



# \* UKRAINIAN ENERGY REFORM AND SECURITY: OPPORTUNITIES, CHALLENGES AND COOPERATION WITH U.S.



**Oleksandr Dombrovskyi**

Acting Chairman of the Verkhovna Rada  
of Ukraine Committee  
on Fuel and Energy Complex,  
Nuclear Policy and Nuclear Safety



# \* 1) Ukrainian energy reform: view from Parliament





DONE

## **Basic energy legislation in compliance with the Third Package**

**1) Law on Natural Gas  
Market, adopted in April  
2015**



**2) Law on Energy and  
Public Utilities  
Regulator was adopted  
on 22 September 2016**

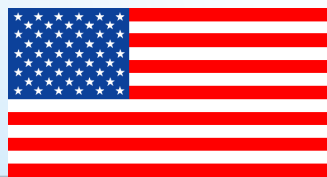


**3) Electricity Market  
Law was adopted in  
April 2017**



**Ukrainian Parliament adopted a law  
ratifying the COP 21 Paris in July  
2016.**

**It was earlier than in:**





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**Ukrainian Parliament adopted Law of Ukraine's joining the Statute of the International Renewable Energy Agency (IRENA) on December 2017.**

**Ukraine has become a member of IRENA on February 24 2018.**

# *Energy efficiency*

**№ 327-VIII of 09.04.2015**



**ESCO Laws that were  
adopted in Ukraine:**



**№ 328-VIII of 09.04.2015**

**on energy service mechanisms  
(including specific public  
procurement procedures)**

**on the ability of budgetary institutions to  
adopt a long-term commitment  
on energy service  
(amendments to the Budget Code of Ukraine)**

***Adoption of these laws stimulates development of ESCO market: opens opportunities for long-term energy service contracts in public sector.***



## Laws were adopted in Ukraine:

According to Directives 2006/32/EU and 2012/27/EU

- *Law of Ukraine "On energy efficiency fund"*
- *Law of Ukraine "On energy efficiency of buildings"*
- *Law of Ukraine "On the commercial meter accounting in the areas of heating, water supply and sanitation, provision of public services"*
- *Law of Ukraine "On Housing and Communal Services"*



## Renewable Energy

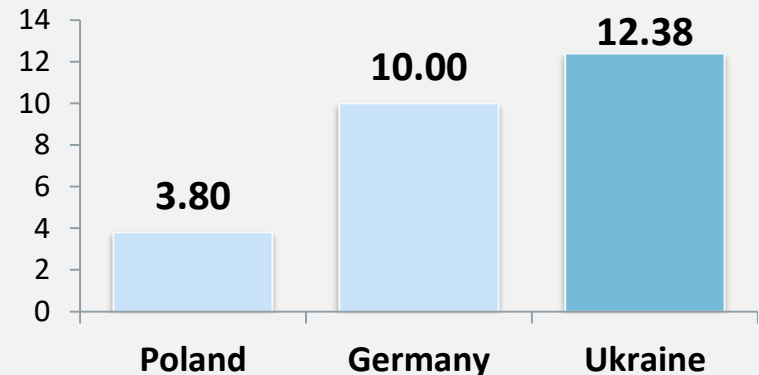
### Law of Ukraine on Renewable Energy Development Stimulation was adopted in 2015

Introduced “green” tariff until 2030 for:

- solar power stations: 15,99 €ct/kWh;
- wind power plants: 6,79 €ct/kWh;
- biomass power stations: 12,39 €ct/kWh;
- small hydro-power stations: 10,45 €ct/kWh;
- geothermal power installations: 15,03 €ct/kWh;
- private households on solar panels: 17,23 €ct/kWh;
- wind turbines up to 600 kW: 5,82 €ct/kWh.

Premium for usage of Ukrainian equipment is introduced (+10% to existing tariff)

Average biomass green tariff, eurocent/kWh







# Law of Ukraine “On Amendments to the Law of Ukraine “On Heat Power Supply” concerning Stimulation of Heat Power Production from Alternative Energy Sources” (No.1959-VIII of 21.03.2017)

## The main provisions :

- **establishing tariffs** for the *heat produced from alternative sources at level 0.9 as of* the current tariff *for heat producers from natural gas or average tariff in region* for public entities and population **by local authorities;**
- **average tariff** for heat produced for population and public authorities, **is calculated by local authorities** according to the Cabinet of Ministers Order.



## **Stimulation of oil and gas production:**



- Law of Ukraine On ensuring transparency in the extractive industries;**
- Law on Royalty decentralization;**
- Stimulating taxation for new gas production;**
- The deregulation Law on stimulation of permitting system of the oil and gas industry**



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# **BASIC STRATEGIC DOCUMENTS IN ENERGY OF GOVERNMENT**





# Energy Strategy of Ukraine for the period up to 2035 "Safety, Energy Efficiency, Competitiveness"



Approved by Government **in August 2017.**

**STAGE 1:** Energy sector reform through 2020

**STAGE 2:** Optimisation and innovative development of energy infrastructure through 2025

**STAGE 3:** Sustainable development through 2035



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# National Renewable Energy Action Plan Until 2020

**GOAL:**

**11% of RES in Ukrainian energy mix by 2020**

**Approved by Cabinet of Ministers of Ukraine in October 2014**





# National Action Plan on Energy Efficiency till 2020

Approved by Cabinet of Ministers of Ukraine in November 2015





# Government's Concept for Development of Ukraine's Gas Production Industry



Approved by Government in **December 2016**.

A key goal included in the Concept is to reduce Ukraine's dependence on gas imports and to enhance energy security of the state.

**A target until 2020** is to increase extraction of Ukrainian gas up to **27,6 billion cubic meters**.



# Ukrainian energy security: threats and opportunity of strengthening



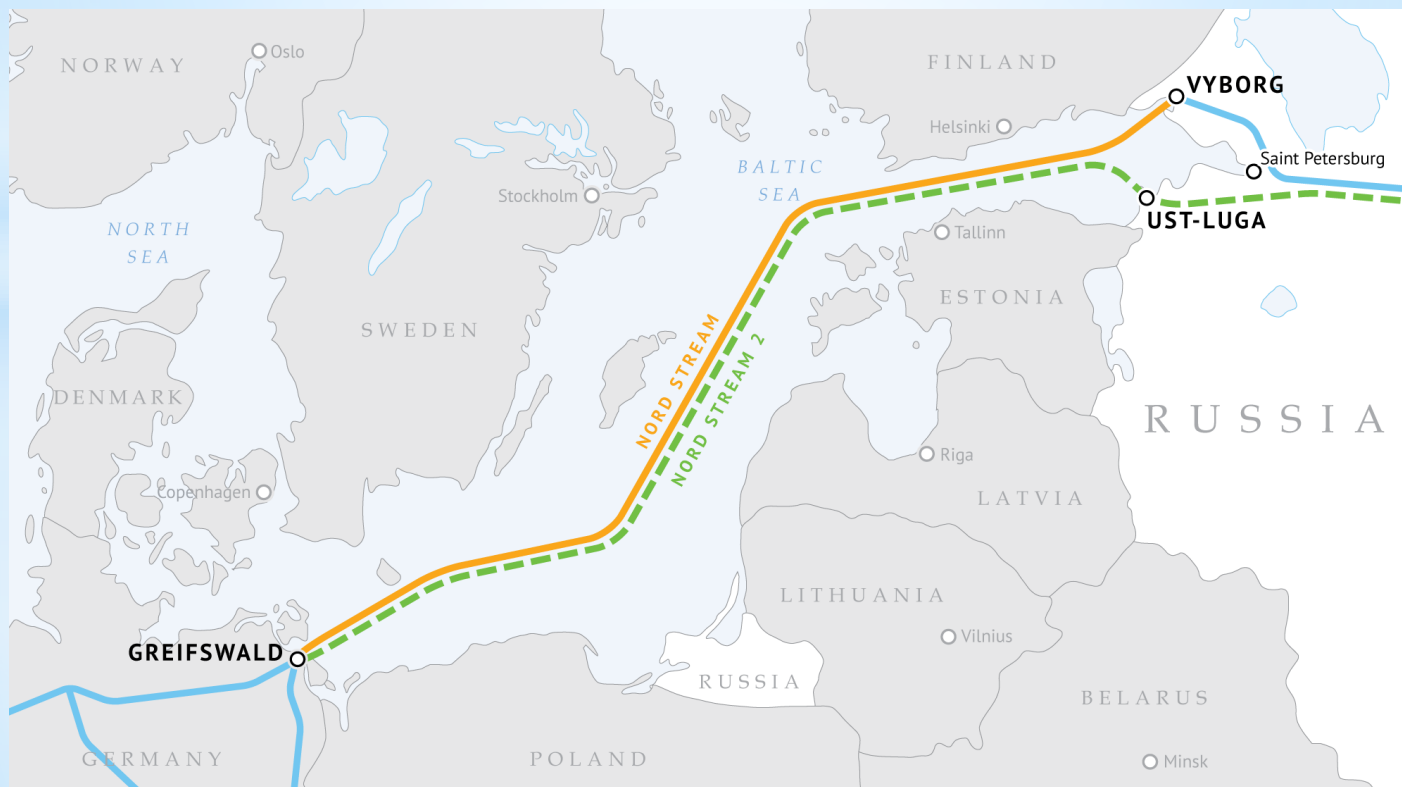




# Nord Stream 2

- Nord Stream 2 is a purely geopolitical project for the Russian Federation that threatens energy security of Europe and supply diversity on Central and Eastern European markets;

- Nord Stream 2 will weaken the Ukrainian economy





# Energy efficiency: from threat to energy independence to source of economic growth

2016	Poland	Ukraine
<b>GDP</b> (constant 2010 billion US\$)	556,18	124
<b>GDP, PPP</b> (constant 2010 billion US\$)	931,8	321,4

	Poland	Ukraine
<b>TPES/GDP</b> (toe/thousand 2010 billion US\$)	0,17	0,74
<b>TPES/GDP PPP</b> (toe/thousand 2010 billion US\$)	0,1	0,29

	Poland	Ukraine
<b>Energy production</b> (Mtoe)	67,68	63,6
<b>Net imports</b> (Mtoe)	28,83	29,15
<b>TPES (Mtoe)</b>	94,93	91,65
<b>Electricity consumption</b> (TWh)	154,08	149,34

	Poland	Ukraine
<b>CO2 emmissions</b> (Mt of CO2)	282,4	150,6
<b>CO2/GDP</b> (t CO2/thousand 2010 billion US\$)	0,51	1,21
<b>CO2/GDP PPP</b> (t CO2/thousand 2010 billion US\$)	0,3	0,47



# **Energy efficiency: from threat to energy independence to source of economic growth**

- 1. Ukraine and Poland have very similar amount of energy production, import and TPES.**
- 2. Level of energy intensity in Ukraine is bigger in 3 times at least than in Poland.**
- 3. Decreasing level of energy intensity in Ukraine to Polish one will allow Ukraine to reach same amount of GDP as in Poland (ceteris paribus assumption)**
- 4. Ukraine can decrease amount TPES in 3 times at least with level of energy intensity like in Poland and current amount of GDP (ceteris paribus assumption)**
- 5. Ukraine could become net exporter of energy resources with level of energy intensity like in Poland and current amount of GDP (ceteris paribus assumption)**



# Cyber security in energy and critical infrastructure

In December 2016 hackers attacked the Ukrainian power grid. Also several Ukrainian ministries, banks, metro systems and state-owned energy enterprises were attacked by hackers during summer 2017.

The terrorist attacks on September the 11th 2001 accelerated the development of comprehensive and detailed cyber security norms in the United States. American authorities have gradually sought to put in place a series of policies and rules to protect energy infrastructure from cyber threats.

The experience of the United States in the issues of cyber security in energy would be very valuable for Ukraine.

Next activity: Common round table discussion “Cyber security in energy sector in the United States. The best experience for Ukraine” of Ukrainian Parliament and U.S. Embassy in Ukraine that will take place on June in Kyiv

# LIFETIME EXTENSION OF OPERATING POWER UNITS OF UKRAINE NPPS

There are 15 nuclear power units in operation

Lifetime extended  
(7 power units)

By 20 years  
**RNPP 1** VVER-440/213  
extended to **22.12.2030**

By 20 years  
**RNPP 2** VVER-440/213  
extended to **22.12.2031**

By 10 years  
**SUNPP1** VVER-1000/302  
extended to **02.12.2023**

By 10 years  
**SUNPP2** VVER-1000/338  
extended to **31.12.2025**

By 10 years  
**ZNPP1** VVER-1000/320  
extended to **23.12.2025**

By 10 years  
**ZNPP2** VVER-1000/320  
extended to **19.02.2026**

By 10 years  
**ZNPP3** VVER-1000/320  
extended to **05.03.2027**

Work is on-  
going  
(4 power units)

**RNPP3** VVER-1000/320  
Design lifetime will end on  
**11.12.2017**

**ZNPP4** VVER-1000/320  
Design lifetime will end on  
**April 2018**

**KhNPP1** VVER-1000/320  
Design lifetime will end on  
**December 2018**

**SUNPP3** VVER-  
Design lifetime will end on  
**February 2020**

Lifetime has not  
ended  
(4 power units)

Lifetime will  
end in 2020  
(1 power units)

**ZNPP5** VVER-1000/320

Lifetime will  
end after  
2020  
(3 power units)

**ZNPP6** VVER-1000/320

**KhNPP2** VVER-1000/320

**RNPP4** VVER-1000/320





## DESIGN AND CONSTRUCTION OF POWER UNITS #3 AND #4 OF KHMELNYTSKYI NPP



*Feasibility study for construction of KhNPP-3 & 4 was updated*

*Positive expert report (ref.#00-2193-16/ПБ) was issued on May 29, 2017*

*Draft resolution of the Cabinet of Ministers of Ukraine “On Approval of the Feasibility Study for Construction of Units #3 and #4 of Khmelnytskyi NPP” was approved by the Ministry of Energy and Coal Industry of Ukraine, and then submitted for review by the central executive authorities*



**Total cost of construction (based on 2016's prices): UAH 72.4 bln**



**Project completion date: KhNPP 3 – 2024  
KhNPP 4 – 2026**

**Supplementary electricity generation that will contribute to ensuring energy independence of Ukraine, implementation of plans of its social and economic development and strengthening of its role at the international electricity market**

**Once in operation, KhNPP Unit #3 and Unit #4 will ensure additional annual supply of 15 bln.kWh(e) to the energy system of Ukraine**

**Note:**

*Construction of KhNPP Unit#3 and Unit#4 according to initial design (each reactor's capacity is 1000 MW, having reactor installation VVER-1000/V-320) started in 1986, but it was suspended in 1990 by the moratorium for NPP construction. Today, the construction availability of the power units is assessed at the level:*

- 75% for Unit#3 ( 85 items of equipment were installed, including tanks, heat exchangers, filters, etc.)
- 28% for Unit #4

# “UKRAINE - EU ENERGY BRIDGE” PILOT PROJECT

The “Ukraine – European Union Energy Bridge” pilot project was initiated by CMU Resolution №671-p of 15.06.2015

## The Project subject matter:

- **Development** of infrastructure of cross-border electric grids and increase of their transmission capacity
- **Integration** of the Unified Power System of Ukraine into the European power system ENTSO-E
- **Arrangement** for KhNPP unit 2 capacity output permitting electricity supply to EU countries through disconnection of the power unit from the Unified Power System of Ukraine for the purposes of the long-term export
- **Mobilization** of the funds raised through electricity export to European Union countries to fund construction of units 3 and 4 of Khmelnytskyi NPP

- The Project is the pilot project and will emerge as the initial step towards the full strategic synchronization of the Unified Power System of Ukraine with the EU power system. This is a significant step of Ukraine towards the integration of its power system with the European power grid





# “UKRAINE – EU ENERGY BRIDGE” PILOT PROJECT (continued)



- The project is fully investment-driven: it doesn't produce any additional load on the budget of Ukraine
- The return on investments will be provided through electricity sales in the European market
- The project should be reviewed in the context of plans for completion of units 3 and 4 of Khmelnytskyi NPP and development of transboundary power grids' infrastructure (through revitalization of 750 kV OTL KhNPP-Rzeszow)



- The planned electricity export from Khmelnytskyi unit 2 will start in 3 years, becoming a source for raising funds to complete Khmelnytskyi NPP units 3 and 4 through a long-term power purchase agreement. The Government of Ukraine shall secure the agreement for its entire validity period.



# CONSTRUCTION OF THE CENTRALIZED SPENT NUCLEAR FUEL STORAGE FACILITY (CSFSF) FOR VVER REACTORS OF UKRAINIAN NPPS

## Project goal:

Improvement of the spent nuclear fuel (SNF) management system of Ukrainian NPPs so as to reinforce Ukraine's energy security through discontinued SNF processing in Russia

Implementation period: – until **2065**  
– **start-up complex** – **2019**



### Launching of 1÷4 start-up complexes will include :

- Establishment of all required infrastructure at the CSFSF site
- Supply of **94 SNF storage modules** (Contract with Holtec International)
- Equipment will be supplied by the technology owner - *Holtec International*



- **CSFSF design engineering** was performed by the Ukrainian design engineering organization – Kyiv Research-and-Development and Design Engineering Institute “Energoproekt”
  - CSFSF capital construction cost (for 458 SNF storage modules) – **UAH 37,2 bln.**
  - Funding sources: loans and SE NNEGC “Energoatom” internal funds
  - Indirect return on the investment in CSFSF construction is expected in three to four years from the start of operation
- 
- **Project location:** Chernobyl Exclusion Zone (Kyiv region) as per the Law of Ukraine on CSFSF (*No4384 of 09.02.2012*)

### CSFSF design capacity:

- ✓ **12 010** spent FAs from VVER-1000;
- ✓ **4 519** spent FAs from VVER-440

### CSFSF 1÷4 start-up complex capacity:

- ✓ **2 511** spent FAs from VVER-1000;
- ✓ **1 105** spent FAs from VVER-440

It will take **45-50 years** before the CSFSF design capacity is used up with loaded spent nuclear fuel  
The design operational life is **at least 100 years**



## Countering Adversarial Nations through Sanctions Act

An important place in sanction Bill “Countering Adversarial Nations through Sanctions Act” is allocated to support for Ukraine.

The bill clearly states that the policy of the United States is as follows: support to the Ukrainian government in restoring sovereignty and territorial integrity ,assistance in reforming the energy sector of Ukraine and reducing dependence on Russian energy resources, the continuation of opposing the implementation of the Nord Stream 2 project.



# **Welcome to cooperation!**

**Oleksandr Dombrovskiy**  
Acting Chairman of the Verkhovna Rada  
of Ukraine Committee  
on Fuel and Energy Complex,  
Nuclear Policy and Nuclear Safety