assumption that any strict environmental or climate policies are implemented until 2030, and the cost of carbon intensive fuels and technologies are not affected. Such strict environmental or climate policies were not considered.

Considering the nature of the majority of energy efficiency measures, the share of electricity in FEC will increase in all sectors, although the absolute volumes of electricity consumption may somewhere even decrease. For example, in the Residential sector the share of electricity will increase from 12% in 2012 to 19% in 2030, while the actual consumption will decrease owing to the EE measures.

In the Transport sector the share of oil products will remain dominant (> 80%), although electric vehicles are 2-3 times more efficient than ICE cars. Partial elimination of the energy efficiency potential (although comparably expensive) in Transport in all EET scenarios shows that conditions and assumptions of these scenarios are not critically severe.

The electricity production in the S2A Scenario is negligibly less than in New BAU Scenario, meanwhile heat production (and demand) is reduced considerably owing to implementation of EE measures in Industry, and also thermal modernization of buildings in Residential and Commercial sectors.

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The reduction of final energy consumption in 2030 by 30% will result in correspondent but minor reduction of primary supply by 20% compared to New BAU scenario or till around 113.6 mtoe, keeping its level in 2025-2030. The most reduction is observed in gas and coal consumption.

Due to implementation of energy efficiency measures, the Primary Energy Intensity of GDP in Ukraine will reduce by 40% till 2030 (or till 0.20 toe/thousand 2010 USD GDP PPP). In the New Energy Strategy of Ukraine till 2035 the target of Primary Energy Intensity of GDP in 2030 is specified on the level of 0.15 toe/thousand 2010 USD GDP PPP. This difference with S2A Scenario could be explained by the fact that Energy Strategy covers the entire range of energy policies and measures, and EET scenarios were formulated in a way to examine just the effect of energy efficiency measures (without additional simultaneous promotion of renewables, energy market transformation etc.).

Energy Efficiency Targets

With a consideration of results achieved within this study, that were iteratively presented and discussed during Project Workshops and described in the Final Project Report, the following recommendations could be made as for the Energy Efficiency Targets formulation for Ukraine till 2020 and 2030 in the scope of the EU Energy Efficiency Directive (EED):

- Considering the lack of reliable data needed to estimate the target as regards to Article 5 EED, it is not possible at the moment to strictly identify energy savings with an approach suggested by EED. Meanwhile there were made assumptions on quantification of Article 5 EED target grounded in the Final Project Report and done with a purpose to incorporate requirements of this article into TIMES-Ukraine model and consider them while estimating the overall EED target. We consider the assumption of 13.1 ktoe savings in 2020 as regards to Article 5 EED as reliable;

- With regards to Article 7 EED consumption of the Transport sector is suggested not to be considered for estimating the target, but energy savings achieved there is nevertheless should be accounted. The overall target according to Article 7 EED is suggested to calculate with 0.7% rate, which means that total energy savings with regard to Article 7 EED should make 3 260 ktoe and be uniformly allocated over the four years for 2017-2020; and reduction in 2020 should account 1 304 ktoe;

- The overall EED target for Ukraine is suggested to be declared as not exceedance of the absolute level of the primary energy consumption of 101 316 ktoe, and of final energy consumption of 55 507 ktoe in 2020. Extension of the energy efficiency policy in the perspective till 2030 should be targeted on not exceedance of the absolute level of the primary energy consumption of 109 124 ktoe, and of final energy consumption of 57 199 ktoe in 2030.

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