ENERGY SECTOR OF UKRAINE: strategic issues

DTEK CEO BRIEFING IN WASHINGTON DC
28 FEBRUARY – 1 MARCH 2018

Energy
in action

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ENERGY SECTOR OF UKRAINE IN 2017 - HIGHLIGHTS

Energy Strategy-2035 finalized and approved by the Cabinet of Ministers

Law on electricity market adopted and entered into force

Tax reform for gas production will help industry to become attractive for investors

Stockholm arbitrage final ruling approaching

Loss of Donbas mines in March led to **coal deficit, import from the US** begins

RES are booming, very promising head-start

NERP finally adopted, but important aspects (financing) remain **unsolved**

CAATSA enacted, Ukraine's Energy Security Report published (January 2018)

STRUCTURED GOALS OF THE ENERGY STRATEGY-2035

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STRATEGY GOALS

The key goal of the Energy Strategy is to resolve the energy security issues, decrease energy intensity of the GDP, increase the share of RES and improve environmental standards in the energy sector

- **Energy independence** (import<33%)
- **Efficiency** (<0,13 toe/GDP's USD thousand)
- **RES development** (25% in power generation)

IMPLEMENTATION STAGES

Key tasks within the stages:

2017-2020 MARKET REFORM	2021-2025 OPTIMIZATION AND INNOVATIONS	2026-2035 SUSTAINABLE DEVELOPMENT
• Implementing the market reform and promoting competitive relations • Creating investments-attractive environment • Implementing the 3rd Energy Package	• Synchronization with ENTSO-E • Implementing the National Emissions Reduction Plan • Establishing of mechanisms to attract investments in new projects	• Building new capacities to replace the decommissioned fleet • Achieving the planned level of SO_2, No_x emissions • Achieving 25% of RES in the energy mix

IMPLEMENTATION DIRECTIONS

- Conventional Generation
- Coal Sector
- Oil and Gas
- Energy Efficiency
- Grid/ Networks
- RES
- Integration with Europe

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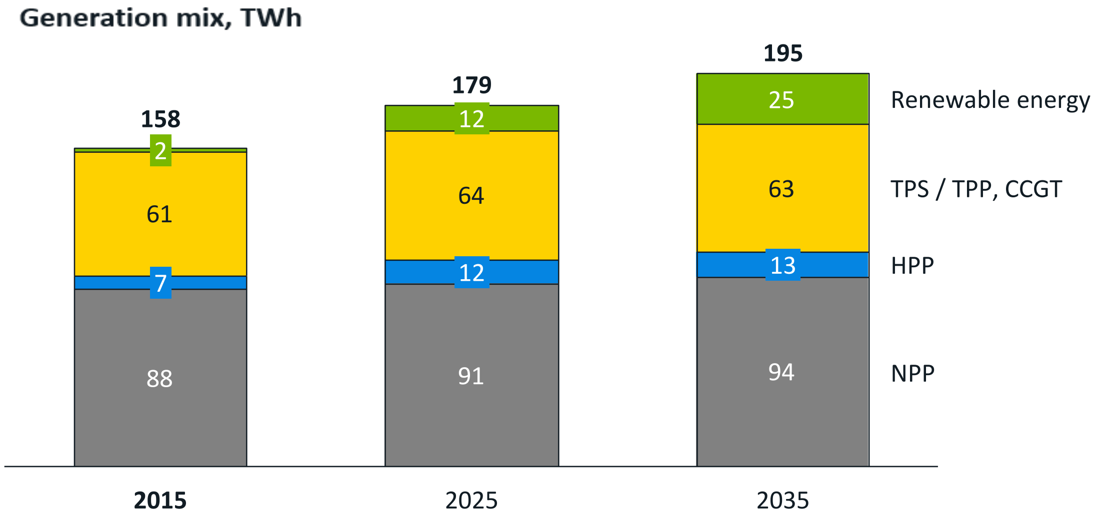
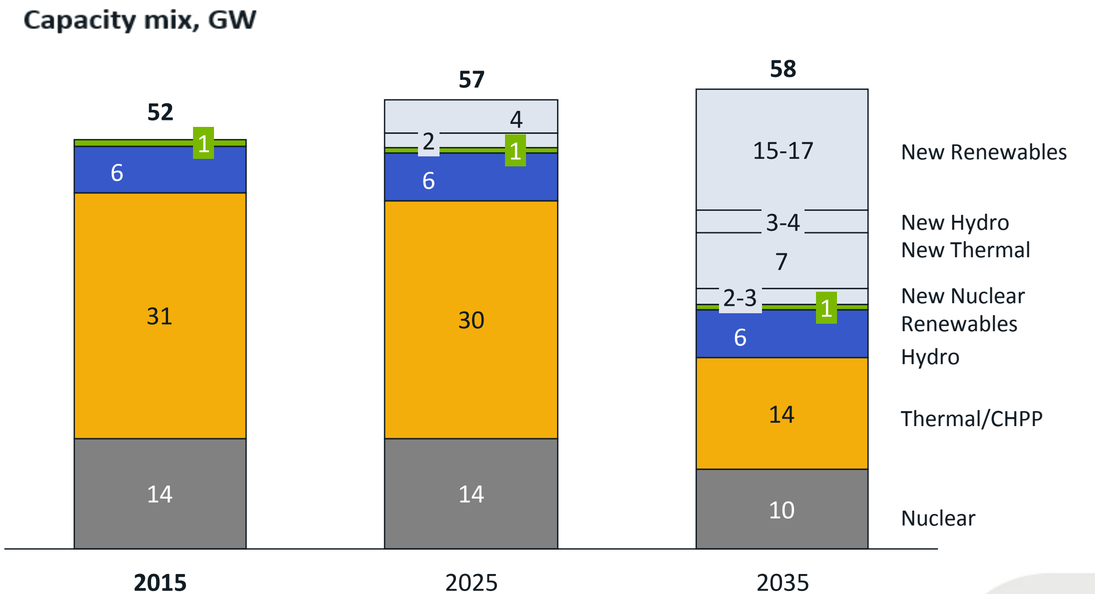
2017-2020	2020-2025	2025-2035
Market reform	Synchronization with ENTSO-E	Commissioning of new capacities
Retrofitting Nuclear and Thermal power units	Meeting EU environmental standards	Smart grid development
Development of renewables	Growing share of prosumers	25% share of Renewables
Implementing incentive tariff setting system	Efficient heat supply through tailor-fit solutions for each city	"0%" share of gas imports
Energy service contracts in the municipal and residential sectors	Growing share of e-vehicles	Energy efficiency at mid EU level

Consumer Renewables Digital technologies Efficiency

GENERATION CAPACITIES FORECAST





Annual electricity consumption growth will constitute up to 2% p.a.

NPPs will remain the base capacity, with a share of more than 50% in the energy mix

Share of coal generation in energy mix until 2035 will be decreased to 25% - 30%

Ensuring domestic coal production at competitive prices remains an important component of Ukraine's energy security

The share of renewables in the capacity mix should reach 30% by 2035 due to construction of +15GW of new generation

Export/import is not considered to be significant part of future energy balance

After synchronization with ENTSO-E Ukraine can use import as alternative to new construction (up to 4-6 GW)

* According to the Energy Strategy -2035

ELECTRICITY MARKET REFORM ROADMAP

International support and pressure (IMF conditionality) are vital for timely completion of reform

Transition period

Nuclear and hydro provide compensation for higher feed-in tariffs

Free market

2017 | 2018 | 2019 | 2020

According to Law

Adoption of license rules and other legislation for unbundling of distribution business ✓

Development and adoption of market rules, codes, etc.

Unbundling

01.07.19
New market

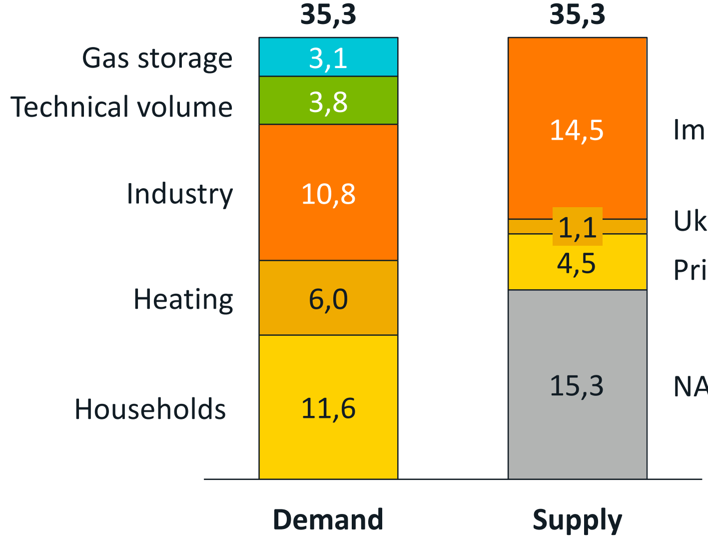
Current development

- License rules and legislation for unbundling adopted in 2017

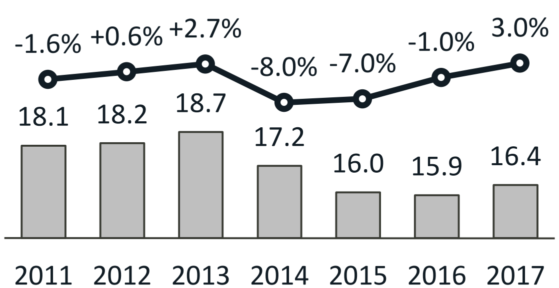
- Adoption of market rules and codes expected in 1Q 2018
- Unbundling of the wholesale system operator expected in 2018
- Compensation mechanism for CHPPs during transition period expected in 2018
- **Market implementation lag is not critical so far but its successful completion requires EU support and consolidation of all stakeholders**

GAS MARKET

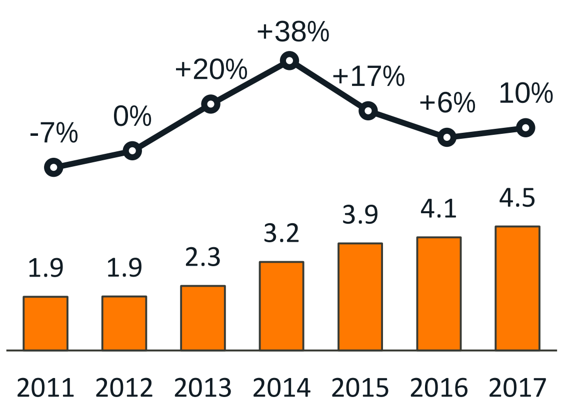
Gas consumption and supply in Ukraine in 2017, bcm



Gas production, bcm



State-owned producers



Private companies

In 2017 production increased to 20.8 bcm, +3.1 %

Political struggles are over: gas industry is deregulated, adequate tax regime and reduced royalties allow long-term investment decisions and form essential preconditions for growth of own gas production

Despite current dispute with IMF, the formula-based approach to price-setting (HUB+) proved efficiency in current market conditions

Ukraine has good chances to become self-sufficient till 2025 and to remain reliable transit country

Naftogaz defeats Gazprom in Stockholm arbitrage on “take or pay”, pricing will be decoupled from politics

Russian gas at competitive prices might return to the market (up to 5 bcm). Final ruling is expected in February

Ukraine has made considerable progress. IMF and EU need to keep pressure to complete unbundling, create trade platforms and launch free auctions for new licenses

2014-2015 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020+

Rent decreased to pre-crisis level for gas

Rent decreased to pre-crisis level for oil

Deregulation of many issues concerning getting new licenses, exploration and development of gas fields

Preferential tax regime for new projects and a stabilization clause

Rent decrease to pre-crisis level for gas condensate

Regulated market

- Regulated tariff, high level of monopoly of Naftogaz – exclusive supplier for the industry
- Supply constraints for independent gas companies
- Shady licensing mechanism
- Highest hydrocarbons' rent rates in Europe

Gas Market Reform

Reform started

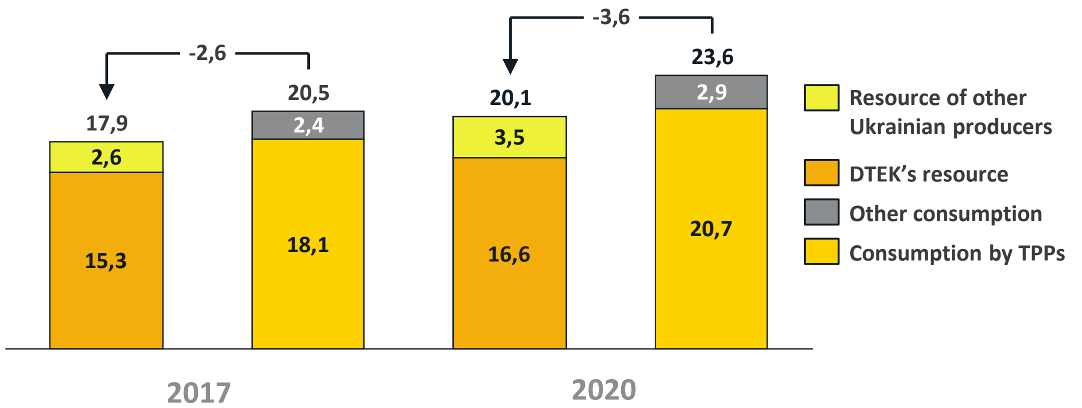
- Adoption of the Law "On the natural gas market"
- Adoption of new market rules, codes and legislation, in line with the EU Third Energy Package
- Bringing prices to market level on a base of import parity
- Tax reform

Things to do

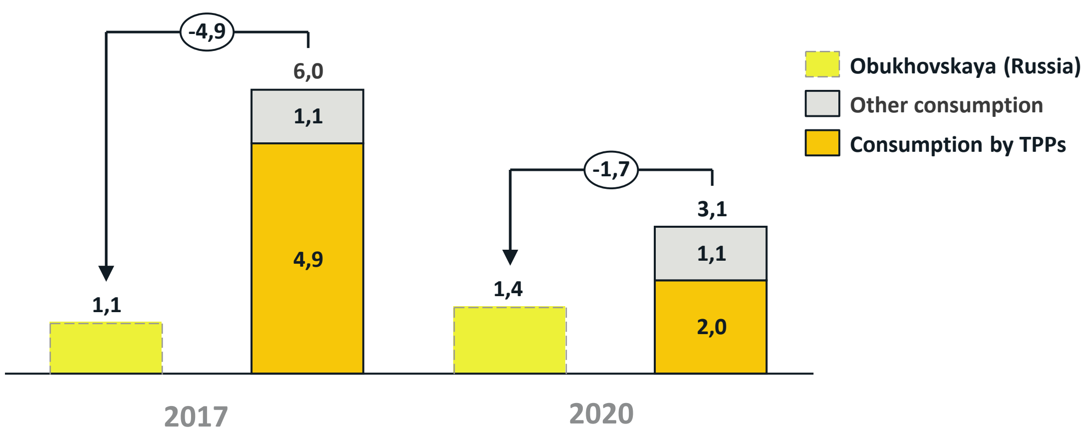
- Corporate governance reform and the creation of an independent supervisory board of Naftogaz
- Full unbundling of production, transportation, storage and sale functions of Naftogas
- Attracting of European partners as transportation and gas storage operators
- Implementation of gas distribution codes
- Finalization of pricing methodology and the monetization of subsidies
- Liberalization of special permits sale through transparent auctions

SHORTAGE OF COAL: NEED FOR INCREASED PRODUCTION

G-grade coal balance, mln tonnes



A-grade coal balance, mln tonnes



Loss of Donbas mines in March 2017 practically incapacitated anthracite-fired TPPs. Relevant primary tasks are:

- transfer TPPs from A-grade to G-grade coal;
- maximise G-grade production

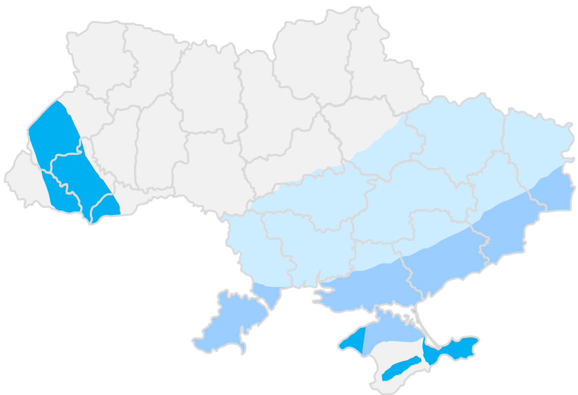
Ensuring Ukraine's energy security is conditioned on:

- investments in perspective mines
- market-based pricing for coal

Market-oriented approach (formula based on import parity and world trends) as an alternative to administrative regulation – temporary measure until free market launch

Looking forward, social costs and risks of inevitable industry restructuring and mines' closures need to be assessed and mitigated. EU experience needs to be studied and fully absorbed

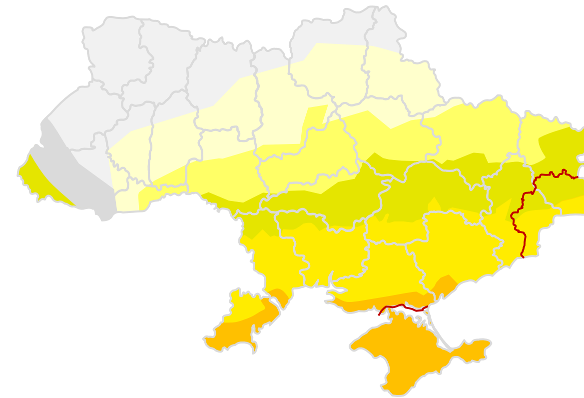
Wind energy potential



Wind speed at a height of 10 m, m/s
<4,5
4,5
5,0
>5,0

Total potential of Ukraine's onshore wind generation is estimated at 12-14 GW

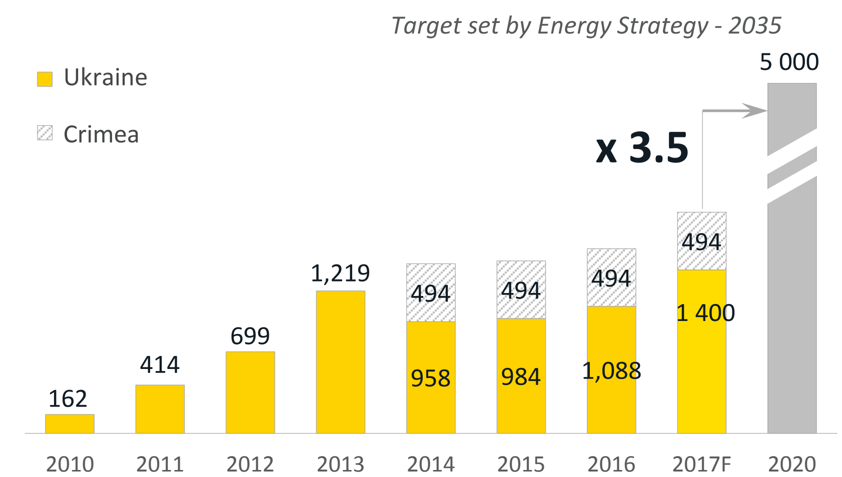
Solar energy potential



Capacity factor, %
12,2%
12,5%
13,0%
13,2%
13,4%
13,9%
14,1%

Total potential of onshore photovoltaic generation is estimated at 8-10 GW

RES market development in Ukraine, MW



Ukraine is one of the most attractive markets in Europe for investments in renewables:

- Considerable potential of solar and wind resources
- One of the most attractive EUR-denominated, state-guaranteed feed-in tariffs
- Fast-growing RES market that will help raise the renewable generation share in the end-user consumption to 11% by 2020 as declared by the State
- Diminishing political and regulatory risks as a result of current energy market reforms and State's commitment to support RES development

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STEP 1

NERP was approved by the Energy Community in 2016 and became effective on 01.01.2018. By 2033, 90 flue gas treatment installations will be operational (64.8 GW, EUR 6.5 bln) and 135 units will be phased out (46.9 GW).

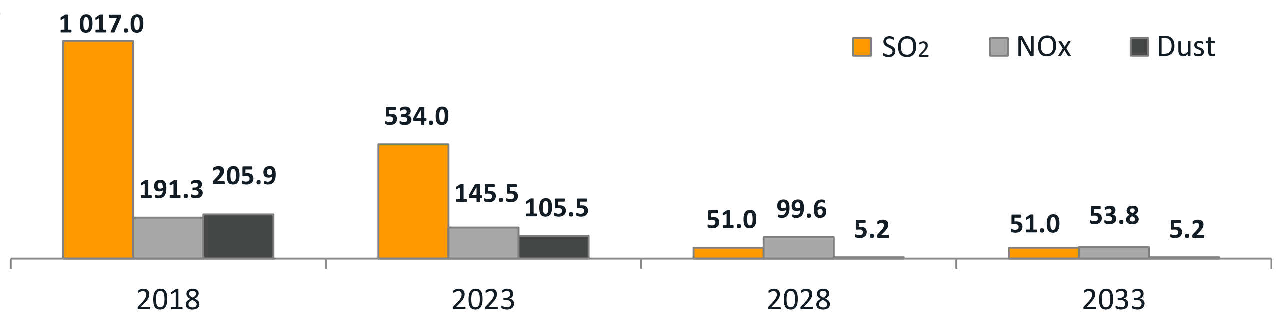
STEP 2

- Ukrainian secondary legislation is to include NERP provisions
- New algorithm to support environmental retrofitting in the new energy market to be designed
- Financing options should be discussed and solved (e.g. environmental tax; tariff as part of PSOs, etc.)

EUR 6.5 bn

Flue gas treatment equipment for 64.8 GW

Expected emissions' reduction of Ukrainian TPPs and CHPPs according to NERP, thou tonnes



▼ 46.9 GW ▼ 7.1 GW ▼ 37.9 GW ▼ 1.9 GW

Ukraine needs assistance in developing algorithm to finance environmental retrofitting in the new energy market

KEY PRIORITIES FOR 2018

1. **Ukraine's Energy Strategy -2035**: develop implementation roadmap
2. **Regulator:** ensure smooth rotation**, independence and professionalism**
3. **Electricity and gas markets:** implement sustainable reform, proceed with EU markets' integration
4. **Gas transit:** ensure corporate governance of Naftogas, establish strong TSO with international participation
5. **Synchronization** with ENTSO-E: discuss and finalize realistic implementation plan
6. **Coal**: stress domestic production, diversify import and enable transfer of applicable international experience in coal sector restructuring
7. **Investments & privatization**: RES development, distribution, oil&gas, etc.
8. **NERP**: adopt robust algorithm for financing of environmental retrofitting