IEF Institute for Economics and Forecasting, Ukrainian National Academy of Sciences

The Energy Transition and Decarbonization Pathways of Ukraine

Workshop: Exploring Pathways to Sustainable Energy in the Belarus-Moldova-Ukraine Region

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ІЕП Інститут економіки та прогнозування Національної академії наук України

"International integration" of energy and climate

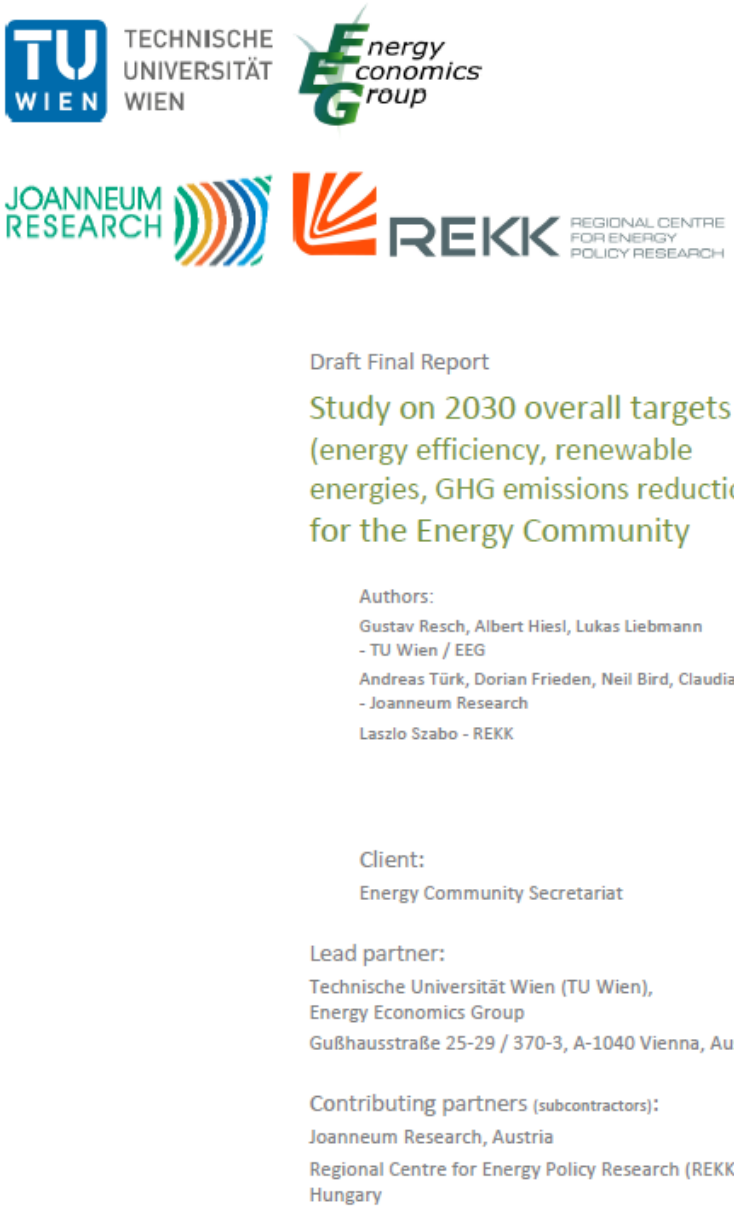
- "On 18 November 2015, the European Commission adopted its first Communication on the State of the Energy Union, stating that integrated national energy and climate plans (NECPs), addressing all five key dimensions of the Energy Union:
  1. Security, solidarity and trust
  2. A fully integrated internal energy market
  3. Energy efficiency
  4. Decarbonizing the economy
  5. Research, innovation and competitiveness".

- "Similar to the European Union, Energy Community Contracting Parties committed to monitoring and reporting in the areas of renewables, energy efficiency, and greenhouse gas emissions as well as other information relevant to climate change".

- On June 2018 Energy Community (EnC) implemented EU recommendation and published Policy Guidelines on the development of NECPs under Recommendation 2018/01/MC-EnC.

- "The NECPs should cover the period from 2021 to 2030, laying down the pathway to achieve the agreed 2030 targets, build upon what each Contracting Parties should deliver in relation to their policies for 2020 (as a baseline), and include a perspective until 2050".

Integrated National Energy and Climate Plans



Draft Final Report

Study on 2030 overall targets (energy efficiency, renewable energies, GHG emissions reduction) for the Energy Community

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Client:

Energy Community Secretariat

Lead partner:

Technische Universität Wien (TU Wien), Energy Economics Group

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Contributing partners (subcontractors):

Joanneum Research, Austria

Regional Centre for Energy Policy Research (REKK), Hungary

- **Energy Efficiency**
  -32,5% in 2030 comparing to the Baseline III scenario for Total Primary Energy Supply and for Final Energy Consumption

- **Renewable Energy**
  +5.6–15% in Gross Final Energy Consumption in 2030 (based on a flat rate / GDP-based approach)

- **Greenhouse Gas Emission**
  +0–20% in 2030 comparing to 2005. *GHG Emission in Ukraine, Moldova, Georgia, and Kosovo can be increase in 2030 by 20% comparing to 2005.*

- **2050 pik**
  No targets and approaches.

I. Energy Efficiency Targets of Ukraine

Energy Efficiency Targets

- **Draft Final Report "Study on 2030 overall targets (energy efficiency, renewable energies, GHG emissions reduction) for the Energy Community"**
  -32.5% reduction of PEC or FEC in 2030 compared to the baseline trend.
  Source: *Draft Final Report "Study on 2030 overall targets (energy efficiency, renewable energies, GHG emissions reduction) for the Energy Community" // Energy Community Secretariat / TU Wien, EEG, Joanneum Research, REKK. – 2018.*

- **Final Report of the EU4Energy Governance project on calculation of the national energy efficiency target until 2020 and 2030 for Ukraine and preparation of the 1st report to the Energy Community according to Directive 2012/27/EU**
  -31-39% in 2030 comparing to the baseline scenario developed for the first NEEAP for Total Primary Energy Supply and **-31-34%** for Final Energy Consumption
  Source**:** FINAL DRAFT of the energy efficiency target till 2020 calculation (including perspective until 2030). - https://library.euneighbours.eu/content/final-draft-energy-efficiency-target-till-2020-calculation

- **The Energy Strategy of Ukraine until 2035: "Safety, Energy Efficiency, Competitiveness"**
  -48% in 2030 comparing to the baseline scenario (*own calculations**) for Total Primary Energy Supply and **-46%** for Final Energy Consumption
  Source**:** Resolution of the Cabinet of Ministers of 18 August 2017 No. 605-p On the Approval of the Energy Strategy of Ukraine until 2035: "Safety, Energy Efficiency, Competitiveness" – 2017. https://www.kmu.gov.ua/ua/npas/250250456

* *Based on energy intensity indicators and Total Primary Energy Supply*

EU4Energy

Energy Efficiency Scenario Design

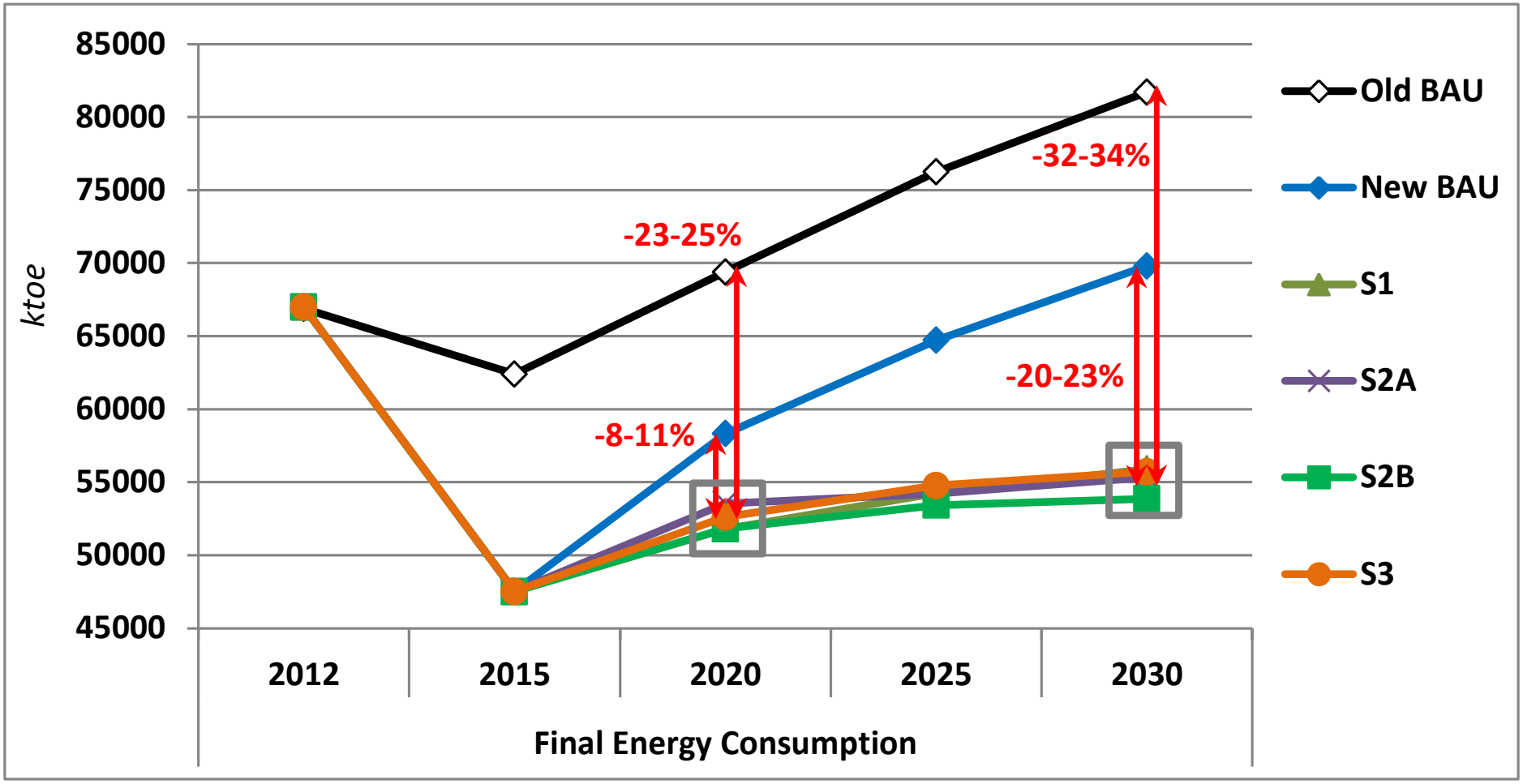
Energy Community

Scenarios	Art. 5	Art. 7	EED Target
NEW BAU Scenario	A hypothetical scenario without implementing energy efficiency policy and measures. In BAU scenario the characteristics of current technologies remain unchanged till 2030.		
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)

EU4Energy

Final Energy Consumption

Energy Community



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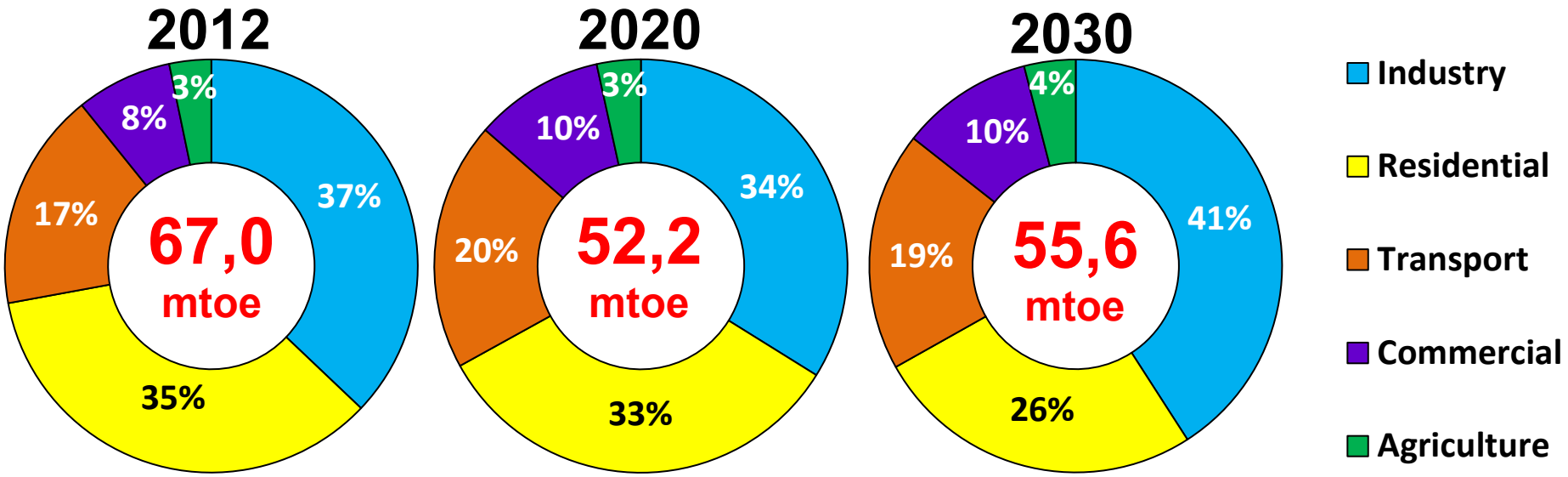
Final Energy Consumption by Sectors

Energy Community



Scenario "S2A"

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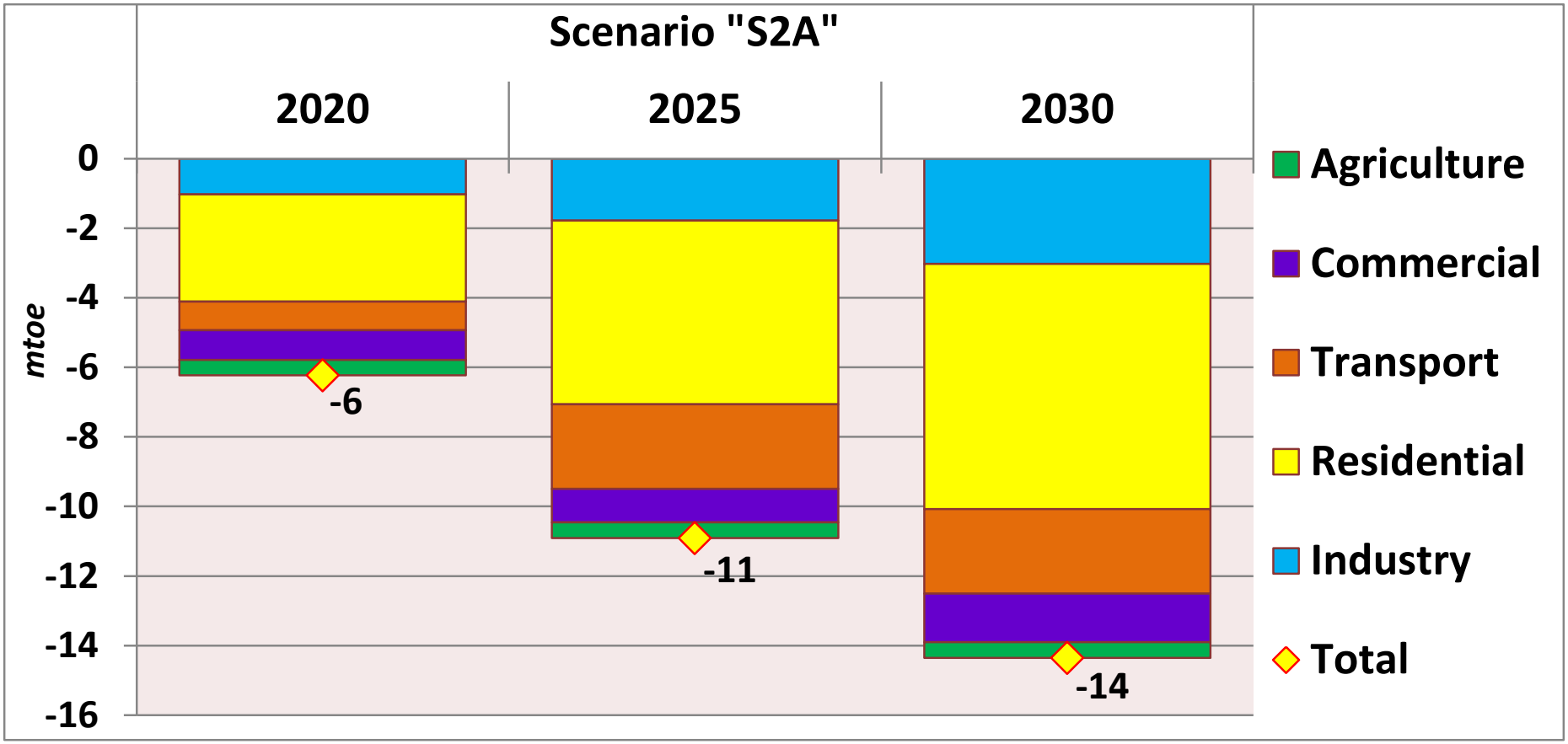
Final Energy Savings by Sector comparing to New BAU Scenario

Energy Community



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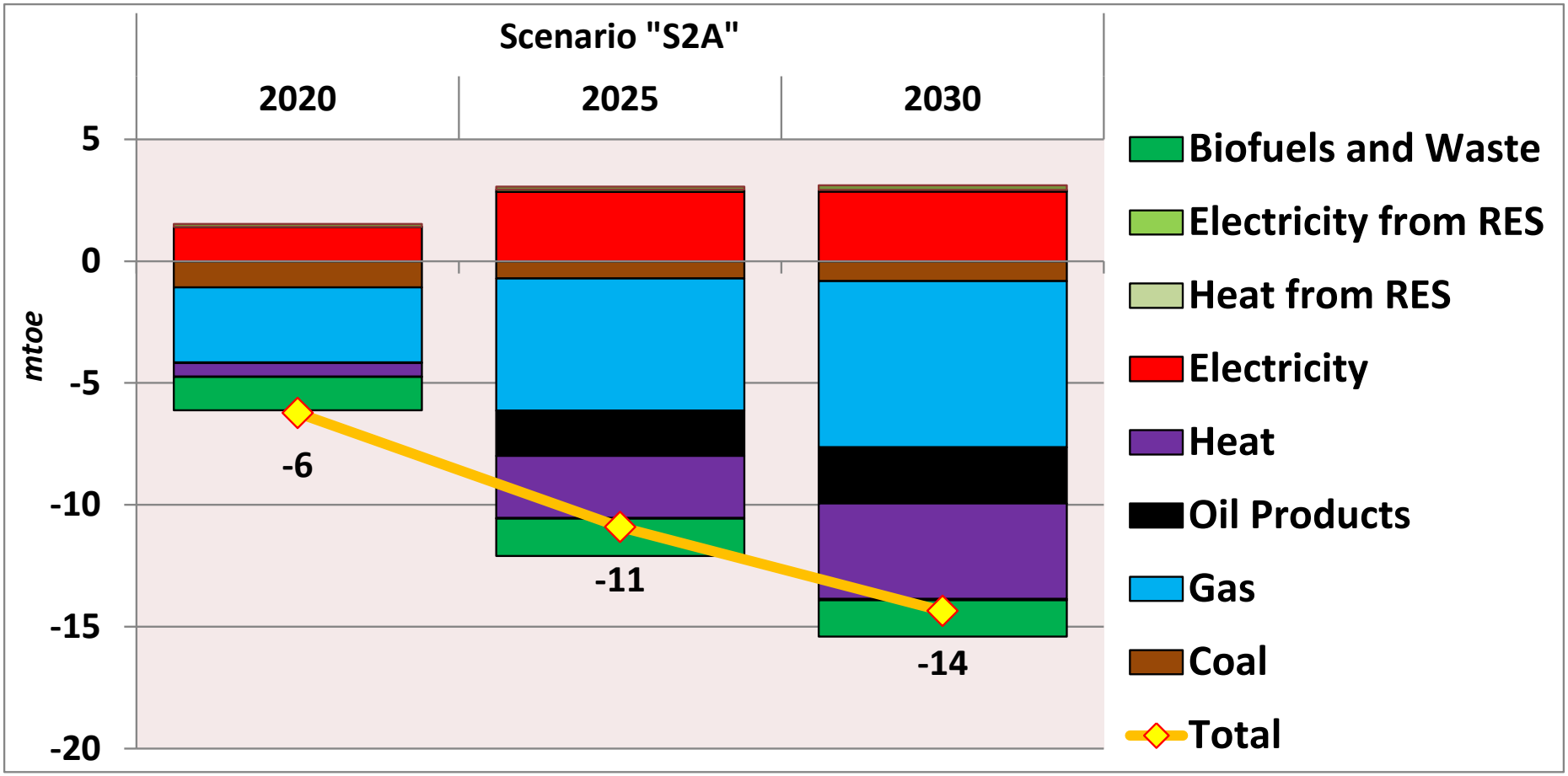
Final Energy Savings by Fuels comparing to New BAU Scenario



II. Renewable Energy Targets of Ukraine

Renewable Energy Targets

- **Draft Final Report "Study on 2030 overall targets (energy efficiency, renewable energies, GHG emissions reduction) for the Energy Community"**

  16.6% in Gross Final Energy Consumption in 2030 (+5.6% to RE Target in 2020 of Ukraine)

  Source: Draft Final Report "Study on 2030 overall targets (energy efficiency, renewable energies, GHG emissions reduction) for the Energy Community" // Energy Community Secretariat / TU Wien, EEG, Joanneum Research, REKK. – 2018.

- **Studies of Institute for Economics and Forecasting of the National Academy of Science of Ukraine (based on the TIMES-Ukraine model)**

  19% - share of renewables in Gross Final Energy Consumption in 2030

  Source: Information-analytical materials of IEF NASU to the Ministry of Ecology and Natural Resources of Ukraine and the Ministry of Energy and Coal Industry

  30% - share of renewables in Final Energy Consumption in the Revolutionary Scenario

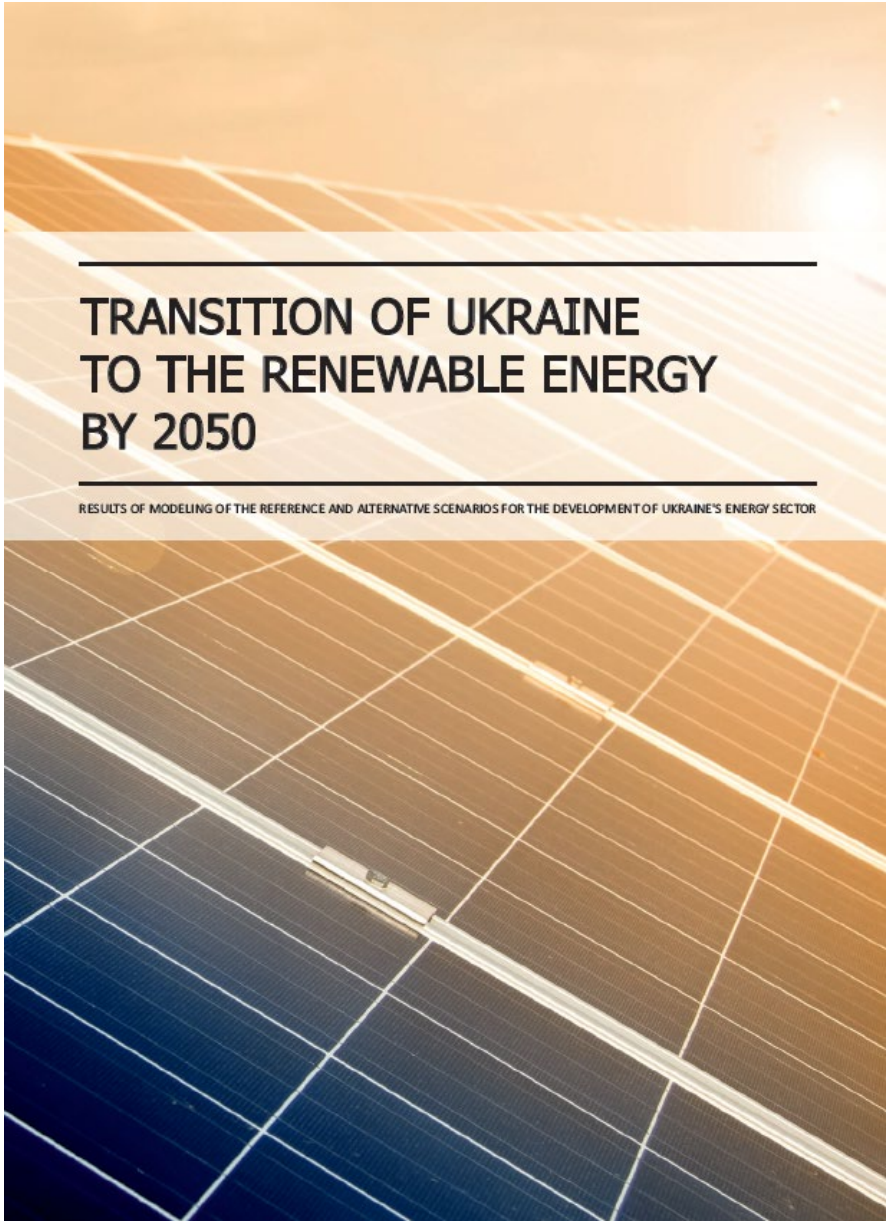
  Source: "Transition of Ukraine to the Renewable Energy by 2050" / O. Diachuk, M. Chepeliev, R. Podolets, G. Trypolska and oth. ; edited by Y. Oharenko and O. Aliieva // Heinrich Boell Foundation Regional Office in Ukriane. – Kyiv : Publishing house "Art Book" Ltd., 2017. – 88 p. - https://ua.boell.org/sites/default/files/transition_of_ukraine_to_the_renewable_energy_by_2050_1.pdf

- **The Energy Strategy of Ukraine until 2035: "Safety, Energy Efficiency, Competitiveness"**

  27-32% in Gross Final Energy Consumption in 2030 (*own calculations**) based on the Energy Strategy data.

  Source: Assessment of the achievement of some key indicators of the effectiveness of the Energy Strategy of Ukraine till 2035 using the TIMES-Ukraine model / O.Diachuk, R. Podolets, // Ukrainian-Danish Energy Center, 2017

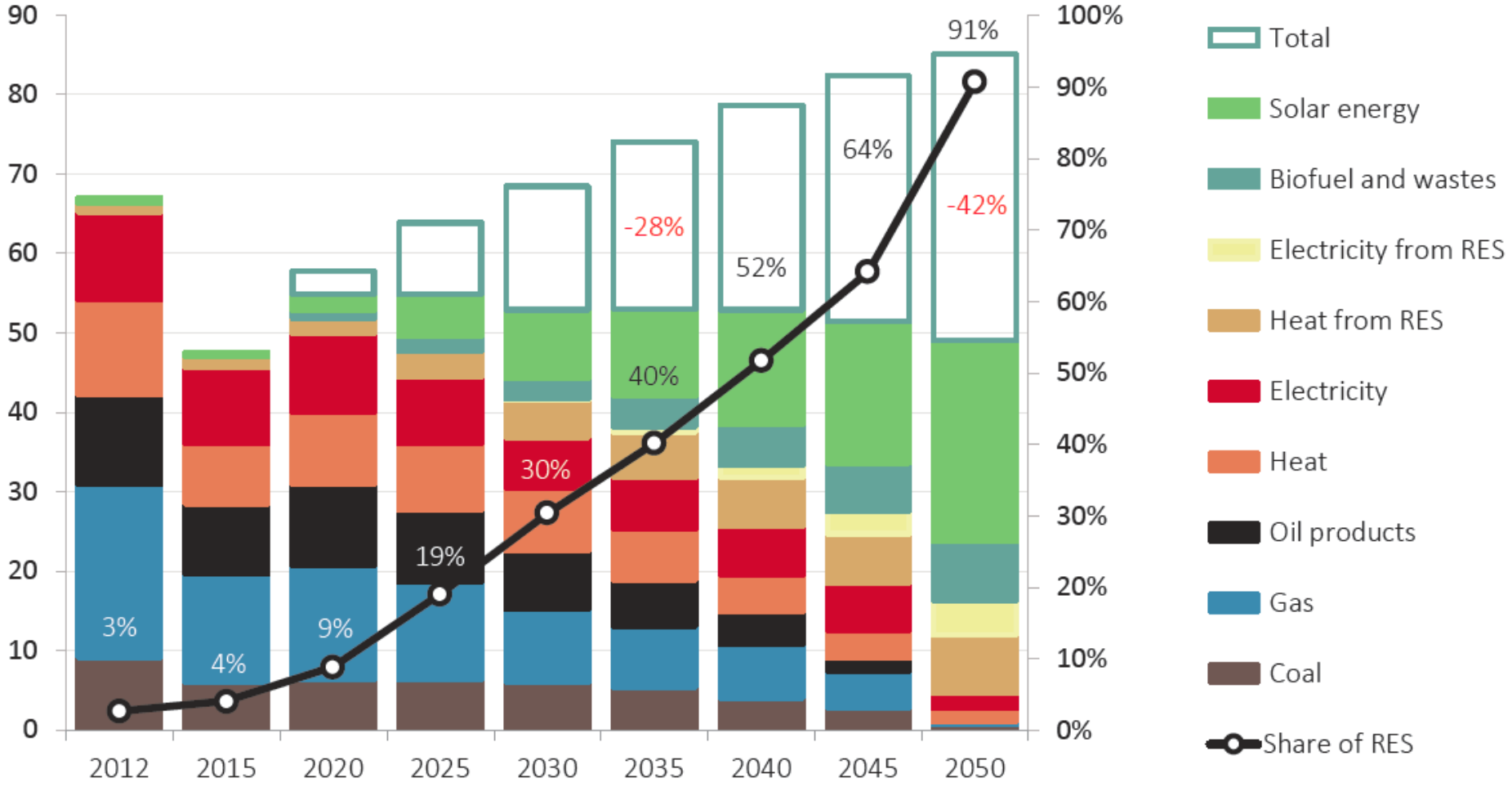
Revolutionary scenario of transition of Ukraine to the Renewables by 2050



- The study “Transition of Ukraine to the Renewable Energy by 2050” was carried out in 2016-2017 by the Institute for Economics and Forecasting of the National Academy of Sciences of Ukraine with the support of the Heinrich Boell Foundation Regional Office in Ukraine and in cooperation with civil society organizations, public authorities, specialized in renewables business associations and independent experts.
- This study presents results of modeling of the reference and alternative scenarios for the development of Ukraine’s energy sector by 2050 and demonstrates how the transition from fossil fuels to renewable energy can be achieved and what economic impacts it will have.

Share of Renewables in Final Energy Consumption

The Energy Transition and Decarbonization Pathways of Ukraine requires rapidly electrification of the whole economy (**Electrification 2.0!**).



III. GHG Emissions Reduction Targets of Ukraine

Targets of GHG emission reductions

- **Draft Final Report "Study on 2030 overall targets (energy efficiency, renewable energies, GHG emissions reduction) for the Energy Community"**
  *by **20%** of the 2005 level GHG emissions in Ukraine may increase by 2030, which is approximately **55-56%** of the 1990 level.*
  Source: Draft Final Report "Study on 2030 overall targets (energy efficiency, renewable energies, GHG emissions reduction) for the Energy Community" // Energy Community Secretariat / TU Wien, EEG, Joanneum Research, REKK. – 2018.

- **Ukraine 2050: Low Emission Development Strategy**
  ***29-41%** of the 1991 level in 2030*
  Source: Ukraine 2050: Low Emission Development Strategy / UNFCCC, 2018. - https://unfccc.int/sites/default/files/resource/Ukraine_LEDS_en.pdf

- **National Determined Contribution (NDC) of Ukraine**
  ***60%** of the 1991 level in 2030*
  Source: Ukraine First NDC, 2015. - https://www4.unfccc.int/sites/ndcstaging/PublishedDocuments/Ukraine%20First/Ukraine%20First%20NDC.pdf

- **The Energy Strategy of Ukraine until 2035: "Safety, Energy Efficiency, Competitiveness"**
  ***60%** of the 1991 level in 2030*
  ***>15%** reductions of GHG emission in Final Energy Consumption in 2030 compare to 2010*
  Source: Resolution of the Cabinet of Ministers of 18 August 2017 No. 605-p On the Approval of the Energy Strategy of Ukraine until 2035: "Safety, Energy Efficiency, Competitiveness" – 2017. - https://www.kmu.gov.ua/ua/npas/250250456

- **The report "Transition of Ukraine to the Renewable Energy by 2050"**
  ***28-36%** від рівня 1990 р. in 2030*

  Source: "Transition of Ukraine to the Renewable Energy by 2050" / O. Diachuk, M. Chepeliev, R. Podolets, G. Trypolska and oth. ; edited by Y. Oharenko and O. Aliieva // Heinrich Boell Foundation Regional Office in Ukriane. – Kyiv : Publishing house "Art Book" Ltd., 2017. – 88 p. - https://ua.boell.org/sites/default/files/transition_of_ukraine_to_the_renewable_energy_by_2050_1.pdf

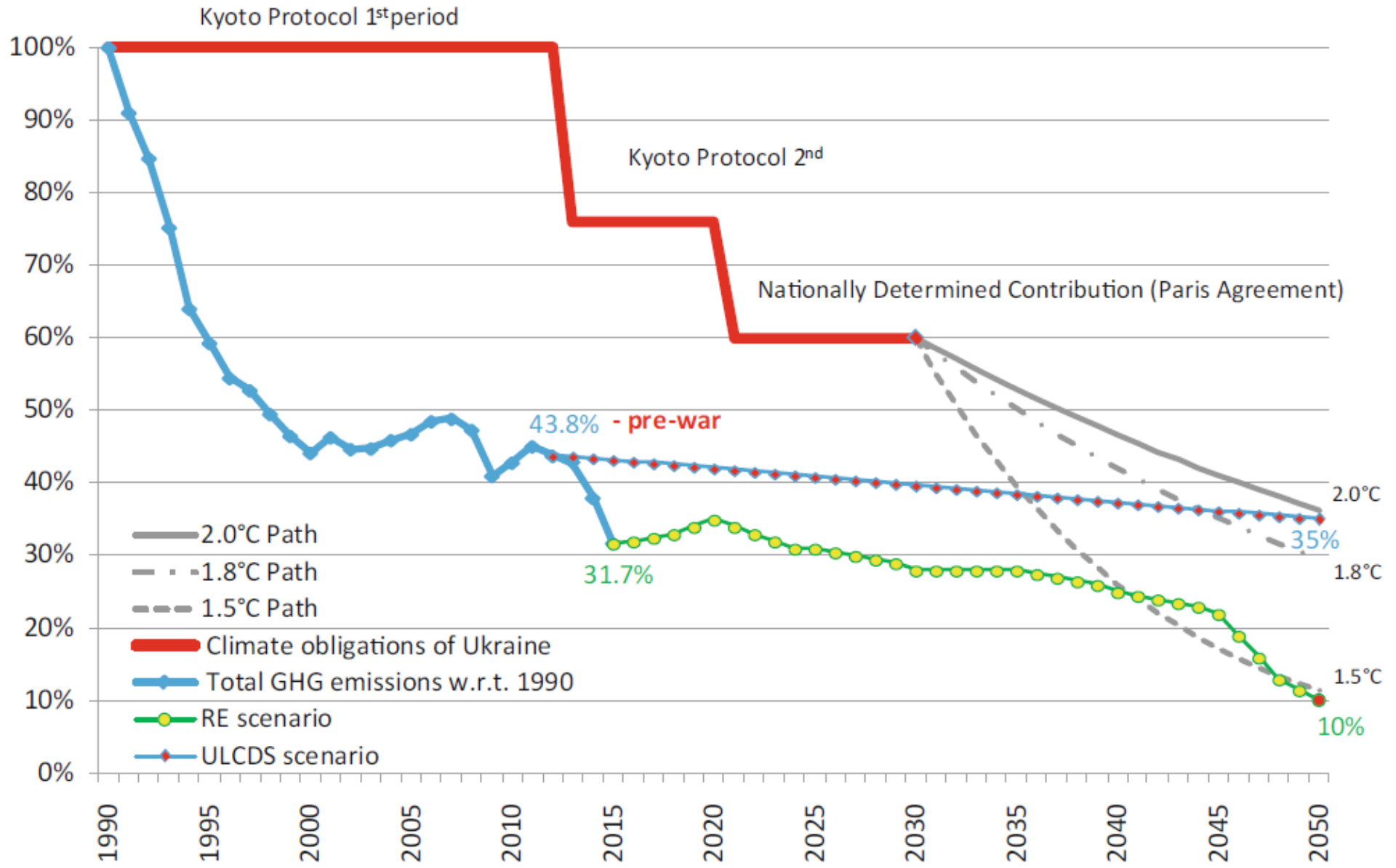
Low Emission Development Strategy of Ukraine

*«**The LEDS goal** is to determine strategic directions for Ukraine's economy sustainable development based on national priorities accordant transition to low emission growth trajectory».*

*«Being committed to achieving Paris Agreement goals and being guided by national priorities, Ukraine will ensure doing its best to achieve the indicative GHG emissions target of **31-34% by 2050 compare to 1990 level**. This target is ambitious and fair in the context of Ukraine's participation in the global response to the climate change threat.*

***Long term strategic planning is an iterative process**; hence, this document should not be treated as final. Ukraine is planning to review its strategy at least every five years in order to measure its progress, and to increase the level of its ambitions in accordance to national circumstances.*

Long-term climate policy scenarios of Ukraine



IV. Planned Infrastructure and Generation Capacities

The draft Transmission System Development Plan for 2019-2028

According to Article 37. Development of the transmission system of the Law of Ukraine "On the electricity market" No. 2019 VIII:
Every year by May 1, the TSO develops and submits to the Regulator for approval a ***10-year Transmission System Development Plan*** (TSDP).
The TSDP ensures that transmission system (TS) meets the requirements of the electricity market as well as the electricity supply security interests.

The TSDP consist:

1) measures of the security of electricity supply;

2) key objects of the TS that should be constructed/ reconstructed within next 10 years;

3) information about the objects of the TS to be built or reconstructed within next 10 years, period and funding sources of the construction/reconstruction;

4) information on investments into the approved objects of the TS that are already at the stage of implementation, with the indication of projected investments to be made within the next 3 years.

Source [in Ukrainian]: https://ua.energy/wp-content/uploads/2018/05/Plan-rozvytku-systemy-peredachi-na-2019-2028-roky.pdf

Source [in Ukrainian]: http://utg.ua/img/menu/gts/TYNDP-TSO.pdf

The gas transportation system development plan for 2018 – 2027 adopted by National Commission for the State Regulation Energy and Utilities (Decree #956 on 04.09.2018).

The Plan provides UAH 60 billion for investments (UAH 6 billion in 2018, UAH 19.5 billion in 2019-2020 and UAH 34.5 billion during the period 2021-2027):

- UAH 22.8 billion for gas pipelines,
- UAH 14.7 billion for compressor stations,
- UAH 14 billion for gas distribution stations,
- UAH 5.8 billion for equipment purchases,
- UAH 2.7 billion for other production facilities.

Conclusions

The Key Challenges of Energy Transition and Decarbonization in Ukraine:

- **Weak investment climate**
- **Low economic growth**
- **Low competition in energy markets**
- **High energy and carbon intensity of GDP**
- **Obsolete energy capacity and infrastructure**
- **Insufficient integration with EU energy markets**
- **Imperfect support schemes in energy sector**
- **…**
- **Insufficient institutional capacity**
- **Insufficient predictability of legislation**
- **Slowly implementation of EU legislation**
- **Weakness of the economic impact assessment of policies and measures**

The Key Opportunities and Priorities of Energy Transition and Decarbonization in Ukraine:

- **Ensuring synergy in energy and economic development**
- **Providing markets transformation and institutions**
- **Fully integration with EU energy markets**
- **Ensuring clean and green policies and measures in energy sector:**
  - **Increasing energy efficiency and energy saving**
  - **Supporting and stimulate renewable energy**
  - **Modernizing the fixed assets used in traditional energy and implementation of innovation technologies**
- **Ensuring the effective implementation of the MRV system and introduce the Emissions Trading Scheme**
- **Reducing industrial emissions and pollutions**
- **Ensuring reliable supply of clean and affordable energy**
- **Extending research, education and awareness in whole economy**
- **…**

Thank You!

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