Renewable Energy and Energy Efficiency Policy Framework in Ukraine

Borys Dodonov

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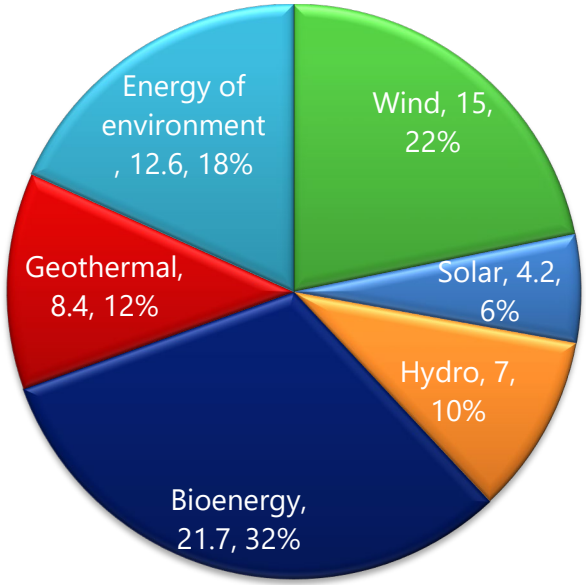
Renewable Energy Potential in Ukraine

- IRENA (2015) cites 68.6 Mtoe/year technically feasible renewable sources potential in Ukraine
- This potential is equivalent to 75% of TPES (91.7 Mtoe) in 2016
- About the third of the total potential is attributed to bioenergy
- The contribution of variable renewable energy (VRE) sources is estimated at 28%
- The shares of energy of environment, geothermal and hydro are 18%, 12% and 10% respectively

Figure 1. Renewable Energy Potential in Ukraine, Mtoe, %



Source: IRENA (2015)

Renewable energy development

Figure 2. Renewable Energy Supply in 2007-2016

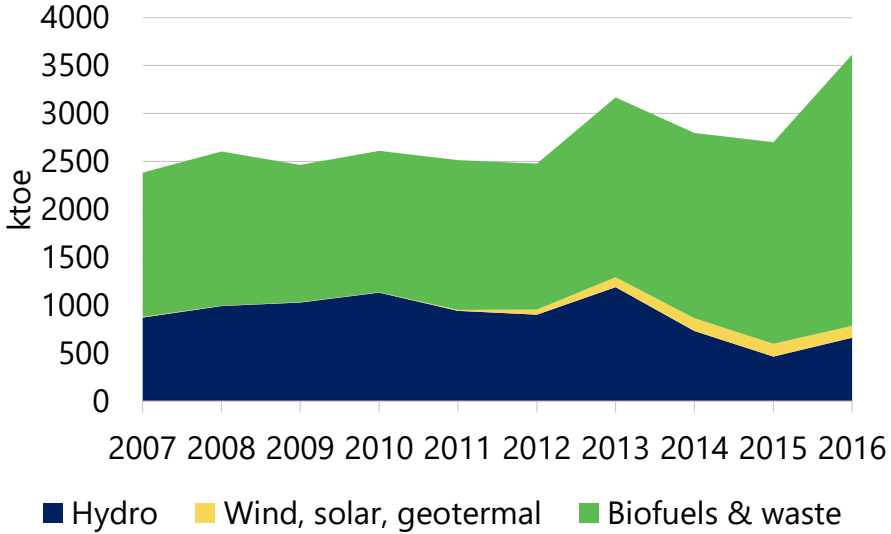
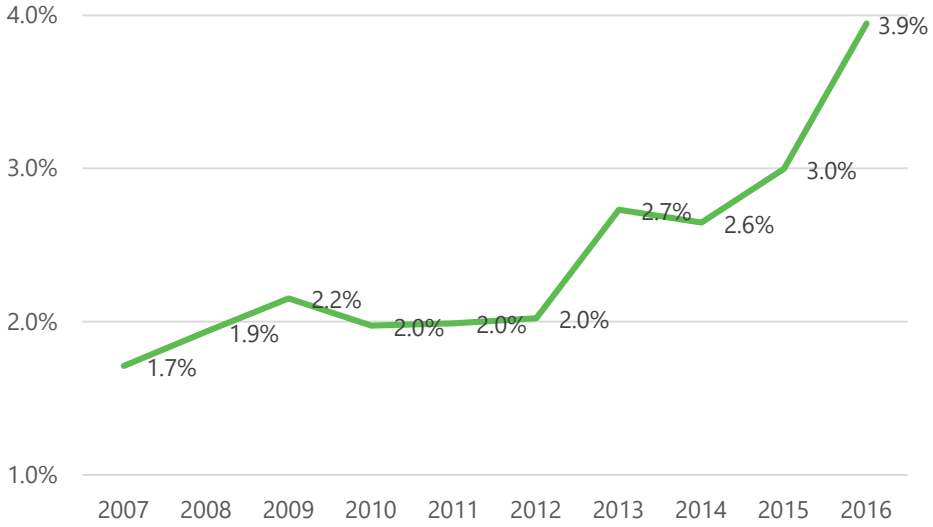


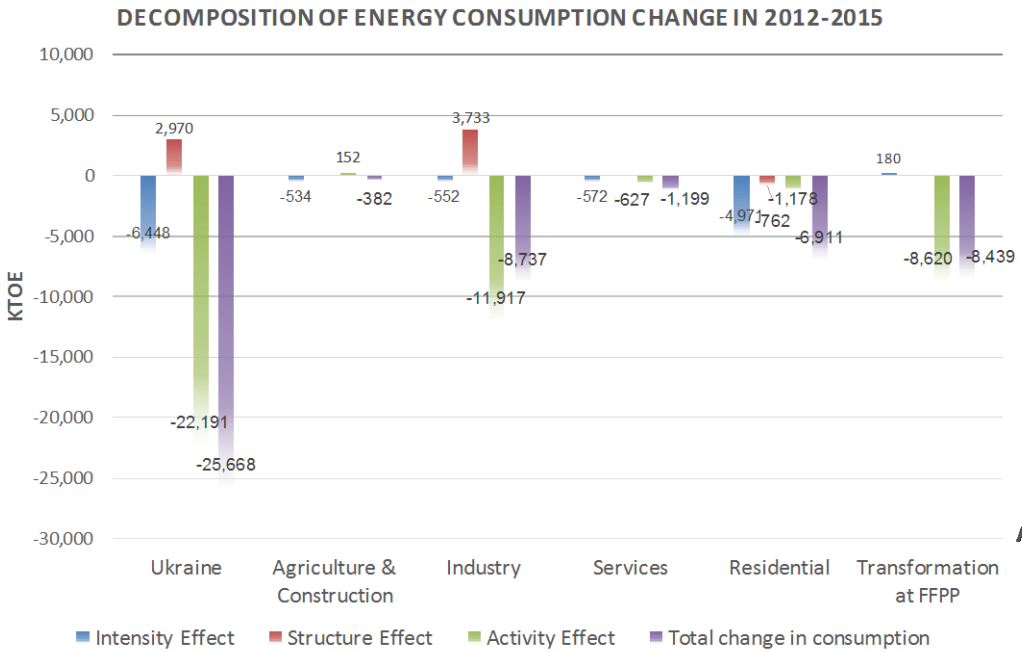
Figure 3. Renewable energy supply as a share of TPES in 2007 - 2016

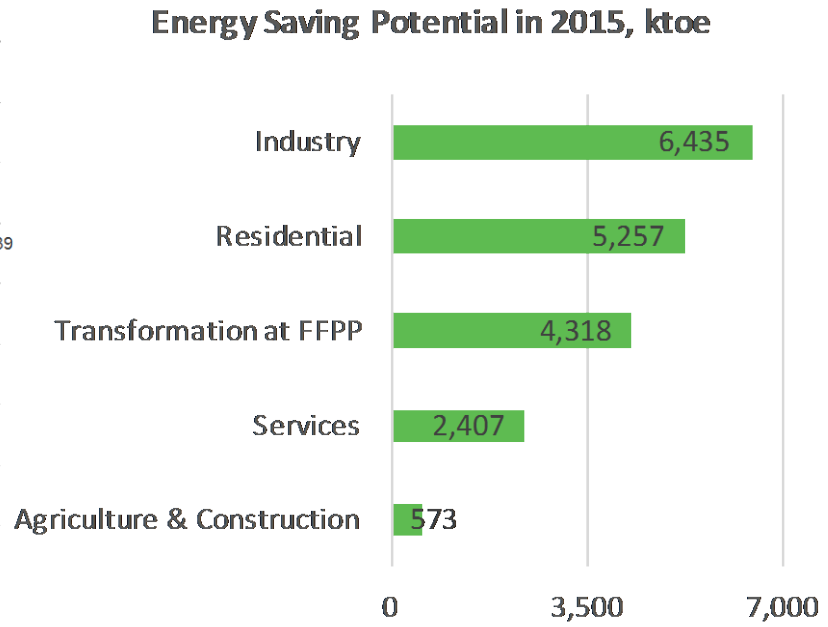


Source: Energy Balances for 2007-2016, State Statistical Service of Ukraine

- The share of RES in total primary energy supply (TPES) increased more than twofold over 10 years from 1.7% in 2007 to 3.9% in 2016
- Ukraine's 3.9% share of renewables in TPES is made up of biofuels and waste (3.1%), hydro (0.7%), solar, wind and geothermal (0.1%)
- Both renewable energy consumption and as a share of TPES have increased from 2007 thanks to significant deployment of biomass in heating sector after the series of gas and heat price hikes for households in 2014-2016

Energy Consumption Trends and Energy Saving Potential





Source: B. Dodonov, 2017, EU4Energy Sustainable Energy Forum Proceedings, Astana

- Energy consumption declined by 25.7 Mtoe over 4 years but only 25% is attributed to improvement in energy efficiency
- 77% of energy saving due to EE improvement stemmed from residential sector after sharp gas and heat tariffs hike in 2015
- Untapped energy saving potential remains substantial and is estimated at 19 Mtoe (w/o transport sector) or about 1/3 of TFC in 2015

National Medium and Long-term Targets for RE&EE

National Renewable Action Plan through 2020 (NREAP)

- NREAP sets separate targets for heat, electricity and transport sectors
- The total renewables consumption expected to increase to 8,590 ktoe and its share in TFC projected to reach 12.4% in 2020
- So far Ukraine is far behind the intermediary targets in quantitative terms

National Energy Efficiency Action Plan through 2020 (NEEAP)

- Adopted by the government in November 2015 to meet the requirements of the Directive 2006/32/EC
- Energy saving quantitative targets for 2017 and 2020 are determined as 5% and 11% of the average TFC over 2005-2009 as specified in the Directive
- The targeted TFC was set at 61.8 and 62.9 Mtoe in 2017 and 2020 while documented by official statistics in 2015 and 2016 were only 47.5 and 48.7 Mtoe respectively

Energy Strategy for Ukraine through 2035 (ESU)

- The total share of renewables in TPES in 2035 is approved at 25%
- The supply of biomass and VRE are estimated at 11 and 10 Mtoe respectively in 2035. The hydro and geothermal consumption will account for 1 and 2 Mtoe respectively in 2035.
- National Action Plan on ESU Implementation for 2018-2020 prescribes drafting the new NREAP and NEEAP through 2030 based on implementation of current plan by 2020

State Support Policies

- Ukraine has a well-established FiT for renewable electricity production
- The renewable electricity developers may conclude the long-term power purchase agreements (PPA) for the entire duration of the FiT (until 2030)
- The NEURC (Regulator) approves feed-in tariff rates on a case-by-case basis upon completion of a power plant
- Approved renewables-based generators are shielded from EUR–UAH exchange rate fluctuations because the FiT rates are fixed in euros
- The existing legislation also protects them from force majeure and provides an opportunity to choose the international arbitration court in Paris and the ICC Rules of Arbitration as an alternative to Ukrainian courts

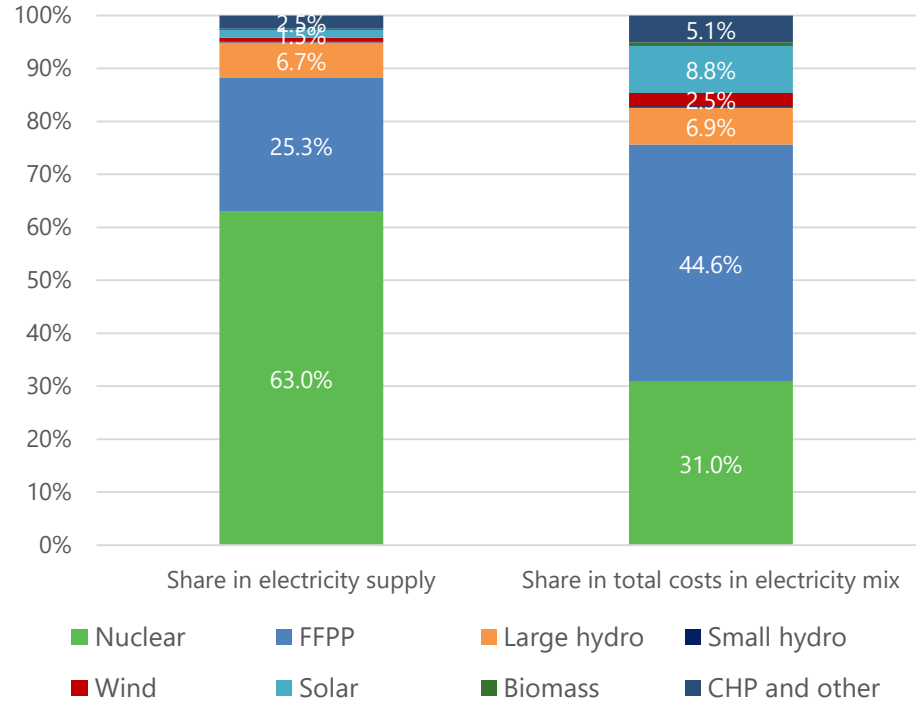
Table 1. Average Feed-in-Tariffs in September 2018, EUR/MWh*

Small Hydro	116.5
Wind	105.4
Solar	203.7
Biomass	117.4
Weighted average tariff	**154.0**

**Note: FiT depends on the time of project's commissioning. FiT were converted from UAH into EUR at official average exchange rate of the NBU for September 2018*

Costs of Renewable Electricity Deployment

Figure 4. Shares of electricity supply and costs in total electricity mix at the wholesale electricity market in August 2018

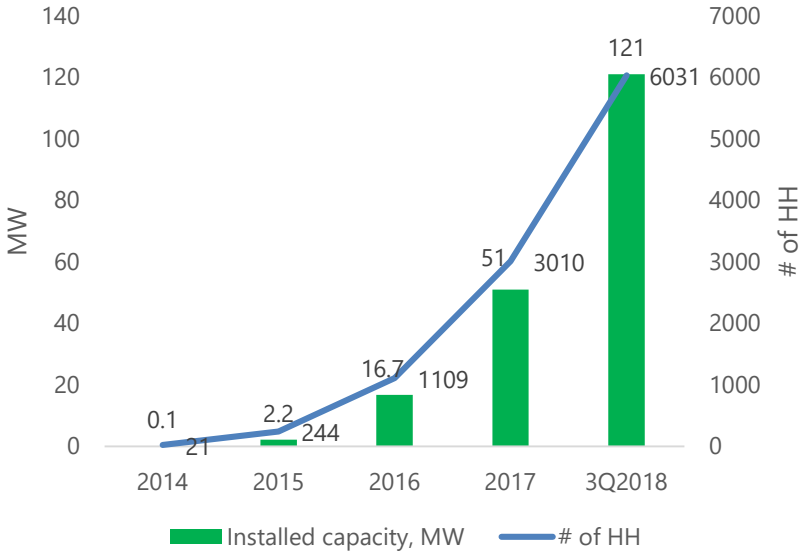


Source: State Enterprise "Energorynok"

- Although RES amounted 2.6% in total electricity supply in August 2018, its share in total costs of electricity supply reached 12.3%
- Policies will need to increasingly focus on bringing down deployment costs towards international benchmarks given projected expansion of variable renewables shares in Energy Strategy
- NAP envisions the award of large solar and wind capacities at auctions processes starting 2019
- The correspondent legislation including 8 alternative drafts laws were submitted to the parliament in 2018

New Opportunities for Households

Figure 5. Installed capacities in residential sector and # of households (HH) with solar PV in 2014-3Q2018



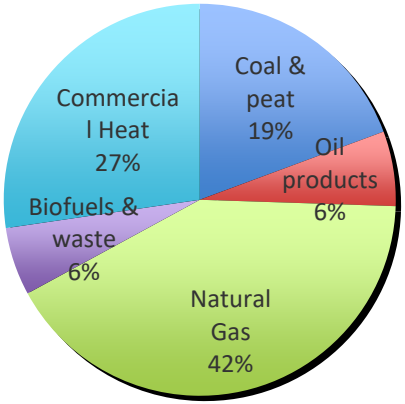
Source: State Agency on Energy Efficiency

- In 2014 it became permissible for households to sell PV electricity directly to energy suppliers via FiT if their installed capacity is lower than 30 kW.
- As a result, the installed PV capacity in residential sector increased from 0.1 MW to 89 MW over 3.5 years
- Approved FiT are fixed in euros, enable fast investment recovery and provide better opportunity for secure investments compared to bank deposits or investments in equity
- The FiT is degressive over time depending on the year of project commissioning, e.g. it amounted to EUR 0.174/kWh for the projects commissioned in 2017-2018 in the 3Q2018*

* Based on simple average official exchange rate for the 3Q2018

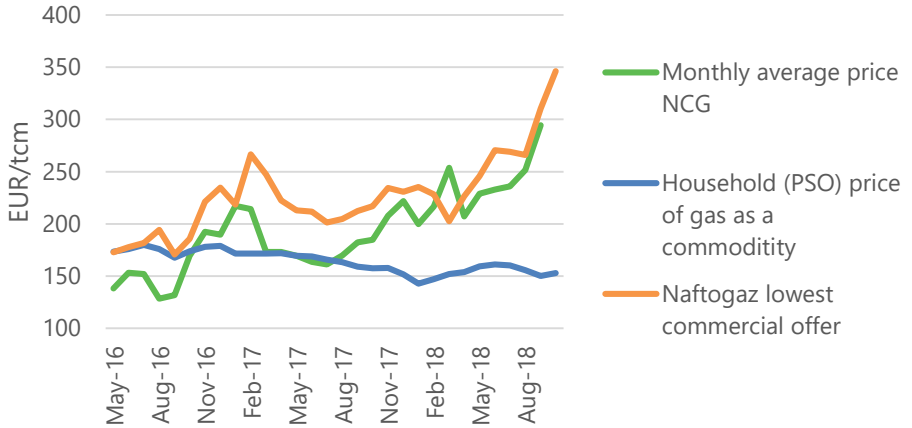
Renewables in Heating Sector

Figure 6. Fuel mix in total final consumption for heat in 2016



Source: Energy Balance for 2016, State Statistical Service of Ukraine

Figure 7. Residential and market gas prices, EUR/tcm



Source: Naftogaz of Ukraine, GASPOOL

- The **6% share of biofuels** and waste in heat production in Ukraine **is two times lower than OECD average**
- **Until 2016** any fuel including **renewables could not compete with highly subsidized gas prices** in residential sector. The gas tariffs covered only about 19% of full costs of gas supply in 2013. **In May 2016 they reached market level** but were not reviewed until November 2018. **As of November 2018 gas tariff for households covers about 72% of full costs of gas supply**.
- **Current housing and utility subsidies program contains little incentive for energy efficiency improvement and switching from gas to cheaper and more environmentally friendly fuels**
- There is no FiT for commercial heat production from renewables but there is a **legislative guarantee for developers of biomass heat production a tariff of 90% of that received by DH companies for heat production from natural gas (at PSO prices)**
- **There is no enforcement mechanism** as in FiT electricity tariffs **of supplying commercial heat produced by renewables developers to DH network** even at more competitive than produced from natural gas prices

Renewables in Transport

- IRENA (2015) estimates the renewables potential in transport sector at 1,982 ktoe in Remap2030 scenario. Most of this potential (76%) is attributed to the liquid biofuels consumption
- There are **no mandates on addition biofuels to oil products** and biofuels cannot compete at current oil prices against conventional fuels
- Starting 2018 the electrical vehicles are exempted from import duties, excises and VAT yielding them price advantage over vehicles with internal combustion engines. However, the inability to enforce the legislation over the import of used vehicles from Eastern European countries led to massive illegal import of old cars undermining the incentives for consumers on legal electric vehicles acquisition

Integration of Renewable Energy and Energy Efficiency Policies

- **Energy efficiency and renewables policies are still made separately** without cross-reference to each other
- Addressing these two issues separately is **no longer appropriate as long as the shares of VRE** are **projected to** drastically **increase** over the next decade
  - Untapped DSR potential is estimated at 4000 TWh or 15% of total electricity demand (IEA (2017)
  - DSR is a more cost-effective and climate-friendly solution than building and retaining power plants and electricity usage for only occasional use
  - Consumers who can rapidly adjust their demand to follow supply are very valuable for system operator and should be correspondently remunerated to increase the incentive to participate
- IEA (2017) estimates that 57% of flexible loads[1] in residential building were covered by energy efficiency policies compared to only 23% coverage of non-flexible residential loads
- Such approach **could reduce the share of flexible demand** in total electricity demand
- **Overall energy efficiency improvement leads to lower peak demand reducing the need for flexibility and DSR**, e.g. a drop in temperature by one degree Celsius in winter in France gives rise to an additional 2.4 GW of demand due to low efficiency of the building stock (IEA 2017)

[1] Flexible loads include equipment and appliances whose usage can be shed or shifted w/o affecting user output or comfort. Inflexible loads include equipment that needs to draw power at the time when consumers demand the service (IEA 2017)

Top 7 from 20 IEA for EU4Energy Policy Recommendations

1. RENEWABLE ENERGY DATA

Targets and strategies need to be underpinned by good data. Governments should produce and publish comprehensive data on renewables following international standards, including:

- Resource data for different renewables (e.g. solar and wind atlas) and make it freely available
- Deployment data for individual renewable technologies
- Deployment data for renewables under specific policy mechanisms
- Data on the costs of deployment

2. CREATE A LEVEL PLAYING FIELD IN ENERGY PRICING

- Eliminate all fossil fuel subsidies
- Develop a system of carbon pricing with a rising carbon price over time

3. ADEQUATE REMUNERATION FOR RENEWABLE ELECTRICITY

- Ensure market-appropriate remuneration levels, with degression over time linked to deployed capacity and where possible involving a competitive award of power purchase agreements (for example through auctions)
- Constantly monitor market evolutions, to properly set the tariff/premium levels
- Develop remuneration levels that reflect the system value of specific renewables (e.g. location, ability to generate at specific times)
- Ensure there are appropriate support mechanisms for both large, utility-scale projects and small installations or for householders

4. SYSTEM INTEGRATION OF VARIABLE RENEWABLE RESOURCES (VRE)

- Reform electricity market design to provide accurate pricing at growing shares of VRE
- Provide support for system flexibility (e.g. demand response, storage such as pump storage hydro, batteries or thermal storage)
- Ensure that grid connection codes include appropriate requirements for VRE
- Plan for deploying a mix of technologies that bring valuable synergies
- Recognize (e.g. through differentiated tariff levels) the different locational, time and technological value of RE power plants

Top 7 from 20 IEA for EU4Energy Policy Recommendations (2)[1]

5. DEVELOP A CROSS-SECTORAL APPROACH IN HEATING

- Tackle heat in both buildings and industry, exploit synergies where possible
- Integrate renewable heat with energy efficiency policies
- Take an energy systems approach, coupling heat and power more closely

6. TACKLE SPECIFIC BARRIERS FOR RENEWABLE HEAT

- Economic barriers (e.g. through financial support mechanisms, carbon taxes)
- Non-economic barriers (e.g. through obligations, building codes, installer certification)

7. INTEGRATED TRANSPORT POLICIES

- Biofuels, conventional and advanced, are only one element of a broader portfolio of options for the transport sector, including:
- Development of the potential for electric vehicles, in conjunction with increased deployment of renewable electricity
- Increasing the energy efficiency of the vehicle fleet
- Promotion of other transport options which can reduce transport demand (e.g. through better urban planning) and make transport use less energy-intensive, such as improved public transport, walking and cycling

[1] The full set of IEA 20 Renewable Energy Policy Recommendations is available at https://webstore.iea.org/download/direct/2327?fileName=20_Renewable_Energy_Policy_Recommendations.pdf

Top 3 Energy Efficiency Priorities for Ukraine (from 18 IEA Key Energy Efficiency Policy Recommendations for Ukraine)

1. Enhance capacity to collect and analyse energy data

- Data collection during the design, implementation and evaluation phases is a necessary part of an effective energy efficiency policy
- Data analysis provide critical information for decision making, including future scenarios, baselines and indicators, which are necessary for tracking progress, monitoring and evaluation of the policy

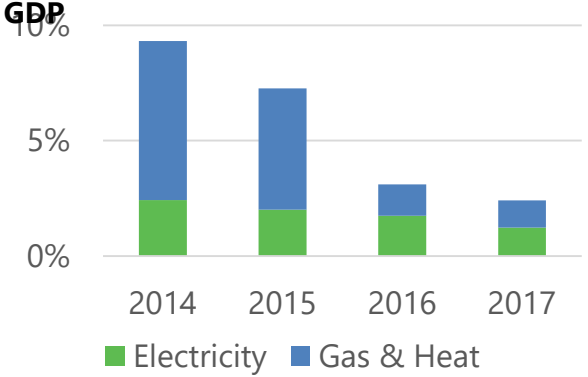
2. Continue to progressively remove energy price subsidies that are:

- The major barrier for EE improvement and renewables development
- Regressive since richer people benefit more from subsidized energy prices
- Negatively affect energy security by lowering investment in domestic exploration and production and lead to an excessive energy import
- One of the major sources of budget and current account deficits

3. Leverage private investment in energy efficiency

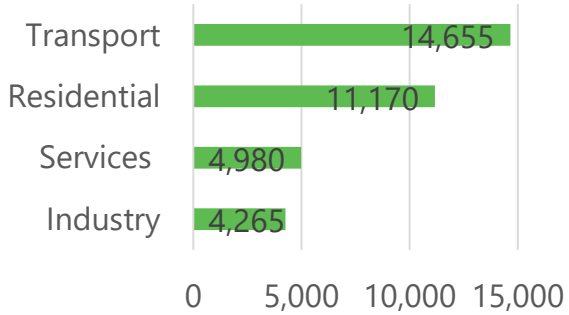
- NEEAP estimates total EE investment needs at EUR 35.07 bn in 2015-2020
- SME and households lack an access to an affordable long-term financing:
  - establishing funding mechanisms to jump-start energy efficiency financing to help them overcome the initial high set-up costs
  - engaging with IFS to establish credit lines for local banks for lending to the residential sector, SMEs and municipalities.

Figure 8. Residential Price Subsidies as % of GDP



Source: NEURC, WB/ESMAP and IEA for EU4Energy estimates

Figure 9. EE Investment Plans for 2015-2020 in NEEAP, EUR m



Source: National Energy Efficiency Action Plan through 2020

Thank you for attention!

Borys Dodonov
IEA for EU4Energy Country Expert for Ukraine
E bdodonov@gmail.com
W www.eu4energy.iea.org/