



Snapshot of Ukraine's Energy Sector:

Institutions, Governance
and Policy Framework



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Foreword

Since 1991, the OECD and Ukraine have been working hand in hand to improve governance and economic development. A Memorandum of Understanding for Strengthening Co-operation (MoU) was signed between the OECD and the Government of Ukraine in 2014. The MoU was renewed until October 2020 at a ceremony held in Kyiv in June 2018. The Action Plan for implementing the MoU was signed in April 2015 and revised by Ukraine and the OECD in 2019 to reflect the new policy priorities. It is structured around three pillars: i) anti-corruption, ii) governance and the rule of law, and iii) investment and business climate.

It is in the context of the OECD-Ukraine Action Plan that in 2019 the OECD launched the project Supporting Energy Sector Reform in Ukraine. The project contributes to the government of Ukraine's efforts to reform the country's energy sector and to promote energy efficiency. Building on an earlier OECD review on corporate governance reform in Ukraine's hydrocarbons sector, this multi-year project aims to improve investment, SOE corporate governance, competition and anti-corruption practices in Ukraine's energy sector. The work comprises analytical inputs, policy recommendations tailored to the sector in the form of analysis based on OECD guidelines and instruments, as well as capacity-building activities aimed at various levels of government. The project involves key stakeholders from Ukraine, including the Ministry of Energy and Environmental Protection (lead Ministry), the Ministry of Economic Development, Trade and Agriculture, the State Agency on Energy Efficiency and Energy Saving, the Cabinet of Ministers and the Ministry of Finance, among others. Relevant energy-related state-owned enterprises (SOEs) are also involved, namely Naftogaz and Ukrenergo, as well as civil society, academia, private sector, and business organisations. The project will run between January 2019 and December 2021. It is being implemented by the OECD in close collaboration with the Government of Ukraine, with the financial support of the Government of Norway.

Within the context of this project, this report provides an overview of Ukraine's energy sector architecture. While analysing the country's energy mix, it covers the sector's overall regulatory framework and identifies key players and their roles across markets. It also provides a case study on Ukraine's electricity sector, focusing on the market structure and processes including electricity production, transmission and distribution. Moreover, the report looks at the launch of the new electricity market in July 2019 and the main components of the reform, while identifying potential challenges and policy considerations.

The report benefited from significant contributions from the representatives of the Ukrainian government. In April, June and September 2019, the OECD held a series of bilateral meetings and consultations in Kyiv with representatives of the Ukrainian government, parliament and selected energy SOEs to collect information in preparation of this report. Additional inputs were provided by key actors in the energy sector, including the National Energy and Utilities Regulatory Commission, the State Agency on Energy Efficiency and Energy Saving, and the National Securities and Stock Market Commission. The report is based on a wide range of sources, including information collected from questionnaires and interviews during missions to Ukraine, previous OECD reviews, and publications by the international community.

The present report was discussed in Kyiv on October 8, 2019. It will serve as the basis for upcoming components of the project, including an in-depth review of Ukrenergo, the state-owned power company undergoing corporate governance reforms.

Acknowledgements

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The report was drafted by Nina Chitaia, Policy Analyst, under the supervision of Gabriela Miranda, Country Manager for Ukraine, and William Tompson, Head of OECD Eurasia Division under the Global Relations Secretariat. Valuable comments, inputs and support were received from Miguel Castro and Yuliya Gorelkina from the OECD Global Relations Secretariat, and Sara Sultan, Arijete Idrizi and Hans Christiansen from the OECD Corporate Governance Division under the Directorate for Financial and Enterprise Affairs. The report also benefitted from the comments and insights of Ksenia Lytvynenko, Illia Poluliakh and the DiXi Group. Additional inputs were provided by Anton Kravchenko and Yustyna Zanko from the OECD Global Relations Secretariat. In Ukraine, operational, logistical and administrative support was provided by Mykhailo Semchuk, and interpretation was provided by Liudmila Taranina and Alesco Ukraine.

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The report is based on a variety of sources, including questionnaires and interviews during missions to Ukraine, information and presentations shared by local stakeholders and experts, previous OECD reviews, and research on Ukraine's energy sector published by the international community.

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The draft report was circulated among Ukrainian stakeholders in July 2019 and its final version was discussed at an event in Kyiv, Ukraine, on October 8, 2019. The final report will serve as a baseline for implementing the upcoming project components throughout 2019-21.

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Acronyms and Abbreviations

AMCU	Antimonopoly Committee of Ukraine
APG	Austrian Power Grid
CHP	Combined Heat and Power
CHPP	Combined Heat and Power Plant
CMU	Cabinet of Ministers of Ukraine
CNBM	China National Building Material Company
CPP	Coal Processing Plant
CRE	Commission de régulation de l'énergie (Energy Regulatory Commission)
CSFSF	Central Spent Fuel Storage Facility
DSO	Distribution System Operator
EBITDA	Earnings before Interest, Taxes, Depreciation and Amortization
EBRD	European Bank for Reconstruction and Development
EC	European Commission
EEG	Erneuerbare Energien Gesetz (Renewable Energy Sources Act)
ENTSO-E	European Network of Transmission System Operators for Electricity
ESU	Energy Strategy of Ukraine until 2035
EU	European Union
FIT	Feed-in Tariff
GDP	Gross Domestic Product
IBRD	International Bank for Reconstruction and Development
IEA	International Energy Agency
IMF	International Monetary Fund
IPS	Integrated Power System
JSC	Joint-Stock Company
KPI	Key Performance Indicator
LLC	Limited Liability Company
MECI	Ministry of Energy and Coal Industry
MGU	Mahistralny Gazoprovody Ukrainy/Main Gas Pipelines of Ukraine
MoU	Memorandum of Understanding
NABU	National Anti-Corruption Bureau of Ukraine
NERC	National Electricity Regulatory Commission
NEURC	National Energy and Utilities Regulatory Commission
NJSC	National Joint-Stock Company

NPP	Nuclear Power Plant
NSSMC	National Securities and Stock Market Commission
OECD	Organisation for Economic Co-operation and Development
PJSC	Public Joint-Stock Company
PPP	Purchasing Power Parity
PSO	Public Service Obligation
PV	Photovoltaic
RAB	Regulatory Asset Base
RTE	Réseau de Transport d'Électricité
SAEE	State Agency on Energy Efficiency and Energy Saving of Ukraine
SOE	State-Owned Enterprise
SPFU	State Property Fund of Ukraine
TSO	Transmission System Operator
TPES	Total Primary Energy Supply
TPP	Thermal Power Plant
UAH	Ukrainian Hryvnia
UES	United Electricity System
USAID	United States Agency for International Development
USD	US Dollar
USSR	Union of Soviet Socialist Republics
VAT	Value Added Tax
WTO	World Trade Organization

Units of measurement

bcm	billion cubic metres
GWh	gigawatt hour
kWh	kilowatt hour
mtoe	million tonnes of oil equivalent
MW	Megawatt
MWh	Megawatt hour
toe	tonnes of oil equivalent

Executive Summary

Energy sector reform remains central to promoting Ukraine's sustainable growth. While remaining a strategic player in energy transit, the country is also one of the largest producers of hydrocarbons in the region. However, following the dissolution of the Soviet Union, political and economic turmoil reshaped the patterns of Ukraine's energy production, supply and consumption. While the decline in population and economic output cut overall demand, mismanagement of state-owned entities, heavy regulation of the sector and outdated technologies fuelled energy inefficiency. Despite some improvement, Ukraine remains one of the most energy-intensive economies in the world, consuming approximately three times the OECD average per unit of GDP.

Following the 2013-2014 Euromaidan protests, the Ukrainian government sought to press ahead with energy-sector reforms. Russia's seizure of Crimea and the conflict with Russian-supported separatists in the Donbass resulted in supply disruptions and energy shortages, particularly in the coal sector. While seeking to promote energy security and stability, commitments to the European Union and the IMF prompted the government to introduce changes across sub-sectors, including tariff deregulation, privatisation and the improvement of corporate governance. The government introduced laws on the natural gas and electricity markets to comply with the EU standards and promote market coupling, while beginning to decommission or privatise state-owned coal mines. In addition, Ukraine began working towards unbundling state-owned companies (notably the oil-and-gas company Naftogaz), while increasing the share of renewables in the energy mix.

Despite implementing reforms, Ukraine has continued to face challenges regarding the policy framework, and the stability and security of the energy sector. Heavy subsidies and market regulation remain present across sub-sectors, along with difficulties in promoting good corporate governance of state-owned entities. Additional aspects include limited transparency and the presence of anti-competitive practices within the sector, which may result in rollbacks on the reforms. Moreover, while Ukraine has remained a transit partner for natural gas between Russia and Europe, its position remains threatened considering the alternative gas transit routes. Notably, at the end of 2019, the country's transit contract with Russia expires, at which time Russia also plans to launch the Nord Stream 2, an undersea pipeline that would bypass Ukraine in delivering natural gas to Germany.

Efforts to advance energy sector reform require an understanding of the architecture of the sector and the reform process, and the identification of potential challenges ahead. This report provides an overall assessment of the country's energy mix and production processes, as well as the key players across sub-sectors, as further depicted under the *pre and post-reform maps* at the end of this report. Despite the introduction of private players on the market, state-owned enterprises (SOEs) remain dominant players in energy production. Naftogaz and its subsidiaries are central to supplying oil and gas in Ukraine, while electricity has primarily been generated through state-owned nuclear and hydro plants. However, private companies have also entered the market, mainly in thermal and coal-based generation, and in electricity and natural gas supply and distribution to end users. Moreover, in recent years, a large number of private players have emerged in the renewables sector, particularly following the introduction of feed-in ("green") tariffs.

While state-owned entities have remained central to energy production, the Ukrainian government has continued to heavily regulate and manage the sector. Notably, the Cabinet of Ministers and the Ministry of Energy and Coal Industry have been framing the policy, while the National Energy and Utilities Regulatory Commission has been regulating and setting tariffs across sub-sectors. At the same time, the governing bodies have been involved in managing or exercising ownership rights over SOEs. For example, the Ministry of Energy and Coal Industry has been responsible for overseeing entities, including the state-owned nuclear and hydro plants, while the Cabinet of Ministers has been responsible for Naftogaz.

However, government involvement through policy implementation and the management of SOEs has translated into heavy regulation and conflicts of interest, thus potentially undermining market efficiency.

The assessment of Ukraine's energy sector governance and regulatory framework is further elaborated in a case study focusing on the electricity market, which it has sought to reform. Since the 1990s, a wholesale market operator had been settling payments across market players, and heavy regulation and mismanagement of SOEs contributed to indebtedness and inefficiency of entities engaged in electricity production, transmission and distribution. In addressing these challenges, in 2017 Ukraine introduced a new law on the electricity market to eliminate the wholesale operator and introduce pro-market elements. These have included the establishment of day-ahead and intra-day trading, and balancing and ancillary service markets, along with bilateral contracts to liberalise tariff-setting. The reform has also entailed promoting competition in the retail market by unbundling oblenergos that previously combined electricity supply and distribution functions. Moreover, in order to integrate with the EU market, Ukraine has sought to ensure that Ukrenergo, its transmission system operator, met the requirements to join the European Network of Transmission System Operators for Electricity (ENTSO-E).

While the new electricity market began to function in July 2019, problems persist. First, Ukraine has faced problems regarding arrears among the market players in the electricity sector. While the wholesale market operator remains heavily indebted, the lack of a debt-settlement mechanism is interfering with market players' ability to adjust to the new system. Secondly, Ukraine has faced challenges in setting tariffs for the transmission system operator. With the launch of the new market, Ukrenergo's tariffs increased as it acquired new functions (for instance, serving as a commercial metering and settlements administrator, while compensating the guaranteed buyer for "green tariffs"). However, as on-going lawsuits regarding electricity price hikes have contributed to lowering Ukrenergo's transmission tariffs, the company risks potential challenges in covering its expenses and in meeting its financial obligations. Thirdly, despite introducing bilateral contracts, Ukraine has continued to control electricity costs by maintaining price caps, as well as public service obligations for nuclear and hydro producers to supply electricity at lower rates for residential consumers. However, price controls have contributed to market distortions within the electricity sector, which may hinder the prospects for market development. Finally, more needs to be done to combat corruption and anti-competitive practices within the sector. The launch of the new market provides potential to enforce transparency and competition across market segments.

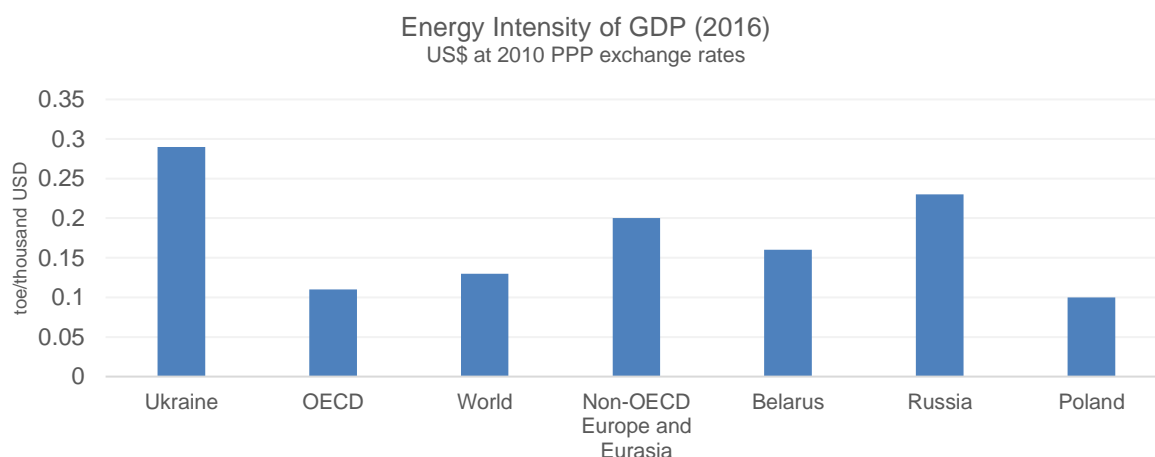
Ukraine's recent presidential and parliamentary elections, and the appointment of a new government provide an opportunity for the country to ensure sustainability of its energy sector reform. While continuing collaboration with international partners, the reform can help optimise energy balance through increased domestic production and reduced import dependence, and improve policy framework and governance across public bodies and state-owned entities. Moreover, *the Energy Strategy of Ukraine until 2035* may serve as a benchmark for measuring progress in promoting energy security and efficiency, while developing competitive market segments across energy sub-sectors.

Snapshot of Ukraine's energy sector: institutions, governance and policy framework

Energy Sector Overview

Energy sector reform remains one of the main priorities in promoting Ukraine's sustainable development. While acting as a key transit partner of primary energy sources, the country has also been one of the largest producers of hydrocarbons among its neighbours (OECD, 2019^[1]). However, the dissolution of the Soviet Union in 1991 contributed to severe political and economic turmoil that affected Ukraine's energy sector, with its total primary supply falling by more than 45% over the course of the decade (IEA, 2019^[2]). Moreover, heavy government regulation, as well as mismanagement of state-owned enterprises and the presence of vested interests, further undermined the stability and security of the energy sector, rendering it one of the least energy efficient countries among the members of the Energy Community (OECD, 2019^[1]). Despite increasing energy efficiency in recent years, Ukraine continues to consume nearly three times the OECD average per unit of GDP (Figure 1).

Figure 1. Energy Intensity of GDP



Source: IEA, 2019^[3]

Ukraine has demonstrated commitment to reforming its energy sector in order to put the country on a path of sustainable growth. Russia's occupation of Crimea in 2014 and the beginning of the conflict in the Donbass disrupted Ukraine's energy supply chain, as a significant portion of coal mines are located in Donetsk and Luhansk (OECD, 2018^[4]).¹ However, as Ukraine signed the Association Agreement with the European Union (EU) in 2014 and engaged in international commitments (including with the IMF), it began working on reforms to promote its energy efficiency. In 2015, the government partially deregulated pricing in wholesale and retail gas markets, while raising tariffs for regulated consumers (such as households and religious organisations). It also took steps towards reducing cross-subsidies within the electricity sector and began working towards the liberalisation of the market. Moreover, the state began phasing out coal subsidies and decommissioning unprofitable state-owned mines, while launching efforts to promote energy

¹ While thermal power plants had been constructed to burn anthracite coal to produce electricity, following the conflict with Russia Ukraine increased coal imports and introduced Rotterdam+ methodology (under which coal price was set according to an average market price for 12 months based on Amsterdam-Rotterdam-Antwerp index. This formed the basis of wholesale market price that helped forecast tariffs for industrial consumers). In addition, limited availability of resources contributed to modernising and re-equipping generation units to switch from anthracite to other types of coal.

efficiency measures. In 2017, the *Energy Strategy of Ukraine (ESU) until 2035* was adopted to work towards a reduction in the energy intensity of GDP, improved energy security and sustainability, and network integration with the EU.

Despite attempts to improve energy efficiency, Ukraine continues to face challenges in promoting the development of the sector. While there has been partial liberalisation of prices across energy sub-sectors, including natural gas and electricity, subsidies have held tariffs below market levels, contributing to inefficiencies in market operation and consumption. Moreover, as state-owned enterprises (SOEs) remain key players across energy sub-sectors, on-going challenges related to SOE efficiency and profitability have affected activities, including energy production, transmission, supply and distribution.² In 2014, the deficit of Naftogaz, the country's national oil and gas company, reached 6.2% of Ukraine's GDP – though it is worth noting that the company became profitable in 2016, thanks mainly to reforms implemented in the intervening period (Naftogaz Group, 2016^[5]). Moreover, Ukraine faces challenges in its role as a transit route. While the country has transmitted natural gas from Russia to Europe for decades, the transit contract expires at the end of 2019. At the same time, Russia is expected to launch Nord Stream 2, an undersea gas export pipeline that will bypass Ukraine through the Baltic Sea to Germany (Box 1). A further challenge is posed by TurkStream, a pipeline that will deliver natural gas from Russia to Turkish and southeast European markets (Gazprom, n.d.^[6]).

Box 1. Nord Stream 2 pipeline

The Nord Stream 2 gas pipeline is the second branch of Gazprom's Nord Stream project. Spanning 1,200 kilometres, the pipeline crosses the Baltic Sea to establish a direct link between Ust-Luga, Russia and Greifswald, Germany. With financing secured in April 2017 and pipe-laying initiated in September 2018, Nord Stream 2 is currently under construction and is expected to begin operating before late 2019. With an annual total capacity of 55 billion cubic metres of gas, Nord Stream 2 is intended to double the aggregate capacity of Nord Stream, thereby bringing the annual joint capacity of the two gas pipelines to 110 billion cubic metres of gas (Gazprom, n.d.^[7]). Upon completion, two-thirds of Russian gas deliveries to the EU could be concentrated in the Nord Stream pipelines, potentially increasing the latter's dependence on the former (OECD, 2019^[8]).

The construction of Nord Stream 2 has significant geopolitical and security implications for Ukraine, diminishing its role as the main gas transit route from Russia to Europe (The Economist, 2018^[9]). While transmitting natural gas to Europe provides a stable revenue stream for Ukraine (making up to 3% of its GDP), its future remains uncertain (Reuters, 2019^[10]). Moreover, the gas transit contract between Ukraine and Russia is set to expire on January 1, 2020. Despite agreeing to engage in talks with the European Commission regarding the future of the transit framework and the transit of Russian gas to the EU, Russia refused to hold trilateral talks in May 2019, while later meetings were postponed (Ukrinform, 2019^[11]). However, the trilateral talks held in Brussels in September 2019 paved the way towards further talks for the following month (Ukrinform, 2019^[12]). The completion of Nord Stream 2 has also remained a source of tension between Ukraine and its EU allies. In June 2019, Ukraine's newly elected President Volodymyr Zelenskyy acknowledged that Ukraine and Germany have diametrically opposing positions on Nord Stream 2, although Germany expressed willingness to negotiate (McLaughlin, 2018^[13]).

Corruption and the power of vested interests to block reform have also reduced Ukraine's energy security. According to the Energy Transparency Index, the country's level of transparency within the energy sector remains limited (particularly in corporate reporting) (DiXi Group, 2018^[14]). SOE mismanagement and

² Some of the main SOEs in Ukraine's energy sector include Naftogaz (hydrocarbons company involved in extracting, transporting and refining oil and natural gas) and its subsidiaries, Energoatom (operates nuclear power plants), Ukrhydroenergo (operates hydro power plants), and Ukrenergo (electricity transmission system operator). A more comprehensive outline of the market players in the sector may be found in the maps provided at the end of this report.

regulated pricing have enabled well-positioned actors across energy sub-sectors to extract rents, leading to UAH 11 billion in losses within the energy complex in 2017 (NABU, 2017^[15]). Their influence across SOE boards and management has helped to stall measures to improve corporate governance, transparency and efficiency across state-owned entities. Moreover, their ownership of stakes across supply chains in electricity, gas and coal markets has resulted in the formation of monopolies, particularly in supplying and distributing energy for end use. In combination with fuel inefficiency and limiting competition across sectors, the growing political influence of vested interests has helped delay reforms and raise the risk of policy reversals (OECD, 2018^[16]). Even if such reversals do not occur, the elevated *risk* of a retreat from reforms increases the cost of implementing them, as agents are less willing to invest in new arrangements and alter their behaviour if they are not confident that reforms will stick.

In addressing these issues, the government has continued introducing reforms within the country's energy sector to promote security and sustainability, while meeting international commitments. In October 2018, the government decided to raise natural gas tariffs for regulated markets by nearly 25% to meet IMF commitments and began working towards improving the management of state-owned enterprises. Notably, Naftogaz and Mahistralni Gazoprovody Ukrainy (Main Gas Pipelines of Ukraine, or MGU), the new operator of Ukraine's gas transmission system, agreed to unbundle the country's gas transmission function (Box 2). Similarly, in moving forward with the electricity sector reform, in July 2019 Ukraine launched a new electricity market, transitioning away from a single-buyer model. Moreover, in combatting corruption, the Ukrainian government has continued working towards promoting integrity, transparency and compliance by setting up bodies, including the National Anti-Corruption Bureau and the High Anti-Corruption Court of Ukraine.³

Box 2. Unbundling of Naftogaz

NJSC Naftogaz Ukrainy (Naftogaz) is a state-owned, vertically integrated oil and gas company managed by the Cabinet of Ministers of Ukraine (CMU). The company consists of multiple subsidiaries and maintains full or partial ownership of entities involved in the hydrocarbons industry. Naftogaz and its affiliated companies produce approximately 75% of Ukraine's natural gas, and engage in activities including exploration, production, drilling, processing, transmission and storage, and supply of natural and liquefied gas for energy transformation and end use. However, as Naftogaz has faced issues regarding its management and asset ownership, it began working on improving its corporate governance, supported and monitored by the OECD based on the Guidelines on Corporate Governance of State-Owned Enterprises (OECD, 2019^[8]).

As part of improving its corporate governance, in 2016 Naftogaz adopted a new model to unbundle its ownership of the natural gas transmission network. While Naftogaz's subsidiary Ukrtransgaz had operated as the transmission system operator in the past, the model is expected to be unbundled by January 1, 2020. In completing the unbundling process, Mahistralni Gazoprovody Ukrainy (Main Gas Pipelines of Ukraine, or MGU) was created to become the new transmission system operator, which has been transferred under the management of the Ministry of Finance. In the meantime, Naftogaz has established the Gas Transmission System Operator of Ukraine LLC (GTSO LLC) to manage the gas pipelines, and its ownership is expected to be transferred under MGU (Naftogaz Group, 2019^[17]).

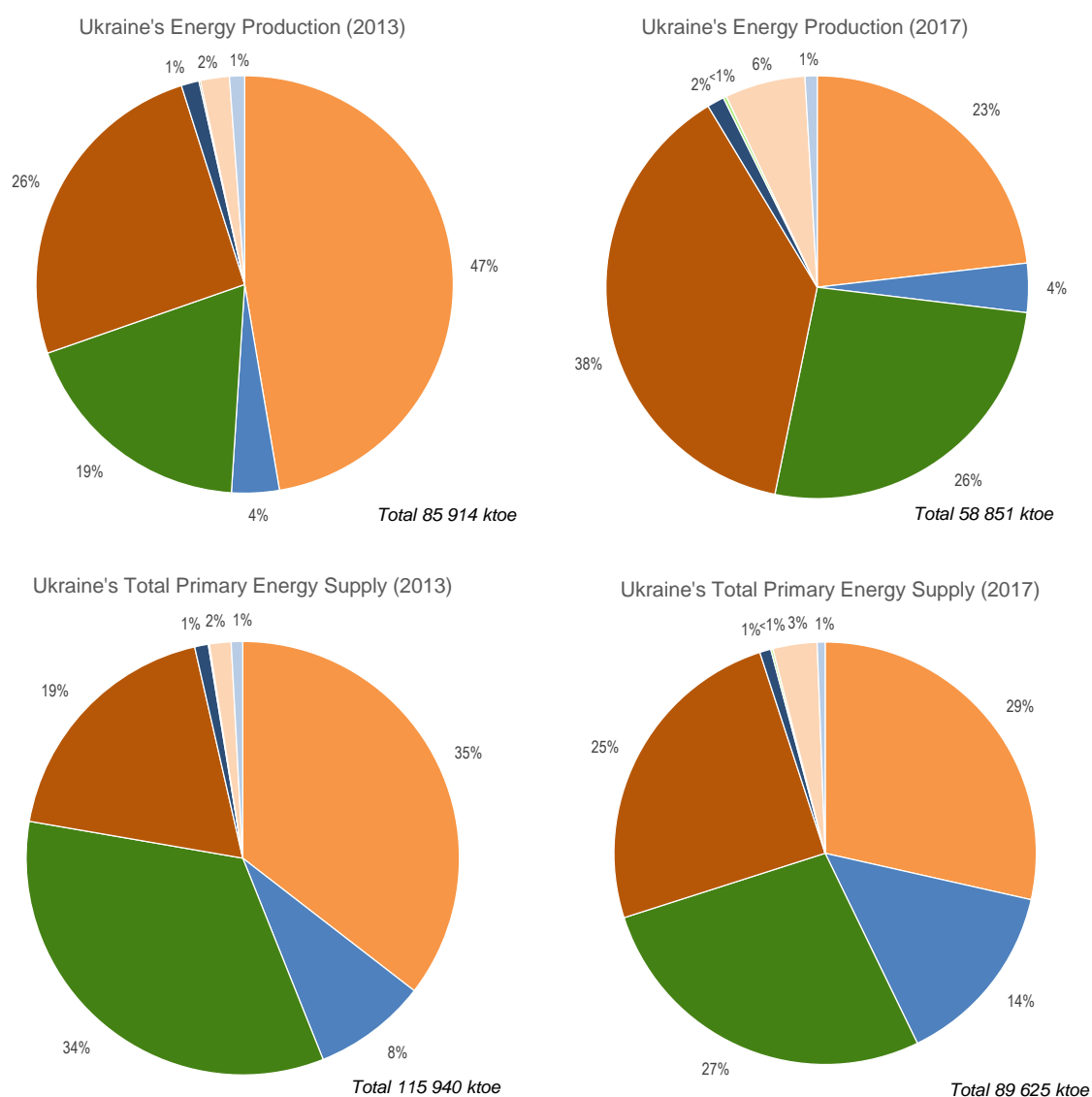
Energy Mix

Energy production, consumption and supply levels contracted in Ukraine during the transition recession of the 1990s. As GDP fell by more than half in constant dollar terms, and both population and industrial output declined, total primary energy supply (TPES) fell from 252.3 to 135.1 million tonnes of oil equivalent (mtoe) (Annex 1). However, as its economy began to recover, energy supply stabilised, though the global financial

³ In January 2018 alone, NABU uncovered a UAH 1.4 billion embezzlement scheme involving stakeholders across both gas and electricity sectors (NABU, 2018^[16]).

crisis during 2007-2008 and subsequent challenges, including Russia's occupation of Crimea and the conflict in the Donbass, constituted further shocks. As a significant number of coal mines are located in the Donbass, the share of coal production halved (Figure 2) between 2013 and 2017. In 2017, Ukraine's total primary energy supply was just 89.6 mtoe, with the largest shares consisting of coal (29%), natural gas (27%) and nuclear (25%). While producing about two-thirds of energy supply domestically, Ukraine continues to import coal, natural gas and crude oil and oil products to meet domestic demand. In recent years, the country has also witnessed growth in its share of renewables in total energy production. While biofuels and waste have been used predominantly for energy production, Ukraine has continued installing solar and wind capacities, with the former growing from 948.2 to 2640.4 megawatts and the latter from 515.4 to 776.4 megawatts between 2018-2019 (NEURC, 2019_[18]).

Figure 2. Ukraine's Total Production and Total Primary Energy Supply (TPES)*



Legend

■ Coal & Peat ■ Crude Oil & Oil Products ■ Natural Gas ■ Nuclear ■ Hydro ■ Geothermal, solar, etc.** ■ Biofuels & Waste ■ Heat

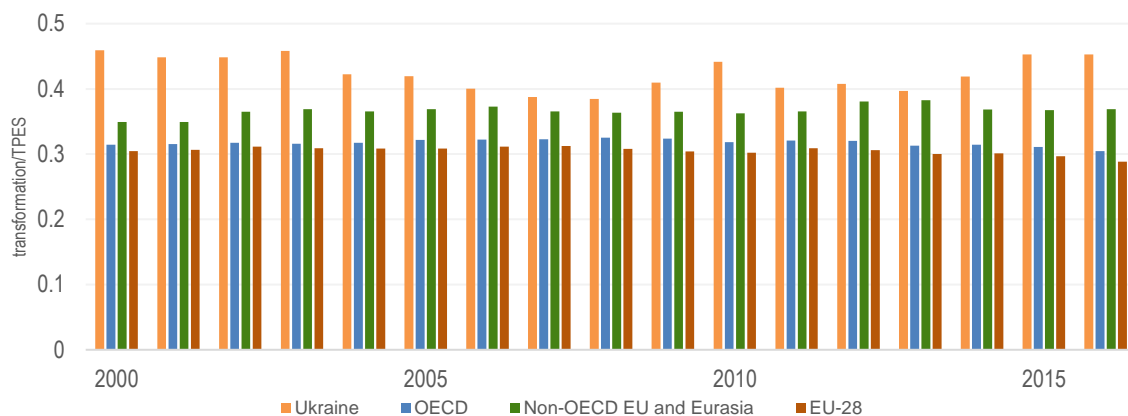
* Percentages may not add up to 100%, as they are rounded to the nearest value

** Geothermal, solar and wind made up less than 1% of production and total primary supply, though their share increased over the course of 2018-2019.

Source: Author's compilation is based on SSSU (2019) data

Ukraine continues to face challenges in achieving efficiency in energy transformation from primary to secondary sources. During the early 2000s, the energy intensity of final consumption fell far faster than that of its primary energy supply, suggesting that the efficiency of the energy transformation sector was improving little, if at all (IEA, 2006^[19]) (OECD, 2007^[20]). Despite slight improvements, Ukraine has continued to use a significant share of its primary energy supply in energy transformation (about 45% in 2016), which is higher than would be found across OECD and EU (28) countries, as well as non-OECD members in Europe and Eurasia (Figure 3).

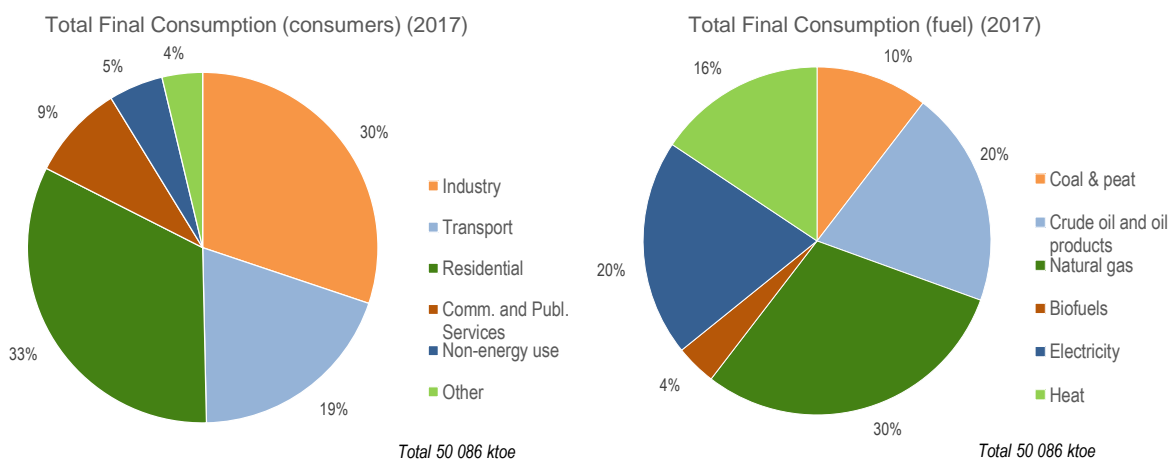
Figure 3. Share of Energy Transformation in Total Primary Energy Supply (TPES)



Source: Author's compilation is based on IEA (2019) data

Ukraine's residential consumers are the main end users in total final consumption, with industrial and transport sectors, among others (including public services, agriculture and non-energy use) following suit. Natural gas remains the primary end use fuel, with the residential sector consuming approximately 59%. Electricity and heat are consumed by residential and industrial sectors, while crude oil and oil products are used primarily in transport. Though a significant portion of coal is used in producing heat and electricity during transformation processes, industrial consumers are its primary end users. In renewables, solar and wind are used to generate electricity, while biofuels and waste are available for end use (mostly for residential consumers) (Figure 4) (Annex 2).

Figure 4. Total Final Consumption



Source: Author's compilation is based on SSSU (2019) data

Key Players and Production Processes⁴

Fossil Fuels

Natural gas and oil

Fossil fuels make up a significant share of TPES, with natural gas and oil remaining central to energy transformation and end use. However, demand for natural gas has fallen, as the total supply has been reduced by two-thirds since 1990 (IEA, 2019^[21]). In 2018, the country's total supply of natural gas amounted to 32.3 billion cubic metres (bcm), as it produced 20.9 bcm and imported 10.6 bcm (Naftogaz Group, 2019^[17]). Prior to the occupation of Crimea and the conflict in the Donbass, Ukraine imported gas primarily from Russia. However, starting in 2015 Ukraine stopped importing gas directly from Russia, while it began "reverse flow" delivery from European countries (IEA, 2018^[21]) (Pirani, 2018^[22]). Crude oil and oil products have likewise occupied a declining place in domestic production. Between 2013-2018, oil production fell from 2.7 million tonnes to 2.1 million tonnes, while over 80% of the crude oil and oil products in Ukraine are imported primarily from Russia, Belarus and Lithuania (SSSU, 2019^[23]) (Naftogaz Group, 2019^[17]) (Unian, 2019^[24]).

Naftogaz and its subsidiaries operate in various stages of the hydrocarbon supply chain, accounting for over three-fourths of natural gas production in Ukraine. Its subsidiaries include Ukrgasvydobuvannya, Ukranaftoburinnya, Chornomornaftogaz and Ukrnafta (OECD, 2019^[8]). In 2018, Ukrgasvydobuvannya produced 15.5 bcm of natural gas, while playing a central role in gas processing (Ukrgasvydobuvannya, 2019^[25]) (Naftogaz Group, 2019^[17]). Prior to starting its unbundling process, Ukrtransgaz, a Naftogaz subsidiary, functioned as the transmission system operator (TSO) (USAID/DiXi Group, n.d.^[26]). Along with domestic production, Naftogaz imported approximately 7.0 bcm of natural gas in 2018 (Naftogaz Group, 2019^[17]).

In addition to state-owned entities, private companies play a prominent role in the hydrocarbons sector. In 2018, private players produced approximately 4.4 bcm of natural gas in Ukraine, while importing 3.6 bcm. Subsidiaries and companies belonging to the Burisma Group, DTEK Oil & Gas (part of the DTEK Energy Group), and the Geo Alliance Group are extensively involved in natural gas and oil extraction (Burisma Group, n.d.^[27]) (DTEK, 2018^[28]) (Geo Alliance, n.d.^[29]). Moreover, privately-owned Oblgaz Distribution System Operators (DSOs) distribute natural gas, while Oblgaz Suppliers operate the natural gas retail market (USAID/DiXi Group, n.d.^[26]). According to the NEURC's estimates, in 2016 gas sellers owned by the operators under the Regional Gas Company brand, which is associated with Group DF Limited, controlled approximately 70% of the distribution networks and supplied nearly 76% of the natural gas volume to the Ukrainian population (USAID/DiXi Group, n.d.^[26]).

Nearly one-third of natural gas supply is used in heat production, with a smaller amount used up in electricity generation. In 2017, households consumed 59% of the available supply, with the remainder consumed primarily by industrial (including chemical and petrochemical companies) and transport sectors. Crude oil is mostly used in energy transformation and refineries in Ukraine, including the production of gas and diesel, motor gasoline, and liquefied petroleum gasses for consumption. Nearly four-fifths of oil products are used in transport and industry, with smaller amounts used by agricultural and residential sectors.

Coal

Coal production and consumption in Ukraine have fallen over time. In 1990, coal represented 63.9% of Ukraine's total production and one-third of the country's TPES. However, along with the overall decline in total energy demand, Russia's occupation of Crimea and the conflict in the Donbass destabilised domestic coal production. According to the Ministry of Energy and Coal Industry, while Ukraine produced 65 million

⁴ An outline of the key players in the energy sector may be found in the maps provided at the end of this report.

tonnes of coal in 2014, its output amounted to 33.3 million tonnes by 2018 (MECI, 2019^[30]).⁵ In meeting its domestic demand, Ukraine continued obtaining coal from non-government controlled areas. However, in 2017, the country halted cargo traffic with the east following a rail blockade, which raised concerns regarding potential energy shortage (Polityuk and Kalmykov, 2017^[31]). As such, the government sought to diversify coal imports and rebuild generation units to increase the consumption of coal types other than anthracite.⁶ While Russia accounted for most of the coal imports to Ukraine, smaller volumes came from the United States, Canada, Australia, South Africa and Poland (IEA, 2019^[32]). In addition, the government adopted the Rotterdam+ methodology in setting the wholesale price of coal as part of securing imports. The formula was based on an average market price of coal in the ports of Amsterdam-Rotterdam-Antwerp for 12 months, plus the cost of delivery to Ukraine (NEURC, 2016^[33]) (Kossov, 2019^[34]).

In terms of the coal market, both state-owned and private companies play an important role. The National Coal Company, a state-owned enterprise controlled by the Ministry of Energy and Coal Industry, was created in 2017 to reform Ukraine's coal industry until 2020 (Cabinet of Ministers, 2017^[35]). The enterprise was established as a holding company to encompass state-owned mines, though it has yet to become operational (USAID/DiXi Group, n.d.^[26]). Moreover, private coal producers include companies belonging to the DTEK Energy Group and Metinvest Group (though the latter's investments in the coal sector are mostly abroad) (DTEK, 2017^[36]) (Metinvest, 2006^[37]). In addition to their role as coal producers, companies belonging to the DTEK Energy Group also operate numerous Coal Processing Plants (CPPs), which reduce the mineral impurity content and remove barren rocks from coal extracted throughout Ukraine (DTEK, 2017^[36]).

Low-carbon sources

Nuclear

Over the years, Ukraine has witnessed increased demand for nuclear energy, which accounted for 38% of total domestic energy production and 25% of TPES in 2017. Nuclear plants generate over half of the country's electricity (MECI, 2019^[30]). Given the security and strategic considerations, state-owned enterprises play a dominant role in nuclear production. The Eastern Mining and Processing Plant, a state-owned enterprise, is the main producer of uranium ore, while other companies, such as Nuclear Energy Systems of Ukraine LLC, are minor producers. Following the extraction of uranium ore, the Eastern Mining and Processing Plant conducts the initial stage of processing, which results in the production of uranium ore concentrate (USAID/DiXi Group, n.d.^[26]). However, under international agreements, Ukraine does not carry out the entire nuclear production cycle. Specifically, it does not conduct uranium enrichment, the second stage of uranium ore processing, to produce nuclear fuel. Instead, Ukraine relies on foreign nuclear fuel imports (NTI, 2014^[38]). Although JSC TVEL Russia, a subdivision of Rosatom, had long been a key supplier of Ukraine's fuel, the occupation of Crimea and the conflict in the Donbass have motivated Ukraine to reduce its dependence on the company and seek alternative partners, such as Westinghouse Electric, an American-Swedish firm owned by Brookfield Business Partners LP (USAID/DiXi Group, n.d.^[26]).

The treatment of the radioactive chemical by-product (spent fuel) formed during the decomposition of nuclear fuel is also conducted by foreign players. Due to capacity and infrastructural limitations, Ukraine is currently unable to process all of its own nuclear waste. In the past, Ukraine relied heavily on Russian firms for nuclear waste processing and storage. However, it has recently explored the possibility of collaborating with firms such as Orano, which is 45.2% owned by the French government, to complete its nuclear transformation process (USAID/DiXi Group, n.d.^[26]) (Orano, 2018^[39]). Moreover, in 2005, Energoatom, which operates Ukraine's nuclear power plants, conceived the construction of the Central Spent Fuel

⁵ Figures provided in million tonnes of oil equivalent and million tonnes of coal may vary based on statistical differences and conversion methodology.

⁶ Ukraine continued to depend heavily on using anthracite coal for electricity production.

Storage Facility (CSFSF) in the Chernobyl Exclusion Zone to gain the capacity for long-term and safe storage of spent fuel in Ukraine (Energoatom, 2017^[40]).

Hydro

Hydropower makes up a smaller portion of Ukraine's total energy production. However, its use in electricity generation has increased over the years, and the government continues to invest in hydropower plant construction and renovation as part of its energy strategy. In 2018, hydropower plants generated 12,008.4 gigawatt hours of energy, which increased from 9,092.6 gigawatt hours in 2014. Ukrhydroenergo, a state-owned company, is Ukraine's main producer of hydroelectric energy (Ukrhydroenergo, 2018^[41]). Nevertheless, this segment of Ukraine's energy sector is also populated by numerous foreign private players, including Norway's AICE Hydro A/S and Austria's ANDRITZ Hydro, a subsidiary of ANDRITZ Technology Group (AICE Hydro, 2017^[42]) (Andritz, 2019^[43]). The eligibility of hydroelectric energy for Ukraine's green feed-in tariff programme may serve as an incentive for foreign players to enter this segment of Ukraine's energy sector. However, according to Ukraine's Law on Alternative Energy Sources, only "micro," "mini," and "small" hydropower plants with generating capacity of less than 10 megawatts are eligible to benefit from the tariff (Verkhovna Rada, 2018^[44]).

Renewables

Over the years, the share of renewables has increased, though it remains low. Excluding hydro, renewables have in recent years constituted 3-4% of Ukraine's energy mix, with a growing use of biofuels, wind and solar. As part of promoting energy security and efficiency, Ukraine has sought to increase its share of renewables by adopting policies, including green feed-in tariffs, and by introducing targets within its energy strategy (according to which it seeks to achieve a 25% renewables share in total supply by 2035). While in 2014 Ukraine's renewable energy generation amounted to 1,771.9 gigawatt hours, in 2018 it reached 2,632.4 gigawatt hours (MECI, 2019^[30]).

Wind and Solar

One of the major players in Ukraine's wind energy segments is DTEK Renewables, the operating company that manages the DTEK Energy Group's assets in the renewable energy sector. DTEK Renewables owns and operates the Botievska and Prymorskaya Wind Farms, each with an installed capacity of 200 MW, and is currently constructing the Orlyvska Wind Farm, which has a planned capacity of 100 MW (DTEK, 2018^[45]). However, the wind energy segment has also attracted a strong foreign presence, which includes Ukraine Power Resources LLC, an affiliate of the Netherlands' First Summit Energy, and SyvashEnergoProm LLC, a project of Norway's NBT AS and France's Total Eren (Ukraine Power Resources, 2018^[46]) (FMO, n.d.^[47]).

As in the wind segment, DTEK Renewables remains a key solar energy producer. It currently operates the Trifanivska Solar Power Plant, its pilot solar energy project, which is equipped with 37,000 solar panels (DTEK, 2018^[45]). Furthermore, in March 2019, DTEK Renewables initiated the operation of the Nikopol Solar Power Plant. Consisting of 750,000 PV panels with an aggregate generating capacity of 200 MW, it is the largest solar power plant in Ukraine (DTEK, 2019^[48]). Attracted by the green feed-in tariff programme, foreign players, such as China National Building Material Company (CNBM), TIU Canada Ltd., RECOM Solar, and Scatec Solar, have also entered Ukraine's solar energy segment (CNBM, n.d.^[49]) (TIU Canada, 2019^[50]) (RECOM, 2019^[51]) (Scatec Solar, n.d.^[52]).

Biofuels and Waste

Biofuels and waste have been used primarily in heat production, with over 80% of the output consumed by the residential sector (IEA, 2019^[2]). Among biomass energy producers, SEC Biomass Ltd. and SALIX Energy, both privately owned, represent key domestic players in Ukraine. Meanwhile, Siemens Ukraine, a subsidiary of Siemens AG, is an important foreign player in this energy segment (Siemens Ukraine, n.d.^[53]). Following production, biomass materials are transformed into solid, liquid or gas biofuels, a process that

is conducted by numerous Ukrainian firms, including Almaz-M, ECO PRIME Co. Ltd., and SALIX Energy (ALMAZ-M, n.d.^[54]) (ECO Prime, n.d.^[55]) (SALIX energy, 2016^[56]). Subsequently, biofuels are converted into heat in more than 30,000 boilers and boiler houses throughout Ukraine (USAID/DiXi Group, n.d.^[26]). Boilers and boiler houses are constructed by companies such as Kriger Energy Holding LLC, Volyn-Kalvis LLC, Lika-Svit LLC, and KB Energomashproekt (Kriger, 2019^[57]) (Volyn Klavis, n.d.^[58]) (Lika Svit, n.d.^[59]) (KB Energo, 2017^[60]).

Secondary Outputs (Electricity and Heat)

The transformation process yields two secondary outputs, namely electricity and heat, and this occurs in three types of power plants: Nuclear Power Plants (NPPs), Thermal Power Plants (TPPs), and Combined Heat and Power Plants (CHPPs). NPPs convert chemical energy from uranium into electricity (USAID/DiXi Group, n.d.^[26]). Energoatom, a state-owned enterprise, is the sole operator of Ukraine's NPPs. It operates the Zaporizhzhya, Rivne, Yuzhno-Ukrainska and Khmelnytska NPPs, which collectively consist of 15 nuclear power units (Energoatom, 2017^[40]). Once generated, electricity is delivered to end users through a process involving transmission, distribution, and supply (the architecture and functioning of the electricity market are discussed in greater depth in the case study of this report).

Along with electricity, primary energy inputs are also used in heat production. Since the 1990s, both heat generation and consumption have more than halved, partly due to falling demand and fuel shortages. For their part, thermal plants, including Centrenergo and Donbasenergo, and Combined Heat and Power Plants (CHPPs) convert fossil fuels into secondary sources (Centrenergo, 2012^[61]) (Donbasenergo, 2019^[62]). Companies belonging to the DTEK Energy Group also control numerous TPPs throughout the country, including the Skhidenergo, Dniproenergo, Zakhidenergo, Kyivenergo, Burshtyn and Mironovskaya TPPs (DTEK, 2017^[63]). Heat produced by the TPPs and CHPPs are distributed through the centrally managed municipal heating plants that supply consumers with heat and hot water, known as the district heating distribution system operators (USAID/DiXi Group, n.d.^[26]). As heat production and distribution continue to play a central role in Ukraine's energy sector, the country has sought to modernise the district heating system and launch programmes to promote their efficiency, notably with organisations including the World Bank and USAID.

Energy Sector Regulatory Framework

Governance and Policy Framework

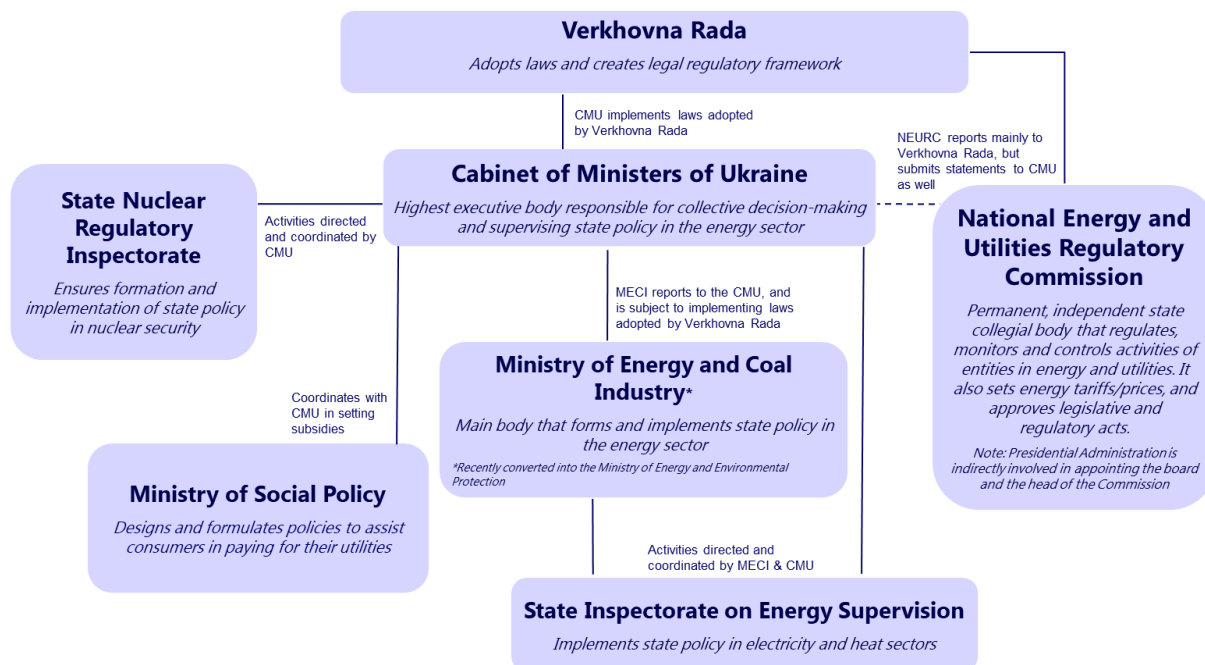
The key players in Ukraine's energy sector governance and regulatory framework include the Cabinet of Ministers of Ukraine (CMU), the Ministry of Energy and Coal Industry (MECI) and the National Energy and Utilities Regulatory Commission (NEURC).⁷ The CMU is the highest executive body responsible for collective decision-making, including the supervision of state policy in the energy sector and power industry.

The MECI forms and implements state policy within the energy sector. It reports to the CMU, as well as the Verkhovna Rada (parliament) and the Presidential Administration (MECI, 2019^[30]). The MECI is also responsible for developing the *Energy Strategy of Ukraine until 2035*, tracking and monitoring results, and submitting annual progress reports to the CMU and the National Security and Defence Council. Along with energy policy implementation, the MECI measures economic incentives, monitors and reports on energy demand and forecasts, and defines strategy and methodology for constructing facilities for energy generation. It also works closely with the State Inspectorate on Energy Supervision and the CMU in implementing state policy in electricity and heat supply, and in monitoring the security of electricity supply,

⁷ Changes in the government structure in August 2019 may impact the energy sector governance and policy framework. Notably, the Ministry of Energy and Coal Industry and the Ministry of Ecology and Natural Resources have been converted into the Ministry of Energy and Environmental Protection. However, for the purpose of understanding the framework and governance of the energy sector in recent years, this study will refer to the former structure.

including technical aspects of the activities of oblenergos (which have recently become distribution system operators (DSOs) and suppliers) in the electricity sector. The State Nuclear Regulatory Inspectorate, by contrast, co-ordinates directly with the CMU in ensuring the formation and the implementation of state policy in nuclear security (Figure 5) (Ukrenergo/Ministry of Finance, 2019^[64]) (MECI, 2019^[30]).

Figure 5. Architecture of Energy Sector Regulatory Framework in Ukraine



Sources: Ukrenergo/Ministry of Finance, 2019^[64]; MECI, 2019^[30], and Ministry of Social Policy, 2019^[65]

Along with the CMU and the MECI, the NEURC remains central to regulating the country's energy sector, particularly in setting tariff policies and in implementing relevant pricing formulation (Ukrenergo/Ministry of Finance, 2019^[64]) (MECI, 2019^[30]). Founded in 1994 as the National Electricity Regulatory Commission (NERC), its regulatory powers soon extended from electricity into the oil and gas sectors. Over the years, its status continued to evolve. In 2014, the NEURC was formed by combining the functions of the National Commission for State Regulation of Energy and the National Commission for State Regulation of Public Utilities, accountable to both the President and the Verkhovna Rada. However, in 2016, a new regulation was adopted to ensure the NEURC's independence. Currently, it reports to the Verkhovna Rada and cooperates with the CMU, though the President maintains an indirect role in appointing Commissioners (Energy Community, 2018^[66]) (Verkhovna Rada, 2016^[67]).

SOE management

Along with shaping the regulatory framework in the energy sector, Ukraine's public bodies are responsible for exercising ownership functions over state-owned enterprises (SOEs). Currently, there are about 85 different state actors and bodies involved in managing over 3,200 SOEs in the country.⁸ The 2006 Law on Management of State Assets offers an overall framework for SOE governance and the exercise of ownership functions, such as reviewing financial plans, approving strategic decisions and appointing managers. Since they are also charged with setting state policies, strategies and regulatory framework, the involvement of ministries and other executive bodies in SOE ownership functions often results in

⁸ Earlier figures referenced 3789 SOEs (3554 majority-owned) owned by the state at both national and regional levels (OECD, 2019^[8]). However, an MEDT source referenced 3244 SOEs and Prozvit e-platform (<https://prozvit.com.ua/#/>) referenced 3640 SOEs total, of which 2276 are operational. With respect to the supply of electricity, gas, steam and air conditioning, Prozvit platform listed 48 SOEs of which 31 remain operational (Prozvit, 2019^[197]).

unclear separation of powers and conflict of interest, contributing to inefficient corporate governance of state-owned entities (Figure 6) (OECD, 2019^[8]).

Figure 6. Architecture of State Owned Enterprise (SOE) Management Framework in Ukraine's Energy Sector



Sources: Ukrenergo/Ministry of Finance, 2019^[64]; MECI, 2019^[30]; SPFU, 2019^[68]; and OECD, 2019^[8]

Within the energy sector, the MECI has been one of the main bodies responsible for the management and oversight of SOEs. In March 2019, over 300 entities (including state enterprises, institutions, organisations and associations) were listed under the MECI's management. In addition, the MECI has been responsible for approximately 130 companies over which it can exercise the power to manage the corporate rights of the state, including Ukrhydroenergo (Ukraine's hydro power plant operator). The ministry has also been responsible for overseeing entities that are being liquidated or reorganised, or are facing bankruptcy (MECI, 2019^[69]).

Other state bodies, such as the CMU, have also been responsible for SOE governance in the sector. Naftogaz, which is arguably the country's most important state company, falls under CMU's oversight, as do the electricity sector's Market Operator and Guaranteed Buyer. Other players include the Ministry of Finance, which became the managing body of Ukrenergo (the electricity transmission system operator) and the Main Gas Pipelines of Ukraine (MGU), the future gas transmission system operator, and the Ministry of Ecology and Natural Resources, which was responsible for entities involved in hydrocarbons exploration. However, the reorganisation of ministries in August 2019 may in due course lead to changes in the structure of SOE oversight.

In addition, the State Property Fund of Ukraine (SPFU) oversees and manages state assets earmarked for privatisation. It is a central body with a special status that implements policy in the sphere of privatisation, lease, use and management of state-owned objects (including corporate rights of state-owned objects that belong to its sphere of management). It has also been involved in the state regulation of property valuation and property rights. The SPFU is responsible to the President, and its activities are directed and co-ordinated by the CMU. The SPFU is also responsible for creating and maintaining a register of corporate rights of the state, which is part of the Unified Register of State Property Objects

(OECD, 2019^[8]) (Ukrenergo/Ministry of Finance, 2019^[64]) (MECI, 2019^[30]) (SPFU, 2019^[68]) (Verkhovna Rada, 2006^[70]) (Verkhovna Rada, 2011^[71]). Currently, it holds shares of electricity producers, including Centrenergo and Kherson Thermal Power Plant, and shares of electricity suppliers and distribution system operators (former oblenergos).⁹ It also holds shares of other companies, including Turboatom, a turbine manufacturing company for plants, including nuclear, thermal and hydro.

Energy Sector Financial Support Schemes

As part of the energy sector regulation and governance, the Government of Ukraine has continued to provide state support for market players and consumers. In maintaining low energy tariffs for end users, Ukraine has imposed price controls and adopted generous subsidy schemes, with the latter amounting to 7.5% of the country's GDP (OECD, 2019^[8]).¹⁰ The government has also continued to impose public service obligations (PSOs) on entities to ensure lower overall costs of utilities for certain segments of the population (particularly households). The CMU makes decisions on imposing special duties on market participants, including the scope and conditions of the PSO. Notably, following the partial liberalisation of natural gas market price in 2015, the CMU imposed PSO on Naftogaz to ensure that households pay lower tariffs (OECD, 2019^[8]). Similarly, with the launch of the electricity market, nuclear and hydro producers of electricity sell a portion of their output at lower rates for residential consumers. Along with PSOs, Ukraine provides an additional layer of support for vulnerable consumers through housing subsidies based on household income and the number of individuals per household (Teplo, n.d.^[72]). While the CMU is responsible for setting the subsidy, the Ministry of Social Policy designs and formulates policies to assist household consumers to pay for their utilities, including natural gas, heat, electricity and hot water. Housing subsidies may be provided either directly to consumers or to local budgets, so that payments among associations, contractors, and service providers can be settled (Box 3 discusses broader policy implications regarding fossil fuel subsidies on the global market) (Ministry of Social Policy, 2019^[65]).

Since government policies have resulted in supplying energy at below cost-recovery levels, the government has also developed schemes to compensate energy producers, distributors and suppliers for their losses:

- As Naftogaz accumulated deficit from selling gas at regulated prices, the government compensated the company through budget transfers and by issuing special state bonds for recapitalisation.
- In the electricity sector, industrial consumers paid significantly higher tariffs compared to residential consumers to compensate for losses, resulting in cross-subsidisation.
- The state has continued to support coal companies by covering the costs of production, refurbishment, reconstruction and upgrades, as well as offering compensation for phase out and decommissioning (OECD, 2018^[73]).

Despite these support schemes, companies in the energy sector have continued to lose money due to mismanagement, which has contributed to draining the state budget.

⁹ SPFU currently owns shares of DSOs, including Zaporizhiaoblenergo (60.25%), Kharkivoblenergo (65%), Odesaoblenergo (25%), Cherkasyoblenergo (46%), Mykolayivoblenergo (70%), Khmelnytskoblenergo (70%), Sumyoblenergo (25%), and Ternopiloblenergo (50.99%). In addition, the SPFU is involved in supervising the supply of electricity for entities linked with the aforementioned DSOs, except for Odesaoblenergo and Sumyoblenergo, while it owns 65% shares of Kharkivenergozbut. Additional companies under SPFU ownership involved in electricity generation include Centrenergo (78.29%), Donbasenergo (25%), Severodonetsk thermal power plant (100%), Kherson Thermal Power Plant (99.83%), Dneprovskaya teploelektrotsentral (99.93%), Odessa TPP (99.99%), and Mykolayiv Thermal Power Plant (99.91%) (SPFU, 2019^[68]).

¹⁰ Ukrainian budget codes refer to grants, transfers and tax breaks that may not be regarded as subsidies in the country. However, according to the WTO, a subsidy constitutes financial contribution (including grants, loans, or fiscal incentives) by a government or a public body within the territory of a member state which confers a benefit. Subsidies can be applied to enterprises or industries, targeted to specific sectors or territories, or be applicable for the purchase of specific goods or services (WTO, n.d.^[162]).

Along with state aid and subsidy schemes, tax exemptions have been applied within the energy sector. In 2015, Ukraine introduced taxes at national level (including corporate profit tax, VAT and excise tax, as well as resource rents and customs duties) that are applicable for players across energy sub-sectors. For example, companies involved in hydrocarbons extraction and refining must provide baseline contributions (such as corporate tax). While excise duties and resource rents have been reserved mostly for companies involved in extracting (and refining) natural gas, oil and coal, rates have differed based on products (OECD, 2018^[73]). In addition, in July 2019 excise duties were introduced in the electricity market (State Fiscal Service, 2019^[74]). However, Ukraine has provided tax breaks and exemptions for companies involved in gas and electricity networks, as well as thermal plants for engaging in investment programmes (OECD, 2018^[73]). In addition, in an effort to promote green growth, Ukraine has exempted cogeneration units and entities engaged in renewable production from taxes (State Fiscal Service, 2019^[75]).

Box 3. Fossil fuel subsidies in the global market

Fossil fuel subsidies have been used by governments to decrease the cost of energy for vulnerable groups or to redistribute natural resource wealth. While amounting to over USD 400 billion globally in 2018, only 8% of the money spent on fossil-fuel subsidies reached the poorest 20% of the population. This is partly because fossil fuel subsidies are poorly targeted, and instead encourage wasteful consumption, strain government budgets and increase emissions. They also hinder investments in low-carbon technologies and energy-efficient equipment, and decrease responsiveness of demand to price changes. Moreover, energy producers often incur financial losses due to under-pricing of energy commodities, which can lead to overall underinvestment in the sector (IEA, 2019^[76]).

As part of addressing these challenges, in 2009 the G20 leaders pledged to phase out inefficient fossil fuel subsidies. While boosting investments in energy infrastructure and promoting the use of renewable and clean technologies, reducing subsidies would incentivise consumers to work towards energy savings. Moreover, phasing out all fossil fuel subsidies by 2030 would help reduce global carbon emissions by about 10%. The plunge in oil prices since mid-2014 has added a further momentum to the phase-out, as reducing the gap between market and subsidised prices has contributed to rendering the process less politically controversial. In fact, several countries, including India, Indonesia and Malaysia have already seized this opportunity (Matsumara and Adam, 2019^[77]) (UN Environment, 2018^[78]).

Energy Strategy of Ukraine (ESU) until 2035

Ukraine has outlined its energy reform targets and objectives in the *Energy Strategy of Ukraine (ESU) until 2035*. Approved on August 18, 2017, the ESU aims to address the needs of the society and the economy, and to promote energy security and efficiency, market development and independence, investment attractiveness, and environmental friendliness. It also seeks to promote network integration with the EU for its electric power and gas complexes. The strategy is divided into three phases: (i) seeking to achieve energy sector reform (by 2020); (ii) infrastructural development and optimisation (by 2025), and (iii) long-run sustainable development. Within each phase, the ESU lists key targets and objectives based on energy sub-sectors. For example, upgrading the electricity sector has been one of the key aspects of this strategy. In complying with the EU's Third Energy Package and adopting necessary measures to integrate into the European Network of Transmission System Operators for Electricity (ENTSO-E), the strategy lists the implementation of regulations set out by the new electricity market law (adopted in April 2017).¹¹ It also

¹¹ The EU's Third Energy Package is a legislative package aimed at promoting and improving energy market functioning, primarily in electricity and natural gas markets. Adopted in 2009, some of the main elements include unbundling energy suppliers and transmission operators, and ensuring the independence of transmission system operators and regulators. Additional elements cover promoting cross-border cooperation and developing retail markets (European Commission, 2019^[190]).

seeks to ensure efficiency across transmission and distribution systems, to integrate SMART grids and automated metering systems, and to increase the share of renewables in Ukraine's overall energy mix, particularly in electricity production (for comparison, Box 4 discusses Germany's Energiewende that was launched to help the country's transition into a low-carbon, nuclear free economy) (Cabinet of Ministers, 2017^[79]).

Box 4. Germany's Energiewende

Energiewende (meaning "energy turnaround" or "energy revolution"), is Germany's plan for transitioning into a low-carbon, nuclear free economy. It is based on the Energy Concept (Energiekonzept) policy published in 2010 and the Renewable Energy Sources Act (Erneuerbare Energien Gesetz, EEG) passed in 2000. Having received support from a large number of stakeholders in the government, industry and society, Energiewende policy includes the following aspects:

- Reduce greenhouse gas emissions and primary energy consumption
- Meet targets for generating energy through renewables (in particular, 40-45% of electricity is planned to be generated through renewable sources by 2025)
- Phase out coal-fired power generation by 2038 and nuclear power by 2022
- Promote energy efficiency measures (compared with 2008, electricity consumption is intended to be 10% lower by 2020 and 25% lower by 2050)

In ensuring the country's energy transition, a monitoring process called "Energy of the Future" was set up under the Ministry for Economic Affairs and Energy. Each year, a monitoring report is drafted and approved by the Federal Cabinet, and transmitted to the Bundestag and the Bundesrat. In addition, an independent commission of four energy experts is involved in providing policy advice and scientific input. Every three years, the Government compiles a progress report regarding energy transition for a more thorough analysis.

Electricity has been one of the main sectors in which Energiewende has been applied. During the first half of 2018, renewables overtook coal as Germany's key power source, as the share of renewables in the country's gross power consumption reached 38.2%. Moreover, Germany remains on track to give up nuclear power by 2022, as major nuclear reactors have already been shut down without harming the security of power supply. German policymakers have also identified challenges related to grid imbalances and phasing out coal use, while seeking to design policies to address them.

Sources: Energiewende, n.d.^[80], Clean Energy Wire, 2018^[81], BMWI, 2019^[82], and Hargreaves, 2019^[83].

The CMU and the National Security and Defence Council of Ukraine exercise co-ordination and control over the ESU implementation. Ukraine's Ministry of Energy and Coal Industry (MECI) has been responsible for monitoring the results of the ESU, elaborating the Action Plan for the ESU Implementation (subject to the Cabinet of Ministers' approval), and co-ordinating and clarifying measures for its implementation. The MECI should also carry out annual monitoring of the ESU provisions in energy sector activities, and submit annual implementation progress reports to the Cabinet of Ministers and the National Security and Defence Council of Ukraine. The results are to be monitored based on the ESU key performance indicators (KPIs) listed in Annex 1 of the strategy. While the indicators are mostly quantitative, it also tracks qualitative objectives, such as Ukraine's integration into the European network. In implementing the strategy, the MECI has developed an Action Plan and has begun tracking the steps that have been taken across public bodies. While it has yet to create an internal working group dedicated to discussing the strategy and its progress, the Directorate for Strategic Planning and European Integration has been responsible for monitoring its implementation (Cabinet of Ministers, 2017^[79]) (MECI, 2019^[30]).

Case Study: Ukraine's Electricity Market

Since the 1990s, Ukraine has sought to reform its electricity sector, becoming one of the first countries in the region to begin working towards liberalising the market. However, progress has been slow, not least because electricity-sector restructuring is one of the most far-reaching and technically complex reforms undertaken since independence in 1991. Not surprisingly, the power sector was profoundly affected by the severe recession of the 1990s, which followed the dissolution of the USSR. Electricity generation fell by 38% between 1991 and 1999 as the economy contracted (IEA, 2019^[2]).

As early as 1996, the government began working towards the creation of a wholesale electricity market, which would involve the unbundling of electricity generation, transmission and distribution activities. However, it retained state-owned enterprises (SOEs) in the sector, set up a single-buyer model, and regulated tariffs within the industry. The SOEs in the sector were not subject to hard budget constraints, and competition was weak. In combination with fossil-fuel subsidies for electricity generation, cross-subsidies in the electricity market and weak payment discipline, this resulted in limited incentives for energy efficiency or new investment, as well as a significant burden on public finances, particularly for local budgets, entailing either public subsidies or forgone revenues from dividends. Below-cost pricing, weak payment discipline on the part of consumers and other inefficiencies led to quasi-fiscal deficits that peaked at more than 3% of GDP (OECD, 2007^[20]). Thus, Ukraine has continued to experience inefficiency in electricity production and distribution, with annual losses surpassing 10% (IEA, 2019^[2]).

The situation was complicated by the partial privatisation of regional power companies – the *oblenergos* – before the restructuring of the sector was complete. While probably desirable in the long run, privatisation proved highly problematic in the absence of any clear plans for further restructuring the power sector, for several reasons. First, any further restructuring was complicated by the need to respect the new owners' property rights. Secondly, the partial privatisation in some segments of the industry created both opportunities to exploit market imperfections and other opportunities arising from the partially reformed nature of the sector. Thirdly, the new owners had a strong interest in shaping further reform of the sector. Moreover, some of the unbundled assets were subsequently “re-bundled” into a large state-owned holding company, and the wholesale power market by the mid-2000s was so heavily regulated and so distorted by cross-subsidy mechanisms that it was probably best understood as a quasi-market (IEA, 2006^[19]).

Despite these challenges and barriers, reform has continued, albeit at an uneven pace. Along with launching initiatives to privatise distribution companies, Ukraine introduced market players within the industry alongside state-owned entities, and, in February 2011, it acceded to the European Energy Community, while seeking to work towards implementing changes to improve competition and transparency within its electricity market. In 2013, the parliament adopted a law to liberalise its wholesale electricity market and to promote competition within the sector in compliance with EU regulations. As part of integrating within the European network, the country sought to meet the requirements of the EU's Third Energy Package, including the establishment of bilateral, retail, and ancillary services markets, along with day-ahead trading (Verkhovna Rada, 2013^[84]).

While the reforms were scheduled for launch in mid-2017, political and economic turmoil in 2014 led to delays, not least because a large share of coal production was concentrated in eastern regions under the control of Russian-backed separatists (OECD, 2018^[4]). With an economic and energy blockade imposed on the regions outside government control, the Ukrainian electricity market operated in a state of emergency (Interfax-Ukraine, 2017^[85]) (Cabinet of Ministers, 2017^[86]).

In seeking to achieve energy efficiency and security, Ukraine has sought to continue to restructure the electricity market. In 2014, the country signed an Association Agreement with the EU (effective September 2017), which requires increased energy efficiency and the promotion of market-oriented reforms. In meeting these requirements, Ukraine has sought to pursue its efforts to comply with the EU's Third Energy Package and to integrate into the European Network of Transmission System Operators for Electricity

(ENTSO-E). In promoting competition within the sector, it introduced the Law on the Electricity Market in 2017 (Verkhovna Rada, 2017^[87]). The law seeks to replace the single-buyer model with more competitive elements, including the establishment of bilateral contracts and creating an ancillary services market, while adopting market-based pricing. Additional aspects include the adoption of common rules for domestic electricity market, cross-border flows, and measures on security of electricity supply and investment in infrastructure. Moreover, the ESU sets goals to promote efficiency within the energy sector, including the electricity market. However, to ensure that the electricity sector reform is implemented and remains sustainable while meeting international commitments, it is necessary to understand its current state and structure, along with foreseeable changes. The sections that follow examine these reform processes in greater detail, segment by segment. When assessing reforms to date, it is critical to bear in mind the peculiar properties of electricity as a commodity (Box 5), which create highly specific challenges and ensure that market design and operation in electricity represent far more complex challenges than do markets for most other goods and services.

Box 5. Economic implications of the physical properties of electricity

Many of the technical challenges for policymakers trying to create electricity markets derive from three peculiar physical properties of electricity: (i) it cannot be stored on a large scale economically, apart from water stored in reservoirs available to hydroelectric generators; (ii) demand tends to be inelastic in the very short term, as most consumers lack the information or the means to react rapidly to changes in price; and (iii) supply and demand must balance at all times at all points in the system, because electrical imbalances at any point within an interconnected transmission network can have immediate and severe repercussions throughout the entire network. In addition, policy makers must consider the binding nature of generator and network capacity constraints when they emerge. The challenge of balancing supply and demand in real time across the whole network is magnified by the dynamic nature of flows on interconnected transmission systems, which follow the path of least resistance determined by the constantly changing interaction between generation and load, rather than contract paths.

This means that even a well-functioning electricity market is likely to be much more volatile than most commodity markets. While market failures and situations involving market power can occur, price volatility per se is not a problem. Indeed, it can be a crucial source of information about where constraints are emerging in the system and what new investment may be required. However, these factors can also make electricity markets particularly susceptible to the exercise of market power (Hunt, 2002^[88]) (IEA, 2001^[89]). For example, a generator who knows he must be dispatched to keep the system in balance is well placed to abuse his position. Electricity's attributes also give rise to the need for centralised or co-ordinated system operation and dispatch to manage reliability. It is these considerations that underlie the need to create a number of special institutions to regulate and operate electricity markets, as well as to prepare fairly complex rules governing electricity trading.

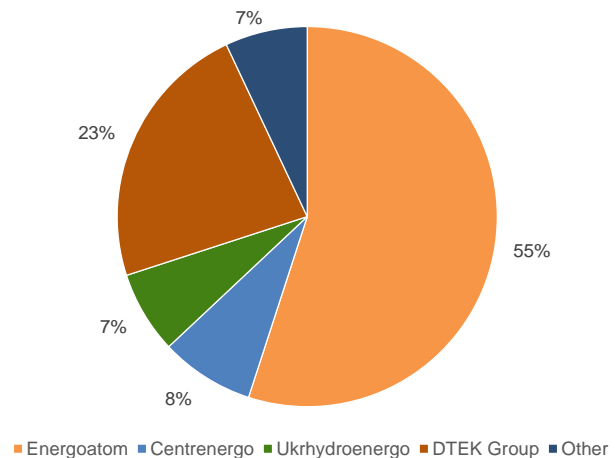
If a liberalised sector is to function efficiently, the authorities must be prepared to tolerate volatility, even if this means accepting sometimes sharp price hikes. This means that the state will need to refrain from using the assets it owns or such tools as price caps (as part of public service obligation) to counter unduly the signals the market is sending. One way to avoid this, while still preventing the abuse of market power, would be greater reliance on competition law. While public intervention can be necessary to prevent disruptions or to counter possible opportunistic behaviour by market actors, the need for such intervention will be much reduced if the broader framework of competition law is comprehensive, well drafted and effectively enforced.

For further discussion on the unique characteristics of electricity and their implications for market performance, see Kellow, 2009^[90], OECD, 2003^[91], and Joskow, 2003^[92].

Electricity Production

In 2018, Ukraine generated 159,351 gigawatt hours (GWh) of electricity, with state-owned enterprises accounting for most of that production (MECI, 2018^[93]). Energoatom, an SOE under the management of the MECI, operates four nuclear plants that collectively consist of fifteen units, generating approximately half of the country's electricity. Ukraine generates a further 7-10% of its electricity through hydro plants owned by Ukrhydroenergo, and roughly 8% through coal and thermal plants owned by Centrenergo. The privately-owned DTEK Group produces 23% of electricity through its coal and thermal units (Figure 7) (MECI, 2019^[30]) (Ukrenergo/Ministry of Finance, 2019^[64]) (NEURC, 2019^[94]). DTEK is Ukraine's largest vertically integrated holding company, involved across industries and stages of production and distribution in the energy sector. Moreover, the company is involved in supply and distribution of heat and electricity to consumers through oblenergors under its ownership (Annex 3 provides a summary of electricity production, transmission and distribution processes and the players involved).¹²

Figure 7. Producers' Share in Electricity Generation



**This figure displays a rough estimate of producers' share in electricity generation, though figures may vary.*

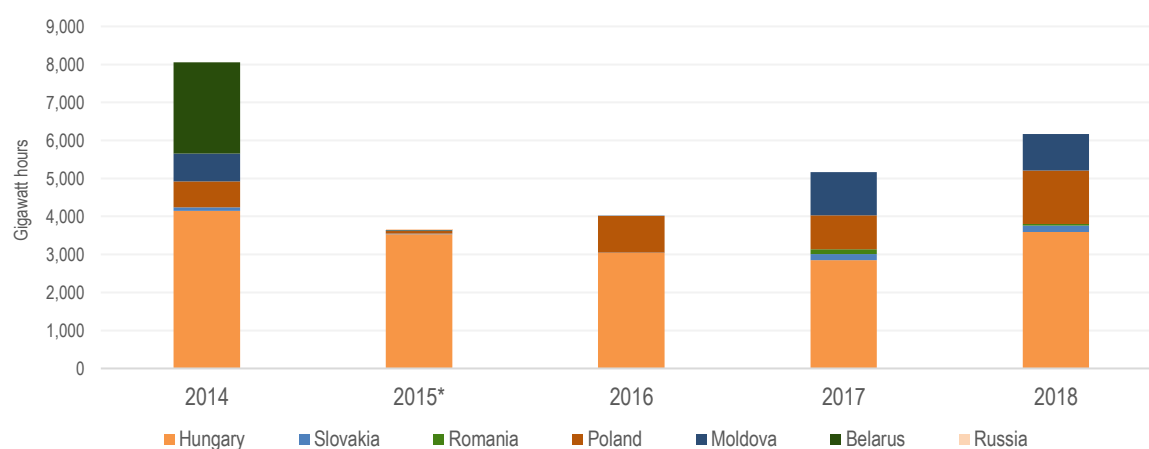
Transmission

Ukrenergo, a state-owned company, has been responsible for operating Ukraine's integrated power system and transmitting electricity through trunk grids from generating plants towards distributors. It currently has eight regional power systems covering Ukraine, operates equipment at high voltage and manages more than 21,300 kilometres of trunk and cross-border high voltage transmission lines.¹³ Each year, Ukrenergo transmits over 110,000 GWh of electricity. Along with domestic operation, it co-ordinates transmission system operation with neighbouring countries (as Ukraine has been exporting electricity to four EU countries), and manages cross-border electricity flows with neighbouring states (Figure 8).¹⁴ It is also responsible for the Ten-Year Transmission System Development Plan and a Generation Adequacy Report, approved by the national regulator (NEURC) (Ukrenergo/Ministry of Finance, 2019^[64]). Ukrenergo has also maintained and invested in new infrastructural capacity, while providing technical and informational support to Energorynok (former wholesale electricity market operator) (Ukrenergo/Ministry of Finance, 2019^[64]) (IEA, 2012^[95]).

¹² As of 2018, DTEK owns 100% shares of twelve coal mining and power generation plants, while holding a majority share in eleven more. Over the years, it has bought up shares of oblenergors, including Kyivenergo, Dniprooblenergo and Donetskoblenergo, which have been unbundled into electricity suppliers and distributors (DTEK, 2019^[194]) (PWC, 2018^[163]).

¹³ In the strategic planning of power grids, Ukrenergo works on a Ten-Year Transmission System Development Plan and a Generation Adequacy Report, which the NEURC approves. The Ministry of Energy and Coal Industry is involved in the overall strategic planning of the electricity sector, while the State Inspectorate on Energy Supervision under MECI and CMU helps monitor the security of electricity supply (Ukrenergo/Ministry of Finance, 2019^[64]) (MECI, 2019^[30]). Moreover, the distribution system operators need to submit plans to develop their local distribution grids and investment programmes to the NEURC for approval (NEURC, 2019^[94]).

¹⁴ Ukraine has been a net electricity exporter to neighbouring countries. Ukraine's power system has been connected with the European Union member states (including Hungary, Slovakia, Poland and Romania) through the Burshtyn Island, and the power systems of CIS countries (including Moldova, Belarus, and Russia). The Burshtyn Island is synchronised with the Central European grids (through the ENTSO-E), and its plants (Dobrotvorskaya TPP and Burshtynskaya TPP) that are involved in exporting electricity to the EU countries are operated by the DTEK Group (Ukrenergo/Ministry of Finance, 2019^[64]) (IEA, 2012^[95]) (DTEK, 2017^[63]) (Ukrenergo, 2019^[96]).

Figure 8. Electricity Exports

*Ukraine has remained a net exporter of electricity, with a small fraction imported from Moldova, Belarus and Russia.

Source: Ukrenergo, 2019^[96]

In implementing the Law on the Electricity Market, the Cabinet of Ministers sought to reorganise Ukrenergo so that it met the requirements of a transmission system operator (TSO) outlined under the EU's Third Energy Package. As part of achieving this goal, in July 2019, Ukrenergo was corporatised, i.e., transformed from a state-owned unitary enterprise into a joint-stock company with 100% state ownership (Ukrenergo, 2019^[97]). Ukrenergo's corporatisation is intended to help ensure its independence and transparency, as well as its certification and compliance with the EU standards so that it can integrate into the European Network of Transmission System Operators for Electricity (ENTSO-E) (Ukrenergo, 2017^[98]). As part of the process, Ukrenergo's management functions were transferred in February 2019 from the MECI to the Ministry of Finance. Once Ukrenergo's assets were valued, it was corporatised and registered on the Unified State Register as a joint-stock company. Along with electricity transmission and dispatching, Ukrenergo's new roles include operating balancing and ancillary service markets, registering bilateral agreements, and serving as a settlements and commercial metering administrator. At the time of writing this report, Ukrenergo has not been certified as an independent transmission system operator (Table 1 describes the relationship between Ukrenergo and governing entities in Ukraine) (Ukrenergo/Ministry of Finance, 2019^[64]).

Table 1. Relationships between Ukrenergo and government entities

Government Entity	Relationship with Ukrenergo
Ministry of Finance	<ul style="list-style-type: none"> • Managing entity of Ukrenergo since February 2019. • Approves Ukrenergo's financial and investment plans, and strategic development plans which the company's Supervisory Board drafts and co-ordinates. • Ukrenergo submits information on financial plans and statements on a quarterly basis, along with explanatory notes on performance results. At the end of the year, an annual report is compiled.
Cabinet of Ministers (CMU)	<ul style="list-style-type: none"> • Ukrenergo submits information regarding the implementation of the company's financial plans.

Ministry of Energy and Coal Industry (MECI)	<ul style="list-style-type: none"> • Ukrenergo provides information on the state of implementation of measures listed in the Action Plan for implementing Energy Strategy of Ukraine until 2035, along with proposals for their revision, indicators and deadlines. • Ukrenergo reports on key figures regarding Ukraine's united electricity system (UES). • Ukrenergo provides information regarding its investment programme.
National Energy and Utilities Regulatory Commission (NEURC)	<ul style="list-style-type: none"> • Ukrenergo provides information necessary for setting tariffs and engaging in investment programmes, as well as for licensing. Ukrenergo also submits reports regarding regime restrictions and network availability. • NEURC approves Ukrenergo's Ten-Year Transmission System Development Plan and Generation Adequacy Report, as well as the company's investment plan. • Under the Law on the Electricity Market, Ukrenergo will need to provide information necessary for developing market rules and transmission system code, as well as for commercial accounting. Moreover, NEURC is involved in approving contracts for transmission and dispatch (operational) control services, as well as in setting tariffs for Ukrenergo's services. Additional elements include monitoring Ukrenergo's independence and ensuring regulatory compliance.
State Property Fund of Ukraine (SPFU)	<ul style="list-style-type: none"> • Ukrenergo provides information and statements as necessary (particularly regarding asset valuation).
National Securities and Stock Market Commission (NSSMC)	<ul style="list-style-type: none"> • Following its corporatisation, Ukrenergo has fallen under the oversight of NSSMC, which will be responsible for setting requirements for issuing and circulating shares, their registration and cancellation, and developing prospectus and collecting relevant information.

Sources: Ukrenergo/Ministry of Finance, 2019^[64]; MECI, 2019^[30], and Ministry of Social Policy, 2019^[65]

Supply and Distribution

Regional electricity supply and distribution companies, known as oblenergos, were established in the mid-1990s to supply and distribute electricity to consumers in Ukraine. Initially, there were 27 oblenergos, of which 24 were allocated to serve each Ukrainian oblast, with separate ones for Kyiv, Sevastopol and Crimea (following the occupation of Crimea, Ukraine lost the Sevastopol and Crimea oblenergos, while additional suppliers and distributors were introduced). Oblenergos were responsible for both supplying and distributing electricity at regulated tariffs only within the territory of their licensed activity (that is, they did not engage in activities across oblasts).¹⁵ However, as tariffs were fixed for consumers (as households

¹⁵ The majority of the distribution systems are privately owned. While there has not been a single body responsible for strategic planning of distribution power grids (making up about 1.2 million kilometres), the NEURC remains responsible for approving the distribution system development plan and investment programmes (NEURC, 2019^[94]). However, distribution system operators under state ownership are subject to the Ministry of Energy and Coal Industry, which is involved in determining technical policy for servicing these networks. The NEURC is also responsible for licensing conditions for business activities to prevent violations (MECI, 2019^[30]).

bought electricity at below cost-recovery levels), oblenergos began incurring losses, which were partially compensated through a system of subsidy certificates (Box 6) (NEURC, 2018^[99]) (OECD, 2018^[73]).

In an effort to promote efficiency within the retail market, the privatisation of the oblenergos began in the late 1990s. Most of the oblenergos have already been privatised either fully or partially, though the state continues to hold shares in eight oblenergos through the SPFU (IEA, 2012^[95]) (MECI, 2019^[30]) (NEURC, 2019^[94]). Along with oblenergos, private suppliers emerged on the market that began selling electricity to consumers at non-regulated tariffs. However, the privatised oblenergos and suppliers are controlled by a handful of individuals, including foreign entities (Unian, 2019^[100]). In order to promote competition in the retail market, Ukraine sought to unbundle the oblenergos by separating potentially contestable activities (electricity supply) from activities with natural monopoly characteristics (electricity transmission and distribution), and creating electricity suppliers and distribution system operators (DSOs) through the electricity market reform.

Box 6. Subsidy certificates

Subsidy certificates have been used to cross-subsidise electricity prices from non-residential to residential consumers. To compensate for losses in supplying electricity at tariffs below cost-recovery levels, electricity supply companies applied for subsidy certificates through the NEURC, the value of which was incorporated into the wholesale electricity market price. In 2018, their share was about 21.9% of the wholesale electricity market price, which has been decreased since 2014 (at 31.18%). The value of subsidy certificates issued amounted to UAH 45.3 billion in 2018. According to the new law on the electricity market and resolution No. 894, the NEURC is responsible for eliminating cross-subsidisation.

Sources: NEURC, 2019^[101] and NEURC, 2018^[102]

Wholesale Electricity Market Operation

Ukraine's wholesale electricity market was launched in the 1990s. While the activities of generators, the transmission system operator, suppliers and distributors did not overlap (except for oblenergos that bundled supply and distribution functions), the government continued regulating the market. Based on the English and Welsh power pool models, Energorynok ("power market") was set up in 2000 as a single buyer to settle payments among market players within the industry based on tariffs set by the National Electricity Regulatory Commission, which later became the National Energy and Utilities Regulatory Commission (NEURC). Energorynok would buy electricity at regulated prices from producers, such as Energoatom and Ukrhydroenergo, which would be transmitted through Ukrenergo towards oblenergos for distribution. Oblenergos would also be responsible for buying electricity from Energorynok and selling it to consumers, who would pay retail prices based on tariffs set according to generation, transmission and distribution costs. However, electricity tariffs varied for residential and non-residential (industrial) consumers, as the former's tariffs were significantly lower compared to those of the latter (Figure 9) (IEA, 2006^[19]).

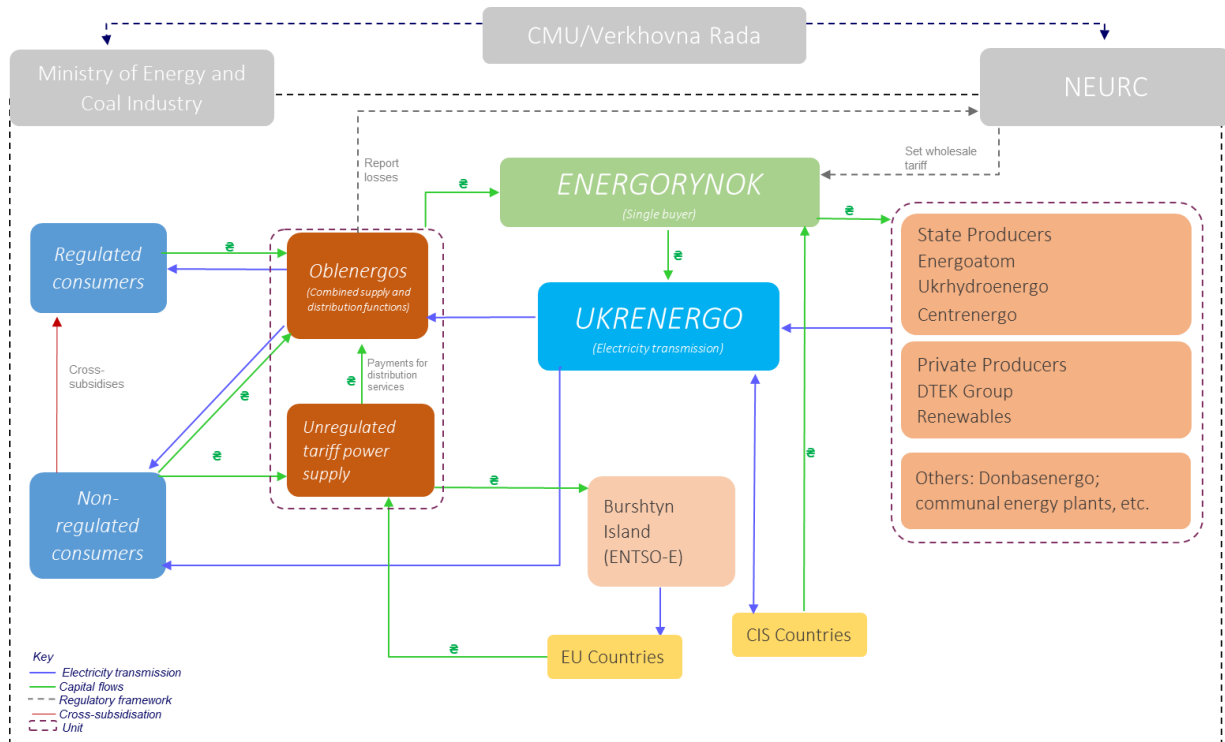
However, there were exceptions to the overall framework. For example, while oblenergos were responsible for buying and distributing electricity, large industrial consumers could purchase electricity from either unregulated electricity suppliers or directly from Energorynok (as long as they were involved in supply activities).¹⁶ For another, consumers were (and are) eligible to receive electricity directly from Ukrenergo, bypassing electricity distribution through oblenergos (or DSOs).¹⁷ Moreover, in certain cases, small

¹⁶ As of 2018, 204 electricity suppliers (33 regulated and 171 non-regulated suppliers) operated in the retail electricity market. Suppliers also bought electricity either on the wholesale market or from small producers with no obligation to sell electricity to Energorynok. Electricity suppliers sold electricity to non-residential consumers on a competitive basis at contractual prices throughout Ukraine (unlike regulated tariff suppliers that carried out their activities within the territory where they were granted license to operate) (NEURC, 2019^[94]).

¹⁷ The list of consumers eligible to obtain electricity directly from Ukrenergo includes large industrial firms, plants and corporations, which can be found on Ukrenergo's website (Ukrenergo, 2019^[195]).

electricity producers that were connected to the distribution grids could sell electricity directly to oblenergos without going through Energorynok (NEURC, 2019^[94]).

Figure 9. Structure of Ukraine's Electricity Market (pre-reform)



Sources: Author's compilation is based on information received through questionnaires, as well as on NEURC, 2019^[101], OECD, 2018^[73], IEA, 2006^[19], and IEA, 2012^[95]

Electricity Sector Management and Regulatory Framework

The MECI has remained one of the primary bodies involved in implementing state policy in Ukraine's electricity sector, while managing entities involved in electricity supply and production. It has also been involved in overseeing entities in the process of completing their liquidation and bankruptcy, such as the state-owned Lisichanskaya Heating Power Plant and the Zuyevka Experimental Thermal Power Plant.¹⁸ Some of the electricity producers under the Ministry's management include Energoatom, Ukrhydroenergo and Nizhnirodnistrovskaya (with 11.48% owned by Ukrhydroenergo), as well as the Kaluska CHP (Ukrhydroenergo, 2018^[41]) (MECI, 2019^[30]). Furthermore, the MECI has been responsible for managing Ukrinterenergo, a state-owned company that had been responsible for promoting Ukraine's electricity export potential. Since its establishment in the early 1990s, the company has sought to promote electricity trade and transit through Ukraine's power grid. Its role has continued to evolve over the years, and, with the launch of the new electricity market, it became the supplier of last resort (Ukrinterenergo, 2018^[103]). Other government bodies involved in implementing state policy in the electricity sector include the CMU and the State Inspectorate on Energy Supervision (MECI, 2019^[30]).

¹⁸ Additional entities listed by the MECI include state-owned Crimean Generation Systems, state scientific and production enterprise Vitroenergosservice and the state-owned Donuzlav Wind Power Plant, which is being terminated due to reorganisation; Luhanskoblenergo, which is in the process of bankruptcy and liquidation, and was owned partly (60.06%) by the Energy Company of Ukraine (which the Ukrainian Government decided to liquidate in 2014); and the Eshar Thermal Power Plant that is being liquidated due to transfer of ownership (MECI, 2019^[30]).

While government bodies have been responsible for managing entities within the electricity sector, the NEURC has been responsible for aspects, including licensing and setting and approving tariffs across the wholesale and retail markets based on a cost-plus methodology prior to reform. For producers, the NEURC introduced price ceilings on components, including fuel costs. In calculating wholesale electricity price, the NEURC would approve Energorynok's estimate based on a weighted average of the cost of electricity bought from all producers, while factoring in costs for dispatching and maintaining the interstate electricity network, the operational expenditures of the wholesale energy market, and additional charges. Prior to the launch of the liberalised electricity market, the wholesale electricity tariff made up about 80% of the retail tariff, which also incorporated transmission and supply tariffs, as well as losses. However, tariffs significantly varied for residential and non-residential consumers, with the latter paying double (or sometimes triple) the price of the former. Residential consumers maintained fixed and preferential tariffs that were below cost-recovery levels. For non-residential consumers, electricity tariffs varied based on voltage class and the cost of distribution by region. Moreover, as industries faced higher electricity tariffs than households, they compensated for lower prices through cross-subsidisation.¹⁹ That is, oblenergos applied for subsidy certificates through the NEURC to report their losses, and the value of the certificates was incorporated into the wholesale electricity price for compensation (IEA, 2012^[95]) (OECD, 2018^[73]).

Electricity Market Reform

Despite attempts to implement reforms, the overall wholesale market structure has changed little over the years. Heavy government involvement in production, transmission and distribution, along with price regulation have tended to limit competition within the sector. Since the late 1990s, the electricity market has been experiencing difficulties due to non-payments. Considering the high level of subsidies and financial mismanagement, Energorynok accumulated approximately UAH 17 billion (USD 3 billion) in debt by the early 2000s, making it difficult to repay electricity producers. As the producers were unable to pay for fuel to generate electricity, the MECI began allocating fuel to the electricity market. The electricity sector continued experiencing price distortions, shut-downs and interruptions, and operation of the system at low frequency levels, while the state continued incurring losses (IEA, 2006^[19]).

In order to overcome these challenges, the wholesale market participants decided to transition gradually from a single-buyer to a competitive model. New initiatives were launched to limit government intervention and to clarify investment decisions. For instance, the government began requiring payments among market players through special bank accounts, and began privatising supply and distribution companies, while electricity suppliers and private players were introduced within the market (notably the DTEK Group) (IEA, 2006^[19]). In 2011, Ukraine acceded to the European Energy Community and began working towards implementing changes within its electricity market. In 2013, the Verkhovna Rada adopted a law to liberalise its wholesale electricity market and to meet the requirements under the EU's Third Energy Package (Verkhovna Rada, 2013^[84]). While the reforms were scheduled for launch in 2017, political and economic challenges in 2014 contributed to its postponement. In 2014, the Cabinet of Ministers also issued a decree to dismantle the Energy Company of Ukraine, a holding company of enterprises including Centrenergo and Luhanskenergo.²⁰

¹⁹ For example, between September 2016 and February 2017, households consuming less than 100 kWh of electricity per month paid 59.5 kopeks per kWh (excluding VAT). Those consuming between 100 kWh to 600 kWh per month paid 107.5 kopeks/kWh, while those consuming over 600 kWh per month paid 136.5 kopeks/kWh. However, in February 2017, the average price for non-residential consumers was 152.01 kopeks/kWh or 191.3 kopeks/kWh depending on the voltage class (excluding VAT) (NEURC, 2016^[164]) (NEURC, 2017^[165]).

²⁰ On June 22, 2004, the Cabinet of Ministers of Ukraine issued decree No. 794 to form the Energy Company of Ukraine, which would become a holding company of enterprises, including Centrenergo, Dnistrovskaya and Luhanskenergo. However, on September 3, 2014, the Cabinet of Ministers decided to liquidate the Energy Company of Ukraine (Decree No. 398), entering into force on September 10, 2014. The Ministry of Energy and Coal Industry was responsible for taking necessary measures to liquidate it, and to inform the Cabinet of Ministers regarding the process within five months (Cabinet of Ministers, 2004^[166]) (Cabinet of Ministers, 2014^[167]).

On April 13, 2017, Ukraine adopted a new Law on the Electricity Market that set forth legal and organisational principles regarding production, transmission and distribution, along with purchase, sale and supply of electricity. As Ukraine has sought to meet the requirements of the EU's Third Energy Package and join the ENTSO-E, legal and technical norms and principles of the law on the electricity market were developed in collaboration with the European transmission system operators, including RTE (France), 50Hertz (Germany), Elia (Belgium) and APG (Austria), to ensure compliance with European requirements and to pave the way for market coupling. The new electricity market is meant to ensure Ukraine's energy security, as well as the reliability of electricity supply and the protection of consumer rights and interests. While promoting energy efficiency, minimising costs and developing market interests, it has sought to introduce non-discriminatory tariffs, free supplier choice (mostly for non-regulated consumers), independent regulation, and greater transparency. The main elements of the law include the establishment of bilateral contracts between parties, along with day-ahead and intra-day markets, balancing and ancillary services markets (monitored by Ukrenergo, the country's transmission system operator), and a retail market that meets the needs of electricity consumers (Box 7 elaborates on the launch of the new electricity market, and Figure 10 depicts the market structure) (Ukrenergo/Ministry of Finance, 2019^[64]) (MECI, 2019^[30]) (DiXi Group et al., 2017^[104]).

Box 7. Launching the new electricity market

The new electricity market in Ukraine was launched on July 1, 2019, as scheduled. However, some international organisations and partners, as well as Ukrainian officials, called for delaying the launch.* This was partly due to the limitations of the framework, as new regulations and amendments were required for debt repayment and taxation policies. It was also feared that launching too soon could risk market malfunction, as the software required for balancing the market and commercial electricity metering was still being introduced, and market participants needed to be trained to use the new system. Finally, the approach of parliamentary elections on July 21, 2019 created an uncertain political environment, in which it might have been difficult for the reform to move forward sustainably. Nevertheless, the new market has been functional, with segments, including bilateral contracts, as well as intra-day, day-ahead and balancing markets put into operation. It should be noted, however, that a number of additional legal elements still need to be introduced in order to comply with the EU requirements (Annex 4).

* In May 2019, Oleksandr Dombrovsky, a member of the Verkhovna Rada, introduced draft bill No. 10318 to delay its launch, while President Zelenskyy sought to postpone the launch for a year (Unian, 2019^[105]) (Verkhovna Rada, 2019^[106]).

Sources: Ukrinform, 2019^[107], DiXi Group et al., 2018^[108], MECI, 2019^[30], Ukrenergo/Ministry of Finance, 2019^[64], and Kossov, 2019^[109]

In meeting these conditions, some of the key elements of the Law on the Electricity Market were as follows:

- **Setting up the Market Operator and the Guaranteed Buyer.** While Energorynok no longer functions as a wholesale operator and exists only as a shell company, Ukraine set up a Market Operator and a Guaranteed Buyer for the new electricity market. Initially, both companies were branches of Energorynok, but they have been registered as independent entities since June 2019. The Market Operator is involved in electricity market oversight, such as monitoring the day-ahead and intra-day electricity markets and organising the sale and purchase of electricity. The Guaranteed Buyer is responsible for increasing the share of electricity generation from renewable sources by buying from entities eligible for "green" tariffs (NEURC, 2019^[94]).²¹ However, since the launch of the new market, the Guaranteed Buyer has been involved in buying electricity from producers, including most of the

²¹ Additional information can be found through the following sources: (Cabinet of Ministers, 2018^[113]), (Cabinet of Ministers, 2019^[196]). Moreover, the state registry lists Market Operator (43064445) and Guaranteed Buyer (43068454) as separate entities on the Unified State Register of Legal Entities (<https://usr.minjust.gov.ua/ua/freesearch>) (Ministry of Justice, 2019^[168]).

electricity generated by Energoatom and 35% by Ukrhydroenergo, and selling it at regulated rates under the public service obligation primarily to benefit household consumers.

- Unbundling oblenergos into electricity supply companies and distribution system operators (DSOs). According to the Law on the Electricity Market, oblenergos have been unbundled into DSOs and suppliers. DSOs are responsible for dispatching electricity to end users, while suppliers buy electricity from producers and sell it to end users. There are three different types of suppliers to meet consumer needs: private suppliers, universal service providers, and suppliers of last resort.²² Non-regulated consumers may select private suppliers freely, and their prices are set based on the agreements with electricity producers and suppliers (MECI, 2019_[30]).²³ Universal service providers, however, sell electricity only to residential and small non-residential consumers at regulated rates (the fixed price will remain at the level of the second quarter of 2019).²⁴ Unlike non-regulated suppliers, universal service providers may operate only within the territory where they have been issued a license, and only one such provider may serve a given region.²⁵ The supplier of last resort (Ukrinterenergo) provides services to consumers due to reasons such as the cancellation of their supplier services or the failure to select a supplier. It may supply electricity for no more than 90 days at a regulated tariff. As of July 2019, there have been 32 DSOs listed on the NEURC website and 528 entities have been licensed to sell electricity, of which 25 serve as universal service providers (NEURC, 2019_[94]).
- Certifying Ukrenergo as a transmission system operator (TSO). Along with transmitting and dispatching electricity through high-voltage networks, Ukrenergo sought to meet the EU requirements for transmission system operators (as further elaborated in Annex 4). As such, it was transferred to the management of the Ministry of Finance and corporatised. Under the new market, Ukrenergo is also responsible for operating balancing and ancillary service markets, registering bilateral agreements, and serving as a commercial metering and settlements administrator. As part of adjusting to its new role, Ukrenergo has introduced new software required for balancing and commercial metering necessary for its operation. The company has not yet been certified as an independent transmission system operator, though the process is expected to be completed by the end of 2019 (NEURC, 2019_[94]) (DiXi Group et al., 2018_[108]) (NEURC, 2019_[94]).²⁶

In addition to structural changes, the new Electricity Market Law provides for changes in the regulatory framework. While the roles of actors, including the Cabinet of Ministers, may remain similar, other players will likely increase their involvement within the electricity sector. For example, the Ministry of Finance has

²² Universal service providers and the supplier of last resort serve approximately 44% of the consumers (NEURC, 2019_[94]).

²³ NEURC Resolutions No. 1168 (orig. No. 307) and No. 1169 (orig. No. 308) introduced amendments to market rules for the day-ahead and intra-day market price setting in the wholesale electricity market (NEURC, 2019_[169]) (NEURC, 2019_[170]).

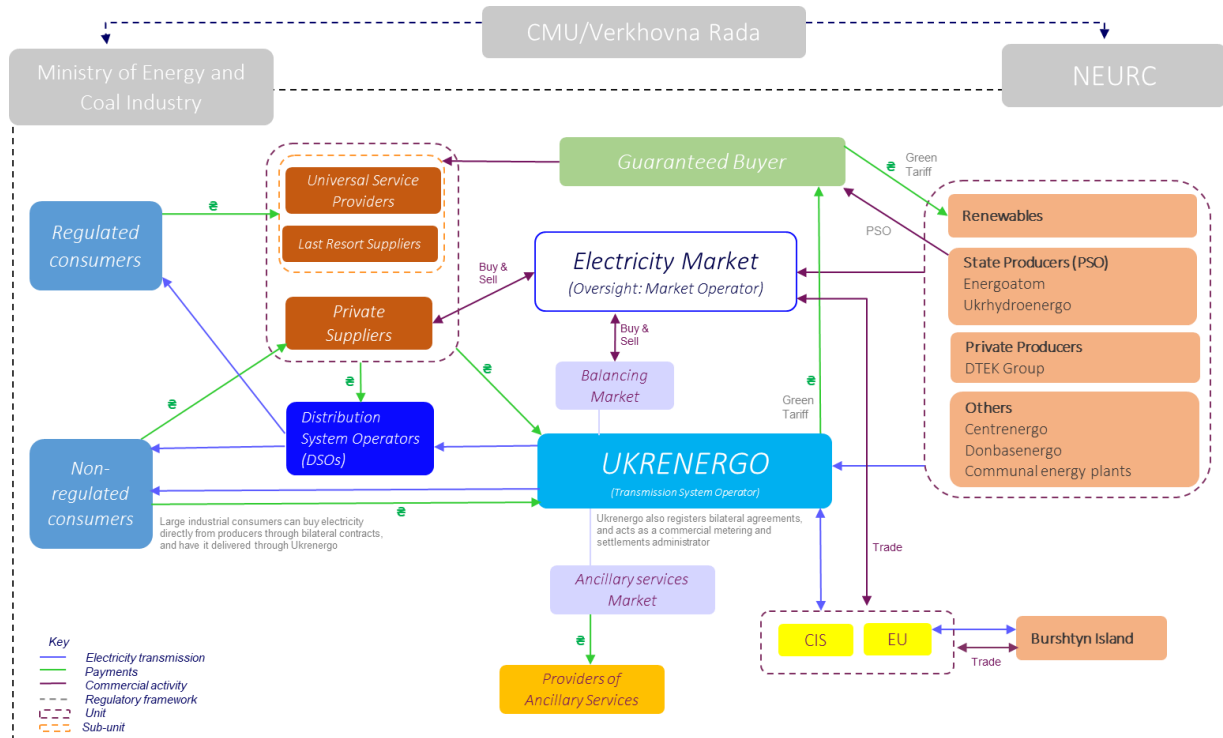
²⁴ The Law on the Electricity Market defined non-residential consumers as those connected to electric networks with contract power of up to 50 kilowatts. However, for the transition period from January 1, 2019 until December 31, 2020, the universal service providers will be providing services to budget institutions, regardless of contractual capacity, and other consumers whose installations are connected to power networks with contractual power of up to 150 kilowatts. These consumers are subject to all rights and obligations under the Law on the Electricity Market for small non-residential consumers.

²⁵ Although electricity supply and distribution companies have been unbundled, vertically integrated entities (such as DTEK or SPFU) may still own both electricity suppliers and distributors. However, if this is the case, the vertically integrated entity needs to have a compliance programme to ensure that supply and distribution activities remain separated (as of August 2019, the NEURC has approved 19 compliance programmes). Starting in the spring of 2020, the regulations will become stricter, as the distributors will not be allowed to own or control shares of entities engaged in production, supply or transmission, and entities engaged in supply will not be allowed to own or control shares of distributors (paragraph 47 of the Law on the Electricity Market). However, there will be certain exceptions - for example, if a distributor has fewer than 100,000 connected consumers and the average monthly distribution does not exceed 20 million kilowatt hours (NEURC, 2018_[191]).

²⁶ Ukrenergo (00100227) as a state enterprise has been liquidated, and it was listed as a joint-stock company on 29.07.2019 under the Unified State Register of Legal Entities (<https://usr.minjust.gov.ua/ua/freesearch>).

been involved in coordinating financial plans for SOEs in the energy sector, along with providing state guarantees for loans and formulating proposals to the government regarding the amount of net profit or dividends to be paid from these enterprises. While the Ministry did not participate in developing SOE policies and strategic objectives previously, it will begin to do so as it has become a managing body of Ukrenergo (MECI, 2019_[30]). In addition, with the partial liberalisation of electricity market pricing and the promotion of free trade, the National Securities and Stock Market Commission (NSSMC) of Ukraine will become involved in overseeing companies participating in the electricity market. However, additional changes may take place following the reorganisation of the government in August 2019.

Figure 10. Structure of Ukraine's Electricity Market (post-reform)



Sources: Author's compilation is based on the 2017 Law on the Electricity Market and CMU Resolution No. 483.

The role of the NEURC has been gradually changing. According to the Law on the Electricity Market, it is responsible for adopting market rules for the day-ahead and intra-day markets, as well as for the retail electricity market. It also develops transmission, distribution and commercial metering codes, and licensing terms (NEURC, 2019_[94]). Since electricity prices are set based on bilateral contracts, the NEURC is no longer involved in wholesale price setting or in cross-subsidisation (although the Market Operator sets price caps on electricity purchased and sold on the market). However, it will continue to regulate prices for electricity transmission and dispatching, for distribution, and for universal service providers and the supplier of last resort.²⁷ Further to tariff regulations, the Cabinet of Ministers has imposed public service obligations (PSOs) on electricity market players in order to further reduce electricity tariffs for certain consumers (mainly households).

²⁷ Details regarding the NEURC's tariff-setting mechanism for transmission and dispatching can be found under NEURC No. 585, NEURC No. 586, and for distribution under NEURC No. 1175. Moreover, in 2018 the NEURC set pricing regulations in 2018 for universal services providers (No. 1177, amended No. 1244) and the supplier of last resort (No. 1179), which are set based on the price of electricity purchased on the market, along with tariffs for transmission and distribution (NEURC, 2019_[172]) (NEURC, 2019_[171]) (NEURC, 2018_[173]) (NEURC, 2018_[174]) (NEURC, 2018_[176]) (NEURC, 2019_[175]).

Launching the New Electricity Market: Challenges and Policy Considerations

While the electricity market has been operational since July 1, 2019, the results as of this writing (September 2019) have been mixed. The government still needs to determine a mechanism for settling debts on the electricity market, and the mechanisms for setting tariffs for electricity transmission and compensating the Guaranteed Buyer have faced challenges, while the imposition of public service obligations (PSOs) on the nuclear and hydro electricity producers has contributed to distortions. Notably, as nuclear electricity is provided primarily to the residential consumers at below cost recovery levels, only a limited amount remains to be sold on the market. This leads industries to turn to more expensive market segments, as they primarily purchase electricity generated through thermal plants (Kossov, 2019^[109]). Moreover, corruption and competition challenges loom over the electricity market, resulting in the losses of billions of hryvnia within the sector. However, the electricity market launch is an opportunity to address some of the key challenges affecting the efficiency and attractiveness of the energy sector in Ukraine.

Debt settlement for state-owned enterprises

One of the main aspects of electricity market reform has been the development of a framework to settle debts for the state-owned enterprises (SOEs). By July 2019, Energorynok had accumulated approximately UAH 32 billion in debt. Reasons for indebtedness include heavy market regulation and the presence of vested interests, which prevented oblenergos from recovering the costs of electricity they sold and reimbursing Energorynok. In turn, Energorynok struggled to settle payments among the market players. By 2017, the wholesale operator owed UAH 12.6 billion to Energoatom and UAH 1.2 billion to Centrengo, while also failing to compensate other players (including oblenergos, such as DTEK Westenergo) for their service. Moreover, as coal producers often faced challenges in paying for primary inputs, Energorynok paid in advance. The coal producers, however, were often late in settling their debts with Energorynok, which further increased the latter's burden (Cabinet of Ministers, 2019^[110]) (Unian, 2017^[111]) (Ukrinform, 2017^[112]) (Cabinet of Ministers, 2018^[113]). In July 2019, universal service providers were to pay UAH 672.8 million to Energorynok, though they only paid UAH 124.1 million (Cabinet of Ministers, 2019^[110]).

With the launch of the new electricity market, Ukraine has sought to design a methodology to settle payments among the market players to ensure market recovery. In collecting and settling old debts, Energorynok will exist as a legal shell company, though a mechanism needs to be adopted through which market participants can collaborate. In 2018, the Cabinet of Ministers submitted a draft law to the Verkhovna Rada to address this issue, though it has been cancelled (Verkhovna Rada, 2018^[114]). Without a mechanism in place, Energorynok continues to face potential bankruptcy and lawsuits, while current participants may experience challenges in advancing market development. Ukrenergo has already filed a lawsuit against Energorynok to collect debts worth up to UAH 1.67 billion (Ukrenergo, 2019^[115]).

In addition, the occupation of Crimea and the conflict in the Donbass pose an additional challenge with respect to settling debts in the electricity market. In May 2015, the CMU and the MECL designated companies responsible for supplying energy in the occupied territories, while Ukrenergo continued to dispatch electricity and perform accounting services. However, as the energy flow with Donbass was interrupted in 2017, companies in the region, including Luhansk Energy Association and DTEK Donetsk Electricity Networks, still owe approximately UAH 3 billion to Energorynok (Cabinet of Ministers, 2019^[110]) (Olearchyk, 2017^[116]). In addition, Ukrenergo has initiated arbitration proceedings against Russia, accusing the latter for breaching an agreement regarding mutual protection of investments and demanding compensation for the seizure of its assets, business and property in the region (Ukrenergo, 2019^[117]).

Electricity tariffs

Electricity Transmission Tariffs

With the launch of the new electricity market and the elimination of the role of a wholesale market operator, the purchase and sale of electricity is based on bilateral agreements among producers, suppliers and

consumers. As the market is in a period of transition, electricity prices remain subject to caps, though Ukraine has worked on eliminating schemes, including cross-subsidisation.²⁸ However, tariffs are set for Ukrenergo and the DSOs for electricity transmission and dispatching, as they perform monopoly activities and are not involved in buying or selling electricity (except for specific cases, including balancing the flow of electricity). In order to ensure these entities invest in their operations and promote the efficiency of their services, Ukraine considered adopting a regulatory asset based (RAB) tariff. The aim of the RAB approach was to incentivise entities transmitting and distributing electricity to increase the value of their assets through upgrades. While this would enable them to charge higher rates for their services, it would also promote their efficiency (Interfax Ukraine, 2018^[118]) (Ukrenergo, 2018^[119]). Although this policy would be beneficial in the long term, it would have caused high fees and price shocks in the short run. As such, during the transition period, the NEURC has been responsible for setting transmission and dispatch tariffs by factoring in elements, such as operating and material costs, financial and corporate expenses, and the volume of electricity transmitted.²⁹

Box 8. Financing Ukrenergo's activities in the new electricity market

Under the new electricity market, Ukrenergo has acquired new roles, including that of settlements and metering administrator, while managing the balancing and ancillary service markets, registering bilateral agreements, and preparing to integrate with ENTSO-E. In carrying out its new role, the company has engaged in financing infrastructural projects in order to modernise the Ukrainian power grid, with funds obtained from organisations including the EBRD and IBRD. In carrying out over 100 investment projects worth EUR 1.5 billion in recent years, Ukrenergo seeks to transform into a European model (Ukrinform, 2019^[120]). In addition, Ukrenergo has begun implementing a pilot project to construct storage capacities, which includes testing methods using electricity generated from renewable sources (Ukrenergo/Ministry of Finance, 2019^[64]).

However, as its investments have been accompanied by higher financing, staff and depreciation expenses, this has not been offset by increasing revenues from its operations during the 2016-2018 period (Annex 5) (EBRD, 2019^[121]). Moreover, the on-going dispute regarding its tariff setting mechanism and recent price cuts have raised questions regarding whether the company will be able to recover the costs of its operation, particularly as its roles have increased and as it has become responsible for compensating the Guaranteed Buyer for the feed-in tariff.

Prior to the launch of the electricity market, Ukrenergo's transmission tariffs amounted to 57.4 UAH/MWh (NEURC, 2019^[122]). The tariffs, however, were re-calculated, and, in June 2019 they were set at 347.43 UAH/MWh for the period of second half of 2019, with an added 8.9 UAH/MWh for dispatching services (NEURC, 2019^[123]) (NEURC, 2019^[124]). Part of the reason for tariff hikes included the cost for the purchase of grid losses and Ukrenergo's responsibility to offset the cost of the Guaranteed Buyer. Moreover, Ukrenergo's new responsibilities as a settlements administrator and commercial metering administrator would require additional expenses (Box 8) (Ukrenergo, 2019^[125]). After the launch of the market, the

²⁸ In June 2019, the NEURC issued a resolution (No. 1169) stating that the participants of day-ahead and intra-day markets in their tenders may not exceed the prices specified by the Market Operator during the first nine months of operation (NEURC, 2019^[177]). In July 2019, the Market Operator set the price cap at 959.12 UAH/MWh (without VAT) between 00:00-08:00 and 23:00-00:00, and at 2048.23 UAH/MWh (without VAT) between 08:00 and 23:00 (Interfax Ukraine, 2019^[179]) (Market Operator, 2019^[178]).

²⁹ Additional challenges remained with respect to using RAB methodology for setting DSO tariffs. As oblenegos were privatised below their asset value, their appraisal may have valued them higher than their initial purchase price. As their distribution tariffs may already increase based on this methodology, there is a question as to whether the owners of DSOs would have been motivated to invest in their upgrades. Rather than introducing RAB tariff-setting methodology, many argued in favour of allowing higher tariffs for new investments only, while maintaining lower tariffs for old assets (Aslund, 2018^[199]) (DiXi Group et al., 2018^[108]).

NEURC adopted a decision to lower the tariff to 312.14 UAH/MWh starting in August 2019, partly due to the reduction in electricity purchase costs to compensate for technological losses (NEURC, 2019_[126]).

Despite attempts to limit the growth of the cost of electricity, the six-fold increase in transmission tariffs resulted in electricity price hikes in July 2019, particularly for industrial consumers. Ukrenergo estimated that soon after the launch of the new market, electricity costs for industrial users had risen by nearly 30%. Ukrenergo's statements regarding price increases were deemed premature, partly because the electricity market had only recently been launched. However, the challenges regarding electricity tariff hikes for industrial consumers soon became apparent (Kyiv Post, 2019_[127]) (Cabinet of Ministers, 2019_[128]). Two weeks following the launch of the market, industrial leaders argued in parliament that higher electricity costs were resulting in losses for them, while workers protested outside the NEURC office. Moreover, Nikopol Ferroalloy Plant, along with four other companies, filed a lawsuit in Kyiv Administrative District Court to lower Ukrenergo's tariffs (Kossov, 2019_[109]).³⁰ In response, the Kyiv court suspended the NEURC's previous resolutions that had increased electricity transmission tariff, temporarily reducing it to 57.4 UAH/MWh (Ukrenergo, 2019_[129]). Although the court reinstated the higher tariff for Ukrenergo, starting in September 2019 the transmission tariff set during the summer has been halved (Kossov, 2019_[109]).³¹ The reduction in Ukrenergo's tariffs, however, prevent it from covering its expenses and compensating the Guaranteed Buyer for generating electricity through alternative sources (for comparison, Box 9 discusses tariff-setting mechanism for RTE, a transmission system operator in France).

Box 9. Tariff-setting mechanism for Réseau de Transport d'Électricité (RTE), transmission system operator in France

Réseau de Transport d'Électricité (RTE) is France's transmission system operator responsible for operating, developing, and maintaining the transmission system. The Energy Regulatory Commission (CRE) an independent regulator, sets RTE's tariffs. They are revised annually and ensure that RTE can cover its operating and capital costs, along with planned investments. The tariffs are standardised throughout the French territory and bought in line with the "postage stamp" principle (which ensures that the tariff is the same regardless of distance travelled), though the overall cost of energy may vary based on seasons and hours of use, as well as network costs. In addition, the CRE sets out a framework that incentivises the RTE to improve its performance through mechanisms that include bonuses and penalties (RTE, 2019_[130]).

Guaranteed Buyer and the Feed-in Tariff

In recent years, Ukraine has sought to increase the share of renewables within its energy mix as part of promoting energy efficiency and security. Notably, *the Energy Strategy of Ukraine* has been looking to increase the overall share of renewables to 12% by 2025, and to 25% by 2035, including for electricity generation (SAEE, 2019_[131]) (Cabinet of Ministers, 2017_[79]).³² As part of incentivising the development of the renewables sector, Ukraine has established a system of green tariffs to purchase electricity produced from renewable sources and to channel it through the common electricity pool. The green tariff is approved by the NEURC and is based on the variety of alternative sources used, with an added premium for using

³⁰ Companies include Nikopol Ferroalloy Plant, Zaporozhye Ferroalloy Plant, Pokrovsky Mining and Processing Plant, Manganese Mining and Processing Plant, and Dniproazot (Guaranteed Buyer, 2019_[185]). It is worth noting that following a controversial privatisation process during the early 2000s, the information available in the public domain traces the beneficial ownership of the Nikopol Ferroalloy Plant to well-known individuals in Ukraine (Grytsenko, Zhuk and Sukhov, 2016_[198]).

³¹ Despite appeals from Ukrenergo, the NEURC and the Guaranteed Buyer to withdraw its decision to suspend the NEURC resolutions that set tariffs for electricity transmission and dispatching, the court refused to do so. Thus, the five companies will continue to pay 57.4 UAH/MWh. In addition, the NEURC had lowered Ukrenergo's tariff at 159.3 UAH/MWh effective from October 1, 2019, while also deciding to reduce September 2019 rates from 312.14 UAH/MWh to 116.54 UAH/MWh (Ukrenergo, 2019_[186]) (Unian, 2019_[187]) (NEURC, 2019_[188]) (NEURC, 2019_[189]).

³² However, it is important to note that the share of renewables in electricity production has surpassed 4% since April 2019, with their market share surpassing 17% (Figures 11 & 12).

equipment produced in Ukraine. Green tariffs have been applied to over 300 renewable producers (most of which are solar), and they are expected to remain valid until 2030.³³ Tariffs vary based on the producer and the type of alternative energy, with solar receiving higher rates (Box 10 discusses German feed-in tariff programme for comparison) (Ukrenergo/Ministry of Finance, 2019^[64]) (MECI, 2019^[30]) (SAEE, 2019^[131]).³⁴

In order to strengthen competition in the renewables sector, Ukraine introduced a renewable auction law in April 2019 (Verkhovna Rada, 2019^[132]). While green tariffs will continue until 2030, state support through feed-in tariffs for electricity supply will be replaced by an auction system through ProZorro (Ukraine's public e-procurement system), under which the investor offering the lowest tariff for electricity produced from renewables will receive state support. Both households and non-residential consumers with installed generating facilities will be eligible for green tariffs. In establishing contractual relations with a guaranteed buyer, users will have to show confirmed rights of land ownership or use, grid connection and construction permits. Moreover, the Law on Alternative Energy Sources will continue to provide additional allowance for electricity producers that use equipment produced in Ukraine.³⁵ The launch of "green" auctions is currently underway, and the first auctions are planned for 2020 (Guaranteed Buyer, 2019^[133]).

Box 10. German feed-in tariff programme

Renewable Energy Sources Act (EEG) aimed at supporting renewable generation has been central to the legal framework for the German feed-in tariff programme. EEG's application is monitored by the Federal Network Agency. Three pillars of the programme include purchasing obligation, guaranteed price fixing, and cost settlement system. Local grid operators are guaranteed buyers, while the EEG provides for guaranteed minimum prices for renewable sources under 20-year contracts with little or no investment risk.

Before introducing a fixed tariff, the German feed-in tariffs were bound at rates ranging from 80% to 90% of the average electricity cost, which varied significantly depending on the cost of technologies and installation capacity. However, the tariff soon began to incorporate the cost of generation through a selected renewable source and its overall use in the country, along with tariff reductions in order to encourage efficiency in generation. Germany is now moving away from feed-in tariffs towards an approach that combines green tariffs with an auction system based on tenders.

Sources: *Erneuerbare Energien, n.d.*^[134], *Sternkopf, 2019*^[135], and *Wuestenhagen and Bilharz, 2006*^[136].

With the changes in the electricity market, Ukrenergo has become responsible for compensating the Guaranteed Buyer for the feed-in tariffs. However, the court's suspension of Ukrenergo's tariffs resulted in a UAH 2.4 billion deficit for the company, while subsequent tariff cuts may contribute to further losses (Ukrenergo, 2019^[137]). Considering these difficulties, the Guaranteed Buyer faced challenges in meeting its obligations to green energy producers and investors. In an attempt to recover payments, the Guaranteed Buyer filed a lawsuit against Ukrenergo, as the estimate for the billing period (during the first 20 days of

³³ Renewable producers have been linked with a small number of influential businesspeople, along with members of parliament and their relatives that are arguably generating revenue through the tariff scheme. Nineteen companies have been linked with local officials in the regions that witness the growth of renewable projects, while 30 companies belong to the richest in the country. Notably, DTEK is currently operating two solar farms and is buying its third wind farm. DTEK is the second largest player in Ukraine's renewables sector after CNBM, a Chinese company (Gorchinskaya, 2019^[184]).

³⁴ The tariffs are set in euros, but they are recalculated and set in UAH every three months. For example, in the spring of 2019, solar tariffs were approximately 550 kopecks per kWh excluding the VAT, compared to wind turbines receiving 382 kopecks per kWh excluding the VAT.

³⁵ For those power facilities that produce electricity from alternative sources of energy and use equipment produced in Ukraine, the "green" tariff for the auction price will include supplements. The law allows for 5% supplement to green tariffs for producers participating in auctions that use between 30-50% of the equipment produced in Ukraine, and 10% supplement for using 50% or more of the equipment produced in Ukraine (Law on Alternative Energy Sources (revised on May 22, 2019) (Verkhovna Rada, 2018^[44])).

the launch of the new market) amounted to UAH 1.58 billion.³⁶ The Guaranteed Buyer also appealed to the President, as well as the Cabinet of Ministers and the High Council of Justice asking for assistance in resolving this matter (Kyiv Post, 2019_[138]). Moreover, the EBRD asked the President to intervene and help resolve the issue of “green” tariff payments (Unian, 2019_[139]).³⁷ By the end of August 2019, the Guaranteed Buyer had recovered a portion of the sum owed by Ukrenergo, and compensated the renewable producers (Guaranteed Buyer, 2019_[140]). However, as Ukrenergo still owes over UAH 1 billion to the Guaranteed Buyer and as the transmission tariffs are going to be lowered, the latter may continue facing challenges in repaying “green” producers (including foreign investors) (Guaranteed Buyer, 2019_[141]).

Public Service Obligation (PSO) and Market Distortions

To ease the transition to the new market, Ukraine has sought to further lower electricity tariffs for consumers (primarily households) by imposing public service obligations (PSOs) on certain players in the market. Participants with special responsibilities in the electricity sector include the Guaranteed Buyer, Ukrenergo, DSOs and the universal service providers, as well as electricity producers (namely Energoatom and Ukrhydroenergo) (Cabinet of Ministers, 2019_[110]). Energoatom and Ukrhydroenergo will need to sell a significant portion of the electricity they generate at a fixed rate for regulated consumers. Notably, in June 2019, the CMU resolution determined that up to 90% of the electricity generated through nuclear plants would be sold at a fixed rate, while only 10% of nuclear power would be sold on the electricity market (in August 2019, the CMU amended the resolution and slightly altered the amount of nuclear power subject to the PSO). Additional elements of the PSO include regulations regarding the Guaranteed Buyer selling electricity at a lower tariff to universal service providers and in organised segments of the electricity market, meeting the needs of domestic consumers, and concluding bilateral contracts at prices set at electronic auctions without exceeding limits (NEURC, 2019_[94]). According to the NEURC, the implementation of the initial PSO status would have added an annual burden of UAH 37 billion to the state budget. Moreover, the NEURC suggested that the distribution system operators and electricity suppliers would not be able to implement the regulation—in fact, it might threaten their financial stability and the ability to operate (Box 11 compares electricity pricing in the OECD countries) (NEURC, 2019_[142]) (Cabinet of Ministers, 2019_[110]).³⁸

However, PSOs and heavy regulations have contributed to market distortions. While Energoatom has continued to produce more than half of Ukraine’s electricity, the cost of nuclear electricity sold on the market has remained lower compared to other sources of electricity generation. In comparison, thermal plants have continued to generate approximately a third of the country’s electricity, while making up for approximately 47% of Ukraine’s energy costs.³⁹ In addition, since the launch of the electricity market, price caps have enabled thermal plants to sell electricity on the balancing market, where caps are higher. Some stakeholders have suggested reducing PSOs for nuclear and hydro producers, or applying the obligation to other producers as well (Figures 11 and 12). However, continued market distortions based on price caps and PSOs in the long run may contribute to market inefficiency on a broader scale. Maintaining PSOs will not ensure that the overall cost of electricity will be lowered for industrial consumers, and higher electricity costs may be factored in their outputs. This may result in higher price of products and services they offer,

³⁶ The calculations were based on the projected volumes of the electricity produced by green producers and the amount of green tariff.

³⁷ However, appeals to the President are beyond the scope of authority.

³⁸ The initial Resolution of the Cabinet of Ministers was No. 483 that introduced PSO on energy market players, though it has been amended twice (Cabinet of Ministers, 2019_[183]). While PSO for nuclear electricity production was imposed on 90% of its production, it was slightly altered in August 2019, though most of the nuclear electricity is still subject to this obligation. Moreover, in August 2019, PSO for electricity produced from hydro was increased to 35% (Cabinet of Ministers, 2019_[183]) (Cabinet of Ministers, 2019_[110]) (NEURC, 2019_[94]) (Interfax Ukraine, 2019_[182]) (Unian, 2019_[181]). Under the PSO, electricity tariffs for households will remain at the level of the second quarter of 2019 (MECI, 2019_[30]).

³⁹ Based on a comparison of levelised cost of electricity, the average cost of nuclear is higher than coal, with the former ranging between 112-189 USD/MWh, and the latter ranging between 60-143 USD/MWh (Lazard, 2018_[180]).

making them less affordable for residential consumers whose incomes would remain the same (Kossov, 2019_[109]).

Figure 11. Volume of Electricity Sold on the Wholesale Market (by source of production)

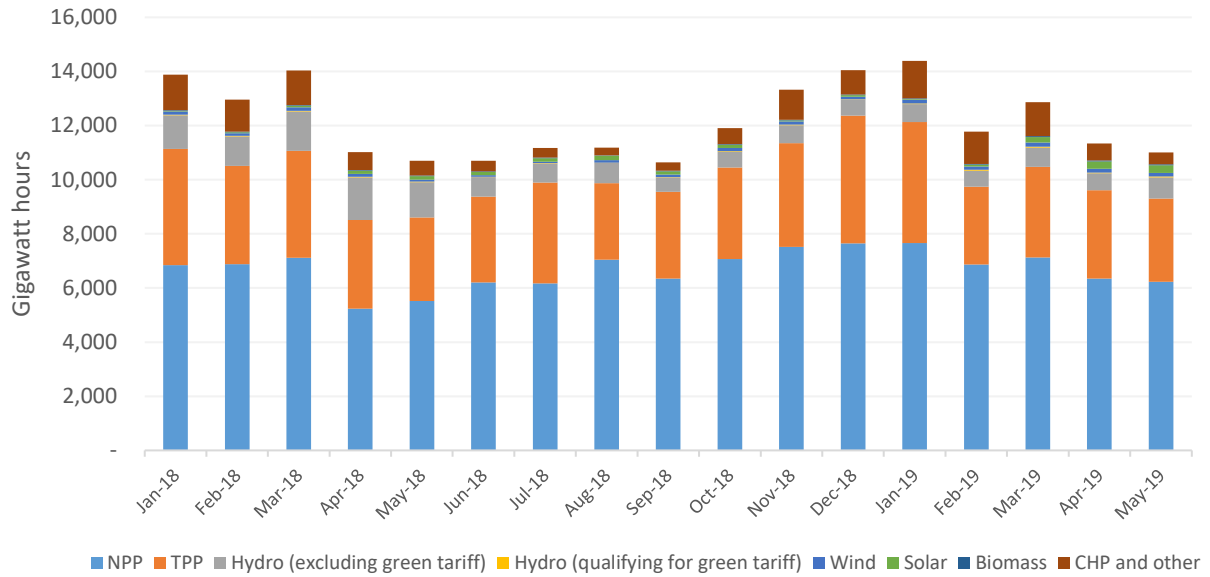
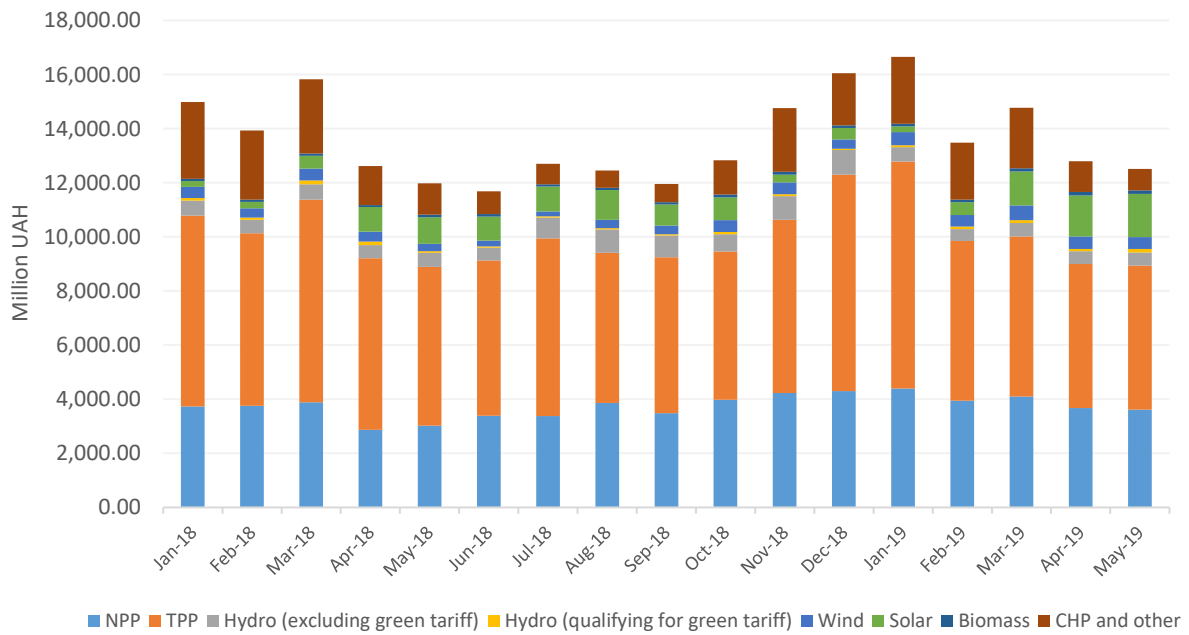


Figure 12. Cost of Electricity Sold on the Wholesale Market (by source of production)



Source (for Figures 11 & 12): Author's compilation is based on data provided through Energorynok, 2019_[143].

Box 11. Cost of electricity in OECD countries

Compared to Ukraine, in OECD countries electricity bill is lower for industrial consumers than for households. According to the IEA, during the first quarter of 2018 households paid 187.98 USD/MWh for electricity, while industrial consumers paid 100.32 USD/MWh.* This is partly because industrial consumers use more electricity and receive larger quantities at higher voltages. As such, electricity delivery to industrial consumers is more efficient and less expensive. For residential consumers, on the other hand, the price of electricity is higher due to additional fees associated with delivery.

**Figures are based on an average price in 29 OECD countries for which data was available for the given period.*

Sources: EIA, n.d.^[144] and IEA, 2019^[145]

Corruption

Corruption continues to pose a significant challenge to market efficiency in the electricity sector. This can be seen in the National Anti-Corruption Bureau of Ukraine's (NABU) investigation into the abuse of the Rotterdam+ formula in coal pricing. The Rotterdam+ formula was adopted in 2016, and was cancelled in 2019 with the launch of the new electricity market. The formula entailed pricing coal on the Ukrainian wholesale market based on its average price in Rotterdam for 12 months, plus the delivery cost to Ukraine. In part, the formula was adopted to secure imports by raising prices to international levels, while meeting import parity pricing requirements and paving the way towards energy market liberalisation (Kossov, 2019^[34]). However, Rotterdam+ methodology drew criticism. For one, it applied to both imported and domestically produced coal, thus significantly increasing price of electricity produced through coal and thermal plants. For another, critics argued that coal coming from Ukraine and Russia was of lower quality, and it should have been priced less than the coal sold in Rotterdam. Moreover, the delivery cost from Rotterdam to Ukraine was higher than the delivery cost from Eastern European countries that were the primary exporters to Ukraine (RFE/RL, 2019^[146]) (Kossov, 2019^[34]).

Through the course of the investigation, NABU claimed that the DTEK managers colluded with the NEURC and manipulated tariffs on electricity generated from coal. This forced consumers to overpay by USD 747 million in 2016-2017 for electricity, and DTEK allegedly gained USD 560 million through the scheme. NABU has served notices to a number of individuals involved in the process, including a former head of the NEURC and other officials, as well as DTEK managers (RFE/RL, 2019^[146]) (Interfax Ukraine, 2019^[147]). While DTEK has been collaborating, the company has argued that there is no reason for investigative action, as import parity has been a price setting mechanism recognised by the IMF and European countries. Moreover, DTEK has argued that there have been no surplus profits in the coal sector and in Ukraine's thermal electricity generation, and that the formula was applied correctly (Interfax Ukraine, 2019^[148]).

More broadly, corruption challenges in the energy sector reflect two factors that, in Ukraine's institutional context, create particular opportunities: the technical complexity of reforming power markets even in more advanced countries and the risks associated with renewables in particular.

- The complexity of electricity markets means that well-positioned players can extract substantial rents by manipulating, or even securing the alteration of, fairly technical aspects of the market rules – things that may be poorly understood by elected policy-makers, let alone the general public.
- In respect of renewables, the combination of new and rapidly changing technologies (and thus rapidly changing cost structures) with the need for a degree of public support raises particular risks. Subsidised renewable energy can attract corrupt and criminal actors, eager to exploit information asymmetries in order to extract public subsidies. In the presence of weak institutions, even well-designed and market-friendly policies can have perverse effects (Gennaioli and Tavoni, 2016^[149]).

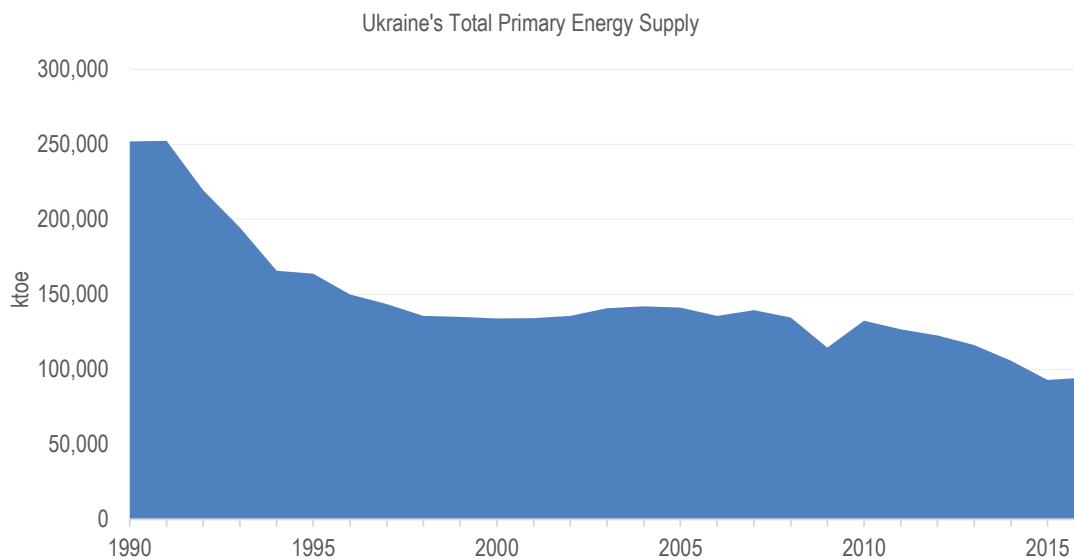
Competition

The Antimonopoly Committee of Ukraine (AMCU) has been responsible for protecting and promoting fair competition in the country's business activities and public procurement, which also cover the energy sector. It works closely with other state bodies, including the MECI and the NEURC, in designing and approving regulations and policies, and carrying out investigations regarding anti-competitive practices across sub-sectors (AMCU, 2019^[150]). With the launch of the new electricity market, the Commission has highlighted the risk that companies holding significant market share could influence electricity pricing (i.e., exercise market power).⁴⁰ This could be achieved by applying different prices or terms to similar agreements, artificially creating deficits in electricity supply, and disclosing insider information. The AMCU has been working on raising awareness of its role in deterring anti-competitive practices, along with promoting policies that would help lower electricity prices, improve quality and security of electricity delivery, and synchronise with the EU market (AMCU, 2019^[151]).

While helping to design policy framework, the AMCU has been investigating anti-competitive practices in the electricity sector. The Commission is currently looking into a case regarding price-fixing in the state-run coal mines that have been supplying coal to thermal and cogeneration plants involved in electricity production. According to the preliminary findings, in 2017-2018 the Ministry of Energy and Coal Industry may have been involved in fixing coal prices for state-owned mines in collaboration with entities, including DTEK and Ukrinterenergo. Their (alleged) support to raise coal prices for electricity generating plants to an agreed level could have distorted competition within the sector (Unian, 2019^[152]). Moreover, as the AMCU continues to monitor the new electricity market, its role will increase once the ancillary services market becomes operational. Ukrenergo will be responsible for the procurement of ancillary services, or services to support electricity transmission, and the Commission will need to ensure that competitive practices prevail (Interfax Ukraine, 2019^[153]).

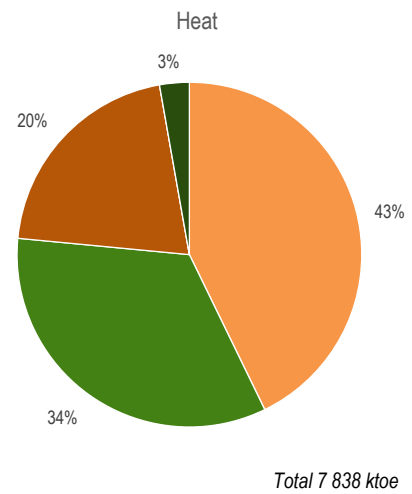
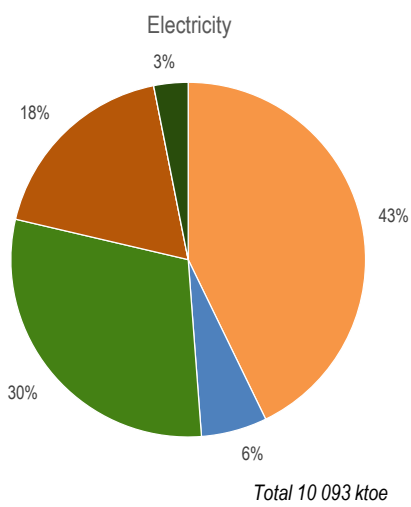
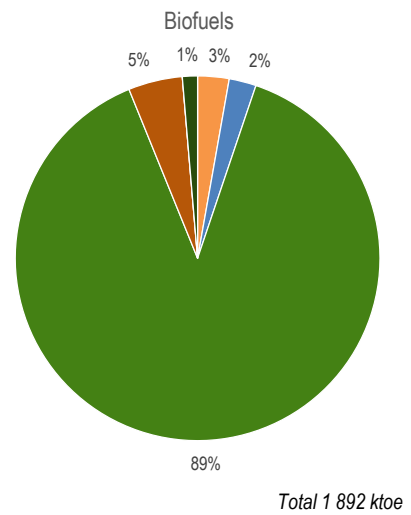
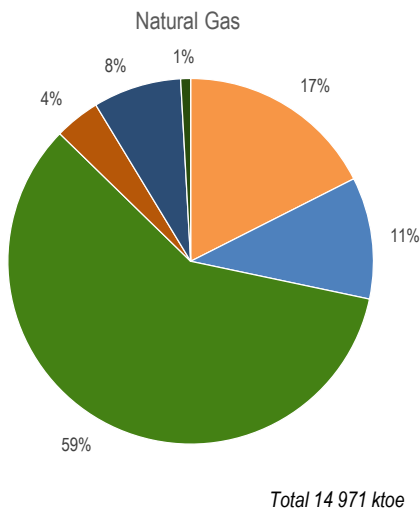
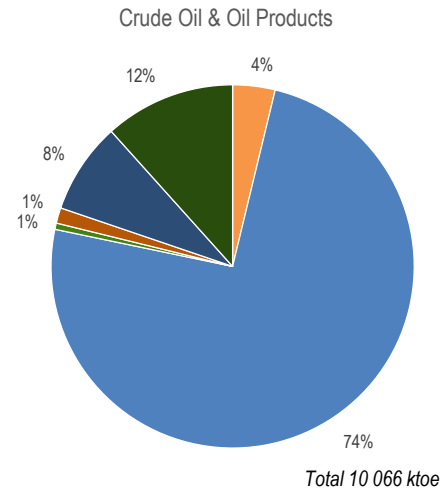
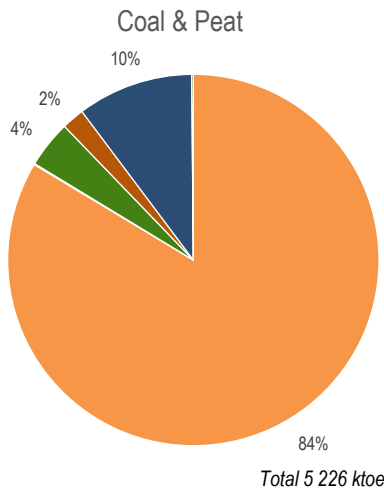
⁴⁰ AMCU recently concluded an investigation regarding DTEK's potential abuse of its market position. While DTEK's share in electricity production has remained below 25%, its share in thermal generation has reached 75% and in coal production has reached 85%. Along with remaining one of the largest private electricity producers, DTEK has also continued to purchase shares of oblenergog, while becoming an owner of supply and distribution companies under the new electricity market. Following a three-year investigation, the AMCU did not find abuses of the market position of DTEK, arguing that heavy regulation of the market and price setting had prevented the company's abuse of power. Nevertheless, this investigation has enabled the Commission to be wary of potential risks of anti-competitive practices with the launch of the new electricity market, and to assess the laws and regulations accordingly (DTEK, 2018^[193]) (Unian, 2019^[192]).

Annex 1. Selected Indicators



Source: IEA, 2019^[3]

Annex 2. Energy consumption by consumer groups (2017)



Key
■ Industry ■ Transport ■ Residential ■ Commercial and Public Services ■ Non-energy use ■ Other

Source: Author's compilation is based on SSSU (2019) data

Annex 3. Summary of Electricity Production, Transmission, Supply and Distribution Processes

	Function	Ownership/Management
<i>Production</i>		
Energoatom	<ul style="list-style-type: none"> Operates four nuclear power plants that consist of fifteen units overall, generating about half of the country's electricity. Involved in electricity production, extension of current and new generating capacities, procurement and export of nuclear fuel, etc. 	Ministry of Energy and Coal Industry (MECI)
DTEK Group	<ul style="list-style-type: none"> Founded in 2005, DTEK Group is Ukraine's largest vertically integrated holding company involved in production, supply and distribution of energy, including coal and natural gas, renewables, thermal power and electricity. Generates 23% of electricity through its coal and thermal power plants. One of the major shareholders/owners of oblenergos (which have been unbundled into supply and distribution companies). 	Private, owned 100% by System Capital Management
Ukrhydroenergo	<ul style="list-style-type: none"> State-owned hydropower company operating 9 plants located across Dniester and Dnipro rivers, generating 7-10% of electricity. Company continues to implement the Hydropower Development Programme until 2026, approved by the Cabinet of Ministers. 	Ministry of Energy and Coal Industry (MECI)
Centrenergo	<ul style="list-style-type: none"> Produces thermal energy and supplies electricity to the wholesale market (there is discrepancy between figures, though it generates between 4-8% of total electricity in Ukraine). Supplies power to Kyiv, Kharkiv and Donetsk regions, operates 23 units, including 18 coal-fired power units and 5 oil and gas units. 	State Property Fund of Ukraine owns 78.3% of the shares, with other legal entities owning 20.4% and individuals 1.3%. While earmarked for privatisation, the plans have been postponed.
Donbasenergo	<ul style="list-style-type: none"> Generates less than 2% of electricity. Ukraine's fifth largest operator of coal-fired thermal power plants. 	Partially privatised by Energoinvest Holding that owned over 60%. However, current ownership structure is unclear.
Renewable sources	<ul style="list-style-type: none"> Over 300 recipients of green tariffs. Until recently, renewables were used in generating less than 2% of electricity, though figures have increased since April 2019. 	Private producers

<i>Transmission</i>		
Ukrenergo	<ul style="list-style-type: none"> Implements and dispatches control over Ukraine's unified energy system, transmits electricity, and maintains and develops transmission system. Following the launch of the new electricity market, its functions include transmitting and dispatching electricity, operating balancing and ancillary services markets, registering bilateral agreements, and acting as a settlements and commercial metering administrator. 	<p>Ministry of Finance</p> <p>(reports to Ministry of Energy regarding the Energy Strategy of Ukraine 2035 and implementation of policy regarding the electricity sector)</p>
<i>Distribution</i>		
Oblenergos	<ul style="list-style-type: none"> Oblenergos were established to supply and distribute electricity to consumers. Initially there were 27 oblenergos, one per each region, along with separate ones for Kyiv, Sevastopol and Crimea. However, following the occupation of Crimea, two oblenergos were lost (Sevastopol and Crimea), while additional ones were introduced. With the introduction of the new electricity market law, oblenergos have been unbundled into Distribution System Operators (DSOs) and suppliers. Currently, there are 32 DSOs listed on the NEURC website, though the information regarding their total number continues to vary and their ownership structure remains unclear. According to the NEURC, over 500 suppliers have already been established. 	<p>Public and private ownership, including foreign-owned entities, with significant shares belonging to 5-7 individuals</p>
<i>Wholesale Market Operation</i>		
Energorynok	<ul style="list-style-type: none"> Until July 1, 2019, its responsibility was to optimise mechanisms of the wholesale electricity market in Ukraine, and improve state of payments of electricity bought and sold on the wholesale market. However, Energorynok no longer performs these functions due to the launch of the new electricity market. Additional roles have included implementing contractual relations, developing proposals for legal framework for wholesale market functioning, concluding agreements, legal support, and implementing export-import transactions. In liberalising the electricity market, Energorynok's functions have been split into Market Operator and Guaranteed Buyer. Energorynok will remain as an entity to collect old debts before its liquidation. 	<p>Founded by the Cabinet of Ministers, 100% state-owned entity. Reported to the Cabinet of Ministers and worked with NEURC in setting the wholesale electricity market price.</p>

National Energy and Utilities Regulatory Commission (NEURC)	<ul style="list-style-type: none"> • Carries out state regulation to balance interests of consumers and economic entities in the field of energy and utilities, along with ensuring energy security and promoting European integration of the electricity and natural gas markets. • Conducts normative and legal review and licensing activities, and forms pricing and tariff policies. • Protects the rights of consumer goods and services in the spheres of energy and utilities. • Facilitates cross-border trade in electricity and natural gas, and creates conditions to attract investments to help market and infrastructural development. • Promotes measures to increase the share of energy generated from renewable sources. 	Independent body, reports to the Verkhovna Rada and the Cabinet of Ministers
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Sources: *Ukrenergo/Ministry of Finance, 2019^[64], MECI, 2019^[30], Ministry of Social Policy, 2019^[65], NEURC, 2019^[94], Verkhovna Rada, 2016^[67] and Hydrotechproject LTD, 2019^[154]*

Annex 4

As part of its obligations under the Association Agreement with the EU, and in complying with the Energy Community Treaty and the EU's Third Energy Package, Ukraine has to meet legal and regulatory obligations in the energy sector as set out in the table below.

Regulation	Status
Directive 2009/72/EC of the European Parliament and of the Council of 13 July 2009 concerning common rules for the internal market in electricity and repealing Directive 2003/54/EC	Provisions are being implemented within the framework of the Law on the Electricity Market
Regulation (EC) No 714/2009 of the European Parliament and of the Council of 13 July 2009 on conditions for access to the network for cross-border exchanges in electricity and repealing Regulation (EC) No 1228/2003	Provisions are being implemented within the framework of the Law on the Electricity Market
Directive 2005/89/EC of the European Parliament and of the Council of 18 January 2006 concerning measures to safeguard security of electricity supply and infrastructure investment	Provisions are being implemented within the framework of the Law on the Electricity Market
Commission Regulation (EU) No 543/2013 of 14 June 2013 on submission and publication of data in electricity markets and amending Annex I to Regulation (EC) No 714/2009 of the European Parliament and of the Council	Provisions are ensured by the NEURC resolution No. 459 "On Approval of the Procedure for Collecting and Transferring Data on the Operation of the Electricity Market for Publication on the ENTSO-E Transparency Platform", which came into force on 10.10.2018.
Commission Regulation (EU) 838/2010 of 23 September 2010 on laying down guidelines relating to the inter-transmission system operator compensation mechanism and a common regulatory approach to transmission charging	On May 23, 2017, Ukraine finalised an Agreement of Accession into the Integrated Power System (IPS) with ENTSO-E, which was signed in June 2017 and entered into force on July 7, 2018. However, the timing regarding Ukraine's involvement in the IPS mechanism was not provided.

Sources: *Ukrenergo/Ministry of Finance, 2019^[64], MECL, 2019^[30], Ministry of Social Policy, 2019^[65], and Ukrenergo, 2019^[155]*

Moreover, following the amendment of the Annex XXVII of the EU-Ukraine Association Agreement (Council Decision (EU) 2019/466, 2019), additional regulations to be incorporated in Ukraine are as follows:

- Regulation (EU) No 1227/2011 of the European Parliament and of the Council of 25 October 2011 on wholesale energy market integrity and transparency;
- Commission Regulation (EU) 2016/1388 of 17 August 2016 establishing a network code on demand connection;
- Commission Regulation (EU) 2016/631 of 14 April 2016 establishing a network code on requirements for grid connection of generators;
- Commission Regulation (EU) 2016/1447 of 26 August 2016 establishing a network code on requirements for grid connection of high voltage direct current systems and direct current-connected power park modules; and

- Regulation (EU) 2016/1952 of the European Parliament and of the Council of 26 October 2016 on European statistics on natural gas and electricity prices and repealing Directive 2008/92/E.

The Verkhovna Rada ratified the amendments to the Association Agreement on June 6, 2019 (EU, 2019_[156]) (Interfax Ukraine, 2019_[157]).

Annex 5. Ukrenergo's Financial Statements

Figure 1. PJSC Ukrenergo Income Statement (thousands, UAH) for years ended Dec. 31, 2016 – 2018

	31-Dec-18	31-Dec-17	31-Dec-16
Revenue from electricity transmission and dispatch services	6,044,712	8,305,235	7,245,964
Impairment of trade and other accounts receivable	-	-294,665	-248,661
Other income	328,296	196,129	253,442
Staff costs	-2,396,720	-2,215,836	-1,896,812
Depreciation and amortization	-812,344	-691,958	-583,883
Impairment of property, plant, equipment	-	-320,147	-
Other operating expenses	-603,692	-578,364	-608,545
Finance income	320,043	340,166	291,268
Finance costs	-322,729	-243,115	-117,818
Foreign currency exchange loss, net	671,095	-1,865,531	-1,177,673
Profit before income tax	3,228,661	2,631,914	3,157,282
Income tax expense	-625,333	-569,374	-405,733
Net profit	2,603,328	2,062,540	2,751,549
Items that will not be reclassified subsequently to profit or loss: Actuarial loss on post-employment and other long-term employee benefit obligations	52,778	-49,240	-78,392
Deferred income tax benefit	-	8,863	14,111
Other comprehensive loss	52,778	-40,377	-64,281
Total comprehensive profit	2,656,106	2,022,163	2,687,268

Source: PJSC Ukrenergo Financial Statements, 2016 – 2018, audited by Deloitte, (Deloitte, 2018^[158], Deloitte, 2017^[159], and Deloitte, 2016^[160])

Figure 2. PJSC Ukrenergo Simplified Balance Sheet (thousands, UAH) for years ended Dec. 31, 2016 – 2018

	31-Dec-18	31-Dec-17	31-Dec-16	Notes
<i>Total non-current assets</i>	25,596,516	23,014,315	19,865,612	Mainly from property, plant, and equipment
<i>Total current assets</i>	3,217,320	3,628,406	3,847,747	Mainly from cash and cash equivalents
Total assets	28,813,836	26,642,721	23,713,359	
Total equity	11,622,836	8,966,730	7,329,706	Mainly from retained earnings
<i>Total non-current liabilities</i>	6,206,751	1,661,041	1,108,493	Mainly from deferred income, long-term borrowing, and long-term employee benefit obligations
<i>Total current liabilities</i>	10,984,249	16,014,950	15,275,160	Mainly from short-term borrowing
Total liabilities	17,191,000	17,675,991	16,383,653	
Total equity and liabilities	28,813,836	26,642,721	23,713,359	

Source: PJSC Ukrenergo Financial Statements, 2016 – 2018, audited by Deloitte, (Deloitte, 2018^[158], Deloitte, 2017^[159], and Deloitte, 2016^[160])

Figure 3. PJSC Ukrenergo Statement of Cash Flows (thousands, UAH) for years ended Dec. 31, 2016 – 2018

	31-Dec-18	31-Dec-17	31-Dec-16	Notes
Net cash generated by operating activities	2,908,318	4,699,648	4,362,465	Mainly from profit from electricity transmission and dispatch services (core activity)
Net cash generated by investing activities	-3,716,494	-3,907,638	-5,253,390	Mainly from acquisition of property, plant, equipment, and intangible assets
Net cash generated by financing activities	634,280	-1,592,755	1,202,035	Mainly from repayment of and proceeds on loans
Net change in cash and equivalents	-173,896	-800,745	311,110	
Cash and equivalents at beginning of year	2,483,444	3,272,616	2,929,722	
Effect of foreign currency exchange differences	14,870	11,573	31,784	
Cash and equivalents at end of year	2,324,418	2,483,444	3,272,616	

Source: PJSC Ukrenergo Financial Statements, 2016 – 2018, audited by Deloitte, (Deloitte, 2018_[158], Deloitte, 2017_[159], and Deloitte, 2016_[160])

References

- AICE Hydro (2017), *About the Company*, <http://aicehydro.squarespace.com/about>. [42]
- ALMAZ-M (n.d.), *About us*, https://almaz-m.com/?page_id=125. [54]
- AMCU (2019), *Antimonopoly Committee of Ukraine: Annual Report 2018*, <http://www.amc.gov.ua/amku/doccatalog/document?id=148160&schema=main>. [150]
- AMCU (2019), *Energy Market: Statement by the Antimonopoly Committee of Ukraine*, Antimonopoly Committee of Ukraine, <http://www.amc.gov.ua/amku/control/main/uk/publish/article/150311>. [151]
- Andritz (2019), *Ukraine - Big plans for Hydro*, <https://www.andritz.com/hydro-en/hydronews/hn-europe/ukraine>. [43]
- Aslund, A. (2018), *Why Ukrainians Are So Upset about New Electricity Tariffs*, Atlantic Council, <https://www.atlanticcouncil.org/blogs/ukrainealert/why-ukrainians-are-so-upset-about-new-electricity-tariffs>. [199]
- BMW (2019), *Monitoring the Energy Transition*, Bundesministerium für Wirtschaft und Energie, <http://dx.doi.org/bmw.de/Redaktion/EN/Artikel/Energy/monitoring-implementation-of-the-energy-reforms.html>. [82]
- Burisma Group (n.d.), *Activities*, <https://burisma-group.com/eng/activities/>. [27]
- Cabinet of Ministers (2019), *On Approval of the Regulation on the Assignment of Special Duties to the Participants of the Electricity Market to Ensure Public Interests in the Functioning of the Electricity Market*, No. 483, Cabinet of Ministers of Ukraine, <https://zakon.rada.gov.ua/laws/show/483-2019-%D0%BF>. [183]
- Cabinet of Ministers (2019), *On the formation of state-owned enterprises “Guaranteed Buyer” and “Market Operator”*, Cabinet of Ministers of Ukraine, <https://zakon.rada.gov.ua/laws/show/324-2019-%D0%BF>. [196]
- Cabinet of Ministers (2019), *Questionnaire on the OECD Project Supporting Energy Sector Reform in Ukraine*, Cabinet of Ministers of Ukraine. [110]
- Cabinet of Ministers (2019), *Statements by the Management of SE “NEC Ukrenergo” on rising electricity prices for industry are incorrect*, Cabinet of Ministers of Ukraine, <https://www.kmu.gov.ua/ua/news/zayavi-kerivnictva-dp-nek-ukrenergo-pro-zrostannya-cini-elektroenergiyi-dlya-promislovosti-ye-nekorektnimi>. [128]
- Cabinet of Ministers (2018), *Audit report on the results of the financial audit of the State Enterprise Energorynok from 01 October 2013 to 31 December 2017*, Cabinet of Ministers of Ukraine, <http://dkrs.kmu.gov.ua/kru/doccatalog/document?id=138473>. [113]
- Cabinet of Ministers (2017), *About the formation of the state enterprise “National Coal Company”*, No. 1019-r, <https://zakon.rada.gov.ua/laws/show/1019-2017-%D1%80>. [35]

- Cabinet of Ministers (2017), *Cabinet of Ministers of Ukraine has extended temporary emergency measures on the electricity market for one month*, Cabinet of Ministers of Ukraine, <https://www.kmu.gov.ua/en/news/249969565?=-print>. [86]
- Cabinet of Ministers (2017), *On approval of the Energy Strategy of Ukraine for the period up to 2035 “Security, energy efficiency, competitiveness”*, Cabinet of Ministers of Ukraine, <https://www.kmu.gov.ua/ua/npas/250250456>. [79]
- Cabinet of Ministers (2014), *Resolution on liquidation of the National Joint-Stock Company “Energy Company of Ukraine”, No. 398-2014-p*, Cabinet of Ministers of Ukraine, <https://zakon.rada.gov.ua/laws/show/398-2014-%D0%BF>. [167]
- Cabinet of Ministers (2004), *Resolution on the formation of the National Joint Stock Company “Energy Company of Ukraine”, No. 794-2004-p*, Cabinet of Ministers of Ukraine, <https://zakon.rada.gov.ua/laws/show/794-2004-%D0%BF>. [166]
- Centrenergy (2012), *About us*, <http://www.centrenergy.com/en/about/>. [61]
- Clean Energy Wire (2018), *Germany’s Energiewende in brief*, Clean Energy Wire, <https://www.cleanenergywire.org/germanys-energiewende-brief>. [81]
- CNBM (n.d.), *About*, <http://cnbm.com.ua/>. [49]
- Deloitte (2018), *National Power Company Ukrenerg: Financial Statements for the Year End 31 December 2018*, https://ua.energy/wp-content/uploads/2019/05/Ukrenerg_18fse_with-signatures.pdf. [158]
- Deloitte (2017), *National Power Company Ukrenerg: Financial Statements for the Year 31 December 2017*, <https://ua.energy/wp-content/uploads/2018/05/Ukrenerg-17ang.pdf>. [159]
- Deloitte (2016), *National Power Company Ukrenerg: Financial Statements and Independent Auditor’s Report for the Year End 31 December 2016*, <https://ua.energy/wp-content/uploads/2017/05/Audytorskyj-zvit-2016r.-angl..pdf>. [160]
- DiXi Group (2018), *Energy Transparency Index*, http://dixigroup.org/storage/files/2019-04-17/energy_transparency_index_2018_eng.pdf. [14]
- DiXi Group et al. (2018), *Electricity Market Reform: Will We Make It In Time?*, <https://www.euneighbours.eu/sites/default/files/publications/2018-04/Power-Reforms-Hurry-up-Holikova-ENG.pdf>. [108]
- DiXi Group et al. (2017), *Ukraine’s Electricity Market Transformation: the Way from Producer to Consumer*, http://enref.org/wp-content/uploads/2017/07/Power-Market-Holikova_ENG.pdf. [104]
- Donbasenergo (2019), *Generating Stages*, <https://de.com.ua/en/generation>. [62]
- DTEK (2019), *DTEK’s Production Indicators for Q1 2019*, DTEK, <https://dtek.com/en/media-center/press/dteks-production-indicators-for-q1-2019/>. [194]
- DTEK (2019), *Nikopol SPP starts green electricity generation*, <https://dtek.com/en/media-center/press/nikopol-spp-starts-green-electricity-generation/>. [48]
- DTEK (2018), *DTEK Oil & Gas*, <https://oilandgas.dtek.com/en/>. [28]

- DTEK (2018), *DTEK Renewables: Our Business*, [45]
<https://renewables.dtek.com/en/business/#botievckaya>.
- DTEK (2018), *The Antimonopoly Committee of Ukraine did not detect abuse of the market position of DTEK Group.*, DTEK Group, [193]
<https://dtek.com/en/media-center/press/v-rezultate-trekhletnego-rassledovaniya-amku-ne-vyavil-zloupotrebleniya-rynochnym-polozheniem-gruppy-dtek/>.
- DTEK (2017), *Coal Mining and Processing*, https://energo.dtek.com/en/business/coal_industry/. [36]
- DTEK (2017), *Electricity Generation*, <https://energo.dtek.com/en/business/generation/>. [63]
- EBRD (2019), *UkrenergO Transmission Network Modernisation*, European Bank for Reconstruction and Development, [121]
<https://www.ebrd.com/work-with-us/projects/psd/ukrenergO-transmission-network-modernisation.html>.
- ECO Prime (n.d.), *Company Info*, <http://www.ecoprime.com.ua/de/index.html>. [55]
- EIA (n.d.), *Electricity explained: factors affecting electricity prices*, U.S. Energy Information Administration, [144]
<https://www.eia.gov/energyexplained/electricity/prices-and-factors-affecting-prices.php>.
- Energiewende (n.d.), *The German Energiewende: transforming Germany's energy system*, [80]
<http://www.energiewende-global.com/en/>.
- Energoatom (2017), *Non-Financial Report*, [40]
http://nfr.energoatom.kiev.ua/en/actvts/sustainable_development/non_financial_reporting/54434-generating_the_energy_future_of_ukraine_se_nnegc_energoatom_presents_the_sustainability_report/.
- Energorynok (2019), *Analysis of prices on the Wholesale Electricity Market in April 2019*, [143]
 Energorynok, <http://www.er.gov.ua/doc.php?f=4661>.
- Energy Community (2018), *The National Energy Regulatory: Governance and Independence*, [66]
 Energy Community, https://www.energy-community.org/dam/jcr:6eb10b22-ca6a-4c43-8c9f-f3614dab3c91/ECS_NEURC_reg_report_032018.pdf.
- Erneuerbare Energien (n.d.), *What Germany contributed to advanced FITs*, [134]
<https://www.erneuerbareenergien.de/archiv/what-germany-contributed-to-advanced-fits-150-437-79984.html>.
- EU (2019), *Council Decision (EU) 2019/466 of 18 March 2019*, Council of the European Union, [156]
<https://eur-lex.europa.eu/legal-content/en/TXT/?uri=CELEX:32019D0466>.
- European Commission (2019), *Third energy package*, [190]
<https://ec.europa.eu/energy/en/topics/markets-and-consumers/market-legislation/third-energy-package#content-heading-1>.
- FMO (n.d.), *About SyvashEnergoProm LLC*, <https://www.fmo.nl/project-detail/54812>. [47]
- Gazprom (n.d.), *Nord Stream 2: a new export gas pipeline running from Russia to Europe across the Baltic Sea*, [7]
<http://www.gazprom.com/projects/nord-stream2/>.

- Gazprom (n.d.), *TurkStream: Gas exports to Turkey and southern and southeastern Europe*, [6]
<https://www.gazprom.com/projects/turk-stream/>.
- Gennaioli, C. and M. Tavoni (2016), "Clean or dirty energy: evidence of corruption in the renewable energy sector", *Public Choice*, Vol. 166/3-4, pp. 261-290, [149]
<https://doi.org/10.1007/s11127-016-0322-y>.
- Geo Alliance (n.d.), *Geo Alliance Group*, <https://geo-alliance.com.ua/en/>. [29]
- Gorchinskaya, K. (2019), *Ukraine's green oligarchs*, Politico SPRL, [184]
<https://www.politico.eu/article/ukraines-green-oligarchs-energy-subsidies-electricity-tariffs/>.
- Grytsenko, O., A. Zhuk and O. Sukhov (2016), *Ihor Kolomoisky: Still Throwing His Weight Around*, <https://www.kyivpost.com/ukraine-politics/ihor-kolomoisky-still-throwing-his-weight-around.html>. [198]
- Guaranteed Buyer (2019), *Guaranteed Buyer Continues Payments to Green Electricity Producers*, Guaranteed Buyer, <http://www.gpee.com.ua/main/news?id=182>. [141]
- Guaranteed Buyer (2019), *New electricity market is being prepared for green auctions*, Guaranteed Buyer, <http://www.gpee.com.ua/main/news?id=193>. [133]
- Guaranteed Buyer (2019), *The court dismissed the appeal against the decision securing a claim regarding suspension of tariffs of Ukrenergo*, Guaranteed Buyer, <http://www.gpee.com.ua/main/news?id=190>. [185]
- Guaranteed Buyer (2019), *The guaranteed buyer paid UAH 3 billion at the "green" tariff*, Guaranteed Buyer, <http://www.gpee.com.ua/main/news?id=194>. [140]
- Hargreaves, B. (2019), *Energiewende: Germany's quest to achieve a 100% renewable energy future*, Wartsila, <https://www.wartsila.com/twentyfour7/energy/energiewende-germany-s-quest-to-achieve-a-100-percent-renewable-energy-future>. [83]
- Hunt, S. (2002), *Making Competition Work in Electricity*, John Wiley & Sons, Inc. [88]
- Hydrotechproject LTD (2019), *HPPs of Ukrhydroenergo PJSC*, <http://hdp.kharkov.ua/en/hpps-ukrhydroenergo-pjsc>. [154]
- IEA (2019), *Coal Information 2019*, OECD Publishing, <https://doi.org/10.1787/4a69d8c8-en>. [32]
- IEA (2019), *IEA Statistics*, <https://www.iea.org/statistics/>. [2]
- IEA (2019), *IEA World Energy Statistics and Balances*, <https://doi.org/10.1787/data-00514-en>. [3]
- IEA (2019), *Key World Energy Statistics: Key statistics on the supply, transformation and consumption of all major energy sources*, <https://www.iea.org/statistics/kwes/prices/>. [145]
- IEA (2019), *World Energy Outlook: Fossil-fuel Subsidies*, [76]
<https://www.iea.org/weo/energysubsidies/>.
- IEA (2018), *Natural Gas Information 2018*, https://doi.org/10.1787/nat_gas-2018-en. [21]
- IEA (2012), *Energy Policies Beyond IEA Countries: Ukraine 2012*, OECD Publishing, [95]
<https://doi.org/10.1787/9789264187450-en>.

- IEA (2006), *Ukraine: Energy Policy Review 2006*, OECD Publishing, <https://www.oecd-ilibrary.org/docserver/9789264109926-en.pdf?expires=1568121262&id=id&accname=ocid84004878&checksum=E8F1E724C5AD29F26F5C276B92303D8C>. [19]
- IEA (2001), *Competition in Electricity Markets*, OECD Publishing, <https://doi.org/10.1787/9789264192768-en>. [89]
- Interfax Ukraine (2019), “*Energoatom*” in the new market will be able to sell at least 10% of its electricity at free prices - PSO conditions, <https://ua.interfax.com.ua/news/economic/594749.html>. [182]
- Interfax Ukraine (2019), *Annulment of PSO, price caps on electricity market should be of high priority for govt – Energy Community*, Interfax Ukraine, <https://en.interfax.com.ua/news/economic/612045.html>. [153]
- Interfax Ukraine (2019), *DTEK considers groundless NABU claims against holding’s employees in ‘Rotterdam+ formula’ case*, <https://en.interfax.com.ua/news/general/606354.html>. [148]
- Interfax Ukraine (2019), *NABU serves notices of suspicion to ex-NCER head, NCER member, four more persons in Rotterdam+ case*, <https://en.interfax.com.ua/news/general/606217.html>. [147]
- Interfax Ukraine (2019), *Rada ratifies changes to energy annex to EU-Ukraine Association Agreement*, Interfax Ukraine, <https://en.interfax.com.ua/news/economic/592005.html>. [157]
- Interfax Ukraine (2019), “Results of first bidding on new segment of wholesale electricity market indicate successful start of energy reform”, *Interfax Ukraine*, <https://ua.interfax.com.ua/news/economic/596682.html>. [179]
- Interfax Ukraine (2018), *Ukrenergo seeks to switch to RAB tariffs from 2019*, <https://en.interfax.com.ua/news/economic/478866.html>. [118]
- Interfax-Ukraine (2017), *Government extends state of emergency in electricity market*, Interfax-Ukraine: Ukraine News Agency, <https://en.interfax.com.ua/news/economic/415444.html>. [85]
- Joskow, P. (2003), “Electricity Sector Restructuring and Competition: Lessons Learned”, *Latin American Journal of Economics-formerly Cuadernos de Economía, Instituto de Economía. Pontificia Universidad Católica de Chile*, Vol. 40/121, pp. 548-558. [92]
- KB Energo (2017), *Boilers for various fuels*, <https://kbenergo.com.ua/kotly-na-razlichnyh-vidah-topliva/>. [60]
- Kellow, A. (2009), *Transforming Power: The Politics of Electricity Planning*, Cambridge University Press, <https://doi.org/10.1017/CBO9780511597152>. [90]
- Kossov, I. (2019), *New energy market brings controversy*, Businessgroup LLC, <https://www.kyivpost.com/business/new-energy-market-brings-controversy.html>. [109]
- Kossov, I. (2019), *Who is standing in the way of the ‘Rotterdam+’ investigation?*, <https://www.kyivpost.com/business/who-is-standing-in-the-way-of-the-rotterdam-investigation.html>. [34]
- Kruger (2019), *About the Company*, <http://kruger.com.ua/about/>. [57]

- Kyiv Post (2019), *Guaranteed Buyer enterprise sues Ukrenergo*, [138]
<https://www.kyivpost.com/ukraine-politics/guaranteed-buyer-enterprise-sues-ukrenergo.html>.
- Kyiv Post (2019), *Power price for industry grows by 30% on new power market*, Businessgroup LLC, [127]
<https://www.kyivpost.com/ukraine-politics/power-price-for-industry-grows-by-30-on-new-power-market.html>.
- Lazard (2018), *Lazard's Levelized Cost of Energy Analysis-Version 12.0*, Lazard, [180]
<https://www.lazard.com/media/450784/lazards-levelized-cost-of-energy-version-120-vfinal.pdf>.
- Lika Svit (n.d.), *About the Company*, <http://lika-svit.com.ua/>. [59]
- Market Operator (2019), *Tariff Setting Mechanism*, Market Operator, [178]
<https://www.oree.com.ua/data/prices.pdf?v=3>.
- Matsumara, W. and Z. Adam (2019), *Commentary: Fossil fuel consumption subsidies bounced back strongly in 2018*, IEA, [77]
<https://www.iea.org/newsroom/news/2019/june/fossil-fuel-consumption-subsidies-bounced-back-strongly-in-2018.html>.
- McLaughlin, D. (2018), *Germany reassures Ukraine over sanctions on Russia and energy fears*, [13]
<https://www.irishtimes.com/news/world/europe/germany-reassures-ukraine-over-sanctions-on-russia-and-energy-fears-1.3929908>.
- MECI (2019), *Lists of state-owned enterprises, institutions, organizations and associations belonging to the sphere of management of the Ministry of Energy and Coal Industry and companies, for which the Ministry of Energy and Coal Industry manages the corporate rights*, Ministry of Energy and Coal Industry of Ukraine, [69]
http://mpe.kmu.gov.ua/minugol/control/uk/publish/article?art_id=245358174&cat_id=245196616.
- MECI (2019), *Questionnaire for the OECD Project on Supporting Energy Sector Reform in Ukraine*. [30]
- MECI (2018), *Information about the main activities of developing fuel and energy complex of Ukraine in December 2018*, [93]
http://mpe.kmu.gov.ua/minugol/control/publish/newscategory?cat_id=35081.
- Metinvest (2006), *Metinvest Holding: About*, <https://metinvestholding.com/en/about>. [37]
- Ministry of Justice (2019), *Unified State Register of Legal Entities, Individual Entrepreneurs and Public Formations*, <https://usr.minjust.gov.ua/ua/freesearch>. [168]
- Ministry of Social Policy (2019), *Questionnaire on the OECD Project Supporting Energy Sector Reform in Ukraine*, Ministry of Social Policy of Ukraine. [65]
- NABU (2018), *NABU Detectives exposed 1.4 billion UAH gas embezzlement scheme*, National Anti-corruption Bureau of Ukraine, [161]
<https://nabu.gov.ua/en/novyny/nabu-detectives-exposed-14-billion-uah-gas-embezzlement-scheme>.
- NABU (2017), *NABU Investigation into the FEC*, Description National Anti-Corruption Bureau of Ukraine, [15]
<https://nabu.gov.ua/open-office/biblio/infographics/rozsliduvannya-nabu-v-galuzi-pek>.

- Naftogaz Group (2019), *Annual Report 2018*, Naftogaz Group, [17]
<http://www.naftogaz.com/files/Zvity/Annual-Report-2018-engl.pdf>.
- Naftogaz Group (2016), *Naftogaz open letter: a year without gas imports from Russia*, [5]
<http://www.naftogaz.com/www/3/nakweben.nsf/0/371FE97DD813E51FC225807600517667?OpenDocument&year=2016&month=11&nt=News&>.
- NEURC (2019), *Activities of the National Commission and the State's Role in Energy Regulation and Municipal Services*, National Energy and Utilities Regulatory Commission, [101]
http://www.nerc.gov.ua/data/filearch/Catalog3/Richnyi_zvit_NKREKP_2018.pdf.
- NEURC (2019), *NEURC has reduced the tariff of Ukrenergo*, [188]
<http://www.nerc.gov.ua/?news=9326>.
- NEURC (2019), *NEURC's position on the decision "On the imposition of special obligations to ensure the general public interest in the availability of electricity for domestic consumers"*, National Energy and Utilities Regulatory Commission, [142]
<http://www.nerc.gov.ua/?news=9128>.
- NEURC (2019), *On amendments to the NERCEP Resolution No. 1411 of 12 July 2019, No. 1781*, [189]
<http://www.nerc.gov.ua/?id=43882>.
- NEURC (2019), *On amendments to the NERCEP Resolution No. 307 of March 14, 2018*, [169]
<http://www.nerc.gov.ua/?id=42078>.
- NEURC (2019), *On amendments to the NERCEP Resolution No. 308 of March 14, 2018*, [170]
<http://www.nerc.gov.ua/index.php?id=42082>.
- NEURC (2019), *On amendments to the NERCEP Resolution No. 308 of March 14, 2018, No. 1169*, National Energy and Utilities Regulatory Commission, [177]
<http://www.nerc.gov.ua/?id=42082>.
- NEURC (2019), *On approval of the Amendments to the Price Formation for Universal Services, No. 1244*, National Energy and Utilities Regulatory Commission, [175]
<http://www.nerc.gov.ua/index.php?id=42272>.
- NEURC (2019), *On approval of the Order of formation of tariff for dispatching (operational-technological) management services, No. 586*, National Energy and Utilities Regulatory Commission, [171]
<http://www.nerc.gov.ua/?id=40404>.
- NEURC (2019), *On approval of the Procedure for setting (formation) of tariff for electricity transmission services, No. 585*, National Energy and Utilities Regulatory Commission, [172]
<http://www.nerc.gov.ua/?id=40403>.
- NEURC (2019), *On setting the tariff for dispatching (operational and technological) management of SE Ukrenergo for the second half of 2019, No. 955*, National Energy and Utilities Regulatory Commission, [124]
<http://www.nerc.gov.ua/?id=41557>.
- NEURC (2019), *On setting the tariff for electricity transmission services of SE "NEK" Ukrenergo " for the second half of 2019, No. 954*, [123]
<http://www.nerc.gov.ua/?id=41556>.
- NEURC (2019), *On setting the tariff for electricity transmission services of SE "NEK" Ukrenergo " , No. 1411*, [126]
<http://www.nerc.gov.ua/index.php?id=42764>.

- NEURC (2019), *On setting the tariff for transmission of electricity of SE “NEK” Ukrenergo “for 2019, No. 1905*, <http://www.nerc.gov.ua/index.php?id=37157>. [122]
- NEURC (2019), *Overview of Renewable Energy Sector Development for Quarter 2 in 2019*, National Energy and Utilities Regulatory Commission, <https://www.slideshare.net/NKREKP/2019-152188845?ref=http%3A%2F%2Fwww.nerc.gov.ua%2F%3Fnews&fbclid=IwAR2NGKRrIpJ-7KSFy8QQqUvIMMCeOgQAwINf74iwFnB7bWtkanrKes7KgJU>. [18]
- NEURC (2019), *Questionnaire on the OECD Project Supporting Energy Sector Reform in Ukraine*, National Energy and Utilities Regulatory Commission. [94]
- NEURC (2018), *Decree on the recognition that some of the resolutions have been declared invalid (No. 894)*, National Energy and Utilities Regulatory Commission, <http://www.nerc.gov.ua/?id=34017>. [102]
- NEURC (2018), *On Approval of the Procedure for Decision on Exemption of the Distribution System Operator from Compliance with Separation and Independence Requirements, No. 372*, National Energy and Utilities Regulatory Commission, <http://www.nerc.gov.ua/?id=32491>. [191]
- NEURC (2018), *On Approval of the Procedure for Forming the Price at which Electricity Supplies to Consumers of the Last Hope Supplier, No. 1179*, National Energy and Utilities Regulatory Commission, <http://www.nerc.gov.ua/?id=35079>. [176]
- NEURC (2018), *On approval of the Procedure for setting (formation) of tariffs for electricity distribution services, No. 1175*, National Energy and Utilities Regulatory Commission, <http://www.nerc.gov.ua/?id=35086>. [173]
- NEURC (2018), *On approval of the Procedure of pricing for universal services, No. 1177*, National Energy and Utilities Regulatory Commission, <http://www.nerc.gov.ua/?id=35077>. [174]
- NEURC (2018), *The volume of grants to compensate for the losses incurred for supplying electricity at regulated tariff for February 2018*, National Energy and Utilities Regulatory Commission, <http://www.nerc.gov.ua/data/filearch/postanovy/2018/p0125-d-2018.pdf>. [99]
- NEURC (2017), *On the Setting of Retail Tariffs for Electricity in February 2017 during the Transition to Market Retail Tariffs for Electricity Released for Every Class of Consumers, Except the Population, on the Territory of Ukraine, No. 51*, National Energy and Utilities Regulatory Commission, <http://www.nerc.gov.ua/?id=23325>. [165]
- NEURC (2016), *Electricity Tariffs for Households from September 2016 to February 2017*, National Energy and Utilities Regulatory Commission, <http://www.nerc.gov.ua/?id=15012>. [164]
- NEURC (2016), *On approval of the Procedure of formation of the forecast wholesale market price of electricity, No. 289*, <https://zakon3.rada.gov.ua/laws/show/z0428-16>. [33]
- NTI (2014), *Ukraine: Nuclear, Nuclear Threat Initiative*, <https://www.nti.org/learn/countries/ukraine/nuclear/>. [38]
- OECD (2019), *Enhancing Competitiveness in Ukraine through a Sustainable Framework for Energy Service Companies (ESCOs)*, OECD Publishing, <https://www.oecd.org/eurasia/countries/Enhancing-Competitiveness-in-Ukraine-through-Sustainable-Framework-for-Energy-Service-Companies-2019.pdf>. [1]

- OECD (2019), *State-Owned Enterprise Reform in the Hydrocarbons Sector in Ukraine*, OECD Publishing, <http://www.oecd.org/corporate/SOE-Reform-in-the-Hydrocarbons-Sector-in-Ukraine-ENG.pdf>. [8]
- OECD (2018), *Anti-Corruption Reforms in Ukraine: Prevention and Prosecution of Corruption in State-Owned Enterprises*, OECD Publishing, <https://www.oecd.org/corruption/acn/OECD-ACN-Ukraine-4th-Round-Bis-Report-SOE-Sector-2018-ENG.pdf>. [16]
- OECD (2018), *Inventory of Energy Subsidies in the EU's Eastern Partnership Countries*, OECD Publishing, <https://doi.org/10.1787/9789264284319-en>. [73]
- OECD (2018), *Maintaining the Momentum of Decentralisation in Ukraine*, OECD Publishing, <https://doi.org/10.1787/9789264301436-en>. [4]
- OECD (2007), *OECD Economic Surveys: Ukraine 2007*, OECD Publishing, https://doi.org/10.1787/eco_surveys-ukr-2007-en. [20]
- OECD (2003), *Competition Issues in the Electricity Sector*, OECD, <https://www.oecd.org/daf/competition/sectors/6095721.pdf>. [91]
- Olearchyk, R. (2017), *Ukraine imposes cargo blockade on breakaway east*, The Financial Times Limited, <https://www.ft.com/content/276f3fd8-098c-11e7-ac5a-903b21361b43>. [116]
- Orano (2018), *Orano signs a new contract with Ukraine on the field of spent fuel reprocessing*, <https://www.orano.group/country/china/en/about-us/our-news/china-group-news/2018/may/orano-signs-a-new-contract-with-ukraine-on-the-field-of-spent-fuel-reprocessing>. [39]
- Pirani, S. (2018), "Russian gas transit through Ukraine after 2019: the options", *Oxford Energy Insight* 41, <https://www.oxfordenergy.org/wpcms/wp-content/uploads/2018/11/Russian-gas-transit-through-Ukraine-after-2019-Insight-41.pdf>. [22]
- Polityuk, P. and A. Kalmykov (2017), *Ukraine bans all trade with rebel-held territory, as separatists seize assets*, <https://www.reuters.com/article/us-ukraine-crisis-blockade-cargo/ukraine-bans-all-trade-with-rebel-held-territory-as-separatists-seize-assets-idUSKBN16M14T>. [31]
- Prozvit (2019), *State Owned Enterprises: 3rd quarter of 2019*, <https://prozvit.com.ua/#/>. [197]
- PWC (2018), *DTEK Energy BV: International Financial Reporting Standards Consolidated Financial Statements and Independent Auditor's Report*, https://dtek.com/content/files/fs_debv_2018.pdf. [163]
- RECOM (2019), *RECOM – Ukraine's green energy venture partner*, <https://recom-solar.com/recom-ukraines-green-energy-venture-partner/>. [51]
- Reuters (2019), *Ukraine gas firm says Russians delaying gas talks as they spur work on Nord Stream 2*, <https://www.reuters.com/article/russia-ukraine-gas/ukraine-gas-firm-says-russians-delaying-gas-talks-as-they-spur-work-on-nord-stream-2-idUSL8N1ZL32Z>. [10]
- RFE/RL (2019), *More Managers Charged For Price Fixing At Ukraine Power Producer*, RFE/RL, Inc., <https://www.rferl.org/a/ukraine-s-biggest-power-producer-denies-wrongdoing-in-price-manipulation-case/30110496.html>. [146]

- RTE (2019), *TURPE 5: Network Tariff, Understanding the Tariff*, Réseau de Transport d'Électricité, https://clients.rte-france.com/htm/an/mediatheque/telecharge/20190701_Plaquette_tarifaire_TURPE_5_CONSO_PROD_EN.pdf. [130]
- SAEE (2019), *Questionnaire for the OECD Project on Supporting Energy Sector Reform in Ukraine*, State Agency on Energy Efficiency and Energy Saving of Ukraine. [131]
- SALIX energy (2016), *SALIX Energy: agro-energy company founded in 2010*, <https://www.salix-energy.com/about>. [56]
- Scatec Solar (n.d.), *Ukraine*, <https://scatecsolar.com/locations/ukraine/#ukraine>. [52]
- Siemens Ukraine (n.d.), *About*, <https://new.siemens.com/ua/en.html>. [53]
- SPFU (2019), *Questionnaire on the OECD Project Supporting Energy Sector Reform in Ukraine*, State Property Fund of Ukraine. [68]
- SSSU (2019), *State Statistical Service of Ukraine*, https://ukrstat.org/en/operativ/menu/menu_e/energ.htm. [23]
- State Fiscal Service (2019), *Questionnaire on the OECD Project Supporting Energy Sector Reform in Ukraine*. [75]
- State Fiscal Service (2019), *Starting July 1, electricity sales are subject to excise duty*, <http://ck.sfs.gov.ua/media-ark/news-ark/382869.html>. [74]
- Sternkopf, T. (2019), *Feed-in tariff (EEG feed-in tariff)*, <http://www.res-legal.eu/search-by-country/germany/single/s/res-e/t/promotion/aid/feed-in-tariff-eeg-feed-in-tariff/lastp/135/>. [135]
- Teplo (n.d.), *How is the subsidy calculated?*, <https://teplo.gov.ua/subsidies/yak-rozrakhovuietsia-rozmir-subsydii>. [72]
- The Economist (2018), *Why Nord Stream 2 is the world's most controversial energy project*, The Economist Group, <https://www.economist.com/the-economist-explains/2018/08/07/why-nord-stream-2-is-the-worlds-most-controversial-energy-project>. [9]
- TIU Canada (2019), *About*, <https://tiucanada.com/about/>. [50]
- Ukraine Power Resources (2018), *Building a Portfolio of Wind Power Projects in Ukraine*, <https://ukrainepowerresources.com/>. [46]
- Ukrenergo (2019), *Court lifts suspension off Ukrenergo tariffs for dispatching and transmission for majority of market participants*, Ukrenergo, <https://ua.energy/media-2/news/court-lifts-suspension-off-ukrenergo-tariffs-for-dispatching-and-transmission-for-majority-of-market-participants/>. [137]
- Ukrenergo (2019), *Court postpones examination of appeal regarding suspension of Ukrenergo tariffs in the second half of 2019*, Ukrenergo, <https://ua.energy/media-2/news/court-postpones-examination-of-appeal-regarding-suspension-of-ukrenergo-tariffs-in-ii-half-2019/>. [125]
- Ukrenergo (2019), *Court refuses to withdraw the provision of claim to cancel Ukrenergo Tariffs for the second half of 2019*, Ukrenergo, <https://ua.energy/media-2/news/court-refuses-to-withdraw-the-provision-of-claim-to-cancel-ukrenergo-tariffs-for-2nd-half-2019/>. [186]

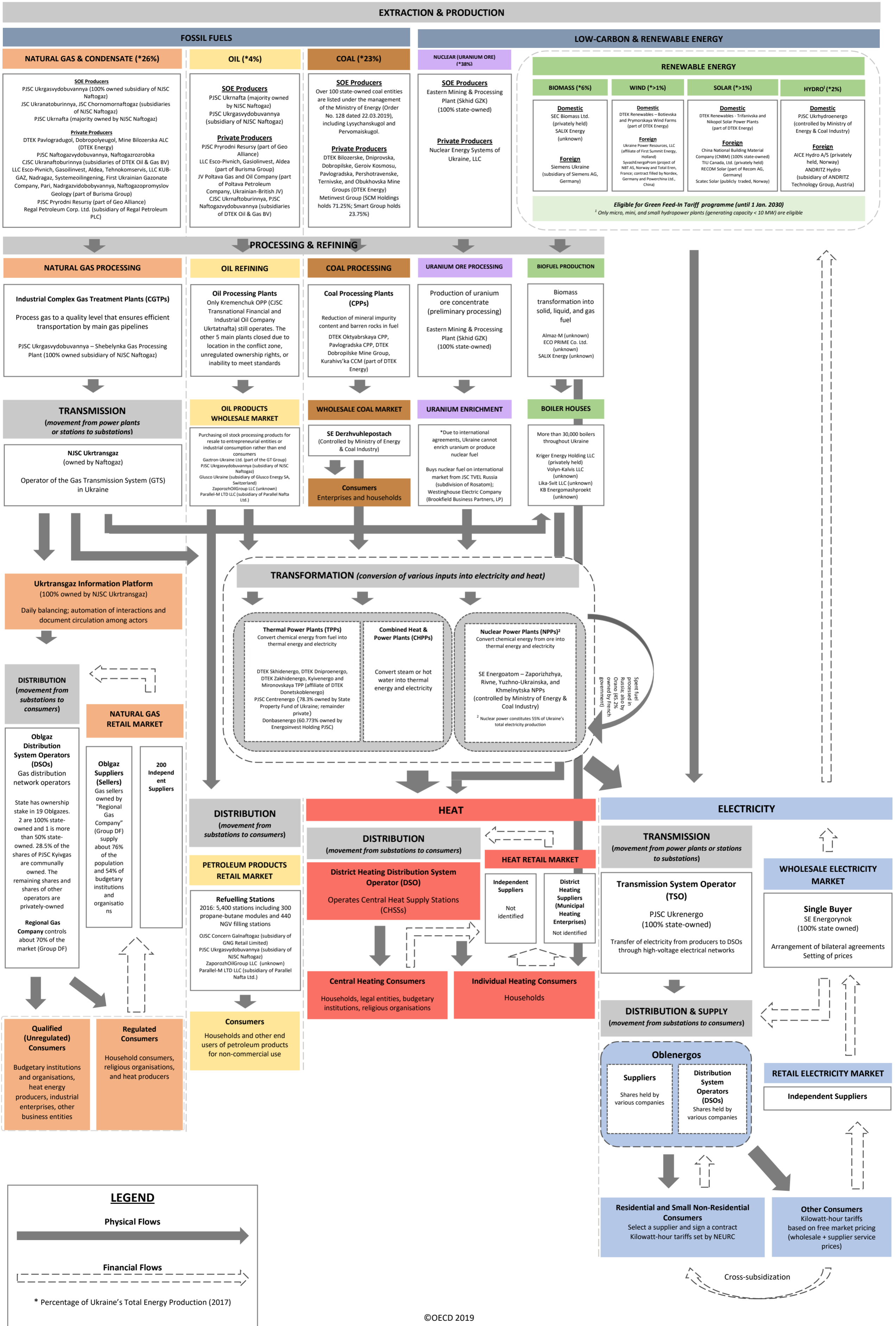
- Ukrenergo (2019), *Cross-Border Flows*, Ukrenergo, <https://ua.energy/activity/dispatch-information/transborder-flows/#1538032249011-abadd3b9-db7cd48b-2cdb>. [96]
- Ukrenergo (2019), *Decision of the court on tariffs of Ukrenergo prevents the new model of the market from functioning*, Ukrenergo, <https://ua.energy/osnovni-podiyi/rishennya-sudushhodo-taryfiv-ukrenergo-unemozhlyvlyuye-funktsionuvannya-novoyi-modeli-rynku/>. [129]
- Ukrenergo (2019), *For the Consumers Connected to the Networks of SE NEC Ukrenergo*, Ukrenergo, <https://ua.energy/osnovni-podiyi/do-uvagy-spozhyvachiv-shho-pidklyucheni-do-merezh-dp-nek-ukrenergo/>. [195]
- Ukrenergo (2019), *Integration with ENTSO-E*, <https://ua.energy/ukrenergo-of-the-future/integration-entso-e/>. [155]
- Ukrenergo (2019), *Ukrenergo files to the court to recover 1.6 billion UAH of debt from SE Energorynok*, Ukrenergo, <https://ua.energy/media-2/news/ukrenergo-files-to-the-court-to-recover-1-6-billion-uah-of-debt-from-se-energorynok/>. [115]
- Ukrenergo (2019), *Ukrenergo informs the Russian Federation about the submission of a claim for loss of assets in Crimea to arbitration*, Ukrenergo, <https://ua.energy/media/pres-tsentr/pres-relizy/ukrenergo-povidomylo-rf-pro-peredachu-do-arbitrazhu-pozovu-shhodo-vraty-aktyviv-v-krymu/>. [117]
- Ukrenergo (2019), *Ukrenergo Reorganised into a Joint-Stock Company*, Ukrenergo, <https://ua.energy/media-2/news/ukrenergo-reorganised-into-a-joint-stock-company/>. [97]
- Ukrenergo (2018), *Ukrenergo and transition to the RAB methodology*, Ukrenergo, <https://ua.energy/media-2/news/ukrenergo-transition-rab-regulation/>. [119]
- Ukrenergo (2017), *Government has approved corporatisation of Ukrenergo*, Ukrenergo, <https://ua.energy/media-2/news/government-approved-corporatization-ukrenergo/>. [98]
- Ukrenergo/Ministry of Finance (2019), *Questionnaire on the OECD Project Supporting Energy Sector Reform in Ukraine*. [64]
- Ukrasvydobuvannya (2019), *Processing*, <http://ugv.com.ua/en/page/pererobka>. [25]
- Ukrhydroenergo (2018), *PJSC "Ukrhydroenergo"*, https://uhe.gov.ua/pro_kompaniyu. [41]
- Ukrinform (2019), *Naftogaz: Russia refuses to participate in trilateral gas transit talks in May*, <https://www.ukrinform.net/rubric-economy/2704205-naftogaz-russia-refuses-to-participate-in-trilateral-gas-transit-talks-in-may.html>. [11]
- Ukrinform (2019), *Participants in the gas talks agreed to meet on the 20th of October*, <https://www.ukrinform.ua/rubric-economy/2784326-ucasniki-gazovih-peregovoriv-domovilisa-zustritisa-u-20h-cislah-zovtna.html>. [12]
- Ukrinform (2019), *Ukrenergo implementing over 100 investment projects*, <https://www.ukrinform.net/rubric-economy/2634400-ukrenergo-implementing-over-100-investment-projects.html>. [120]
- Ukrinform (2019), *World Bank recommends Ukraine to reschedule launch of new electricity market for October 1, 2019*, <https://www.ukrinform.net/rubric-economy/2709611-world-bank-> [107]

[recommends-ukraine-to-reschedule-launch-of-new-electricity-market-for-october-1-2019.html](#).

- Ukrinform (2017), *Debts of Energorynok to Energoatom reach almost UAH 13 bln*, [112]
<https://www.ukrinform.net/rubric-economy/2329711-debts-of-energorynok-to-energoatom-reach-almost-uah-13-bln.html>.
- Ukrinterenergo (2018), *About the company*, SFTC Ukrinterenergo, [103]
https://uie.kiev.ua/en/about_en/about-the-company/.
- UN Environment (2018), *Emissions Gap Report 2018*, [78]
https://wedocs.unep.org/bitstream/handle/20.500.11822/26895/EGR2018_FullReport_EN.pdf?sequence=1&isAllowed=y.
- Unian (2019), *Cabinet obliges Energoatom to sell 90% of its electricity in the new market at a fixed price*, [181]
<https://www.unian.ua/economics/energetics/10583553-kabmin-zobov-yazav-energoatom-prodavati-90-svoyeji-elektroenergiji-u-novomu-rinku-za-fiksovanoyu-cinoyu.html>.
- Unian (2019), *DTEK has purchased two power companies from Russia's VS Energy for 250 million experts*, [100]
<https://www.unian.ua/economics/energetics/10408131-dtek-kupiv-dva-oblenergo-u-rosiyskoji-vs-energy-za-250-milyoniv-ekspert.html>.
- Unian (2019), *EBRD Asks Zelensky to Resolve Green Tariff Payments*, [139]
<https://www.unian.ua/economics/energetics/10635099-yebr-r-prosit-zelenskogo-virishiti-problemu-z-viplatami-za-zelenimi-tarifami.html>.
- Unian (2019), *The AMC wants to change the law on energy markets to fight monopolists*, [192]
 Unian, <https://www.unian.ua/economics/energetics/10513524-amku-hoche-zminiti-zakon-pro-energorinok-dlya-borotbi-z-monopolistami.html>.
- Unian (2019), *The AMCU is investigating a possible collusion on coal prices for TPPs*, Unian, [152]
<https://www.unian.ua/economics/energetics/10654008-amku-rozsliduye-mozhlivu-zmovu-shchodo-cin-na-vugillya-dlya-tes.html>.
- Unian (2019), *Ukraine increased oil imports - bought 42% in Russia*, Unian, [24]
<https://www.unian.ua/economics/energetics/10510968-ukrajina-zbilshila-import-naftoproduktiv-u-rosiji-kupila-42.html>.
- Unian (2019), *Ukrenergo's tariff for electricity transmission has been halved*, [187]
<https://www.unian.ua/economics/energetics/10652832-tarif-ukrenergo-na-peredachu-elektroenergiji-znizili-vidvichi.html>.
- Unian (2019), *Zelensky submits bill to Rada to postpone launch of Ukraine's electricity market for 12 months*, [105]
<https://www.unian.info/economics/10582023-zelensky-submits-bill-to-rada-to-postpone-launch-of-ukraine-s-electricity-market-for-12-months.html>.
- Unian (2017), *Debt in Ukrainian wholesale electricity market hits US\$1.16 bln – Energorynok*, [111]
<https://www.unian.info/economics/2207499-debt-in-ukrainian-wholesale-electricity-market-hits-us116-bln-energorynok.html>.
- USAID/DiXi Group (n.d.), *Map: Energy Sector Transparency*, <http://map.ua-energy.org/en>. [26]

- Verkhovna Rada (2019), *Draft Law on Amendments to Article 9-1 of the Law of Ukraine “On Alternative Energy Sources”*. No. 10318, [106]
http://w1.c1.rada.gov.ua/pls/zweb2/webproc4_2?id=&pf3516=10318&skl=9.
- Verkhovna Rada (2019), *On Amendments to Some Laws of Ukraine on Ensuring Competitive Conditions for Generation of Electricity from Alternative Energy Sources*, No. 2712-VIII, [132]
<https://zakon.rada.gov.ua/laws/show/2712-viii?lang=en>.
- Verkhovna Rada (2018), *Draft Law on Peculiarities of Debt Repayment Formed in the Wholesale Electricity Market*, No. 8253, [114]
http://w1.c1.rada.gov.ua/pls/zweb2/webproc4_1?id=&pf3511=63830.
- Verkhovna Rada (2018), *Law of Ukraine about Alternative Energy Sources (555 IV)*, [44]
<https://zakon.rada.gov.ua/laws/show/555-15>.
- Verkhovna Rada (2017), *Law of Ukraine about the Electricity Market*, No. 2019-VIII, Verkhovna [87]
 Rada of Ukraine, <https://zakon.rada.gov.ua/laws/show/2019-19>.
- Verkhovna Rada (2016), *Law of Ukraine About the National Commission for State Regulation of Energy and Utilities*, No. 1540-VIII, [67]
<https://zakon.rada.gov.ua/laws/show/1540-19>.
- Verkhovna Rada (2013), *Law of Ukraine on the principles of functioning of the electricity market of Ukraine*, No. 663-VII, Verkhovna Rada of Ukraine, [84]
<https://zakon.rada.gov.ua/laws/show/663-18>.
- Verkhovna Rada (2011), *Law of Ukraine about the State Property Fund of Ukraine*, No. 4107- [71]
 VI, Verkhovna Rada of Ukraine, <https://zakon.rada.gov.ua/laws/show/4107-17>.
- Verkhovna Rada (2006), *Law of Ukraine on the Management of State Property Objects*, No. [70]
 185-V, <https://zakon.rada.gov.ua/laws/show/185-16>.
- Volyn Klavis (n.d.), *Services*, <http://www.volyn-kalvis.com.ua/>. [58]
- WTO (n.d.), *Agreement on Subsidies and Countervailing Measures (“SCM Agreement”)*, [162]
https://www.wto.org/english/tratop_e/scm_e/subs_e.htm.
- Wuestenhagen, R. and Bilharz (2006), “Green Energy Market Development in Germany: Effective Public Policy and Emerging Customer Demand”, *Energy Policy*, Vol. 34/13, [136]
 pp. 1681-1696, <http://dx.doi.org/10.1016/j.enpol.2004.07.013>.

ARCHITECTURE OF UKRAINE'S ENERGY SECTOR PRE-REFORM



SNAPSHOT OF UKRAINE'S ENERGY SECTOR

INSTITUTIONS, GOVERNANCE AND POLICY FRAMEWORK

This report provides an overview of Ukraine's energy sector. It presents the structure of the sector, identifying the main state and corporate actors, and clarifying roles and responsibilities, as well as reporting mechanisms. It also elucidates the relationships among actors, including government bodies, regulators, state-owned enterprises and other stakeholders. It looks at the mechanisms in place for licencing and for monitoring the energy strategy.

The report describes how the reforms now underway are changing the architecture of the electricity sector, in particular, and presents the architecture in place since the launch of the wholesale electricity market and the corporatisation of Ukrenergo in July 2019. It encompasses both quantitative and qualitative elements, looking at Ukraine's energy mix, sector governance, and policy and regulatory frameworks. It also provides a case study of Ukraine's electricity market.

The report establishes the basis for upcoming OECD analytical work in the context of the project Supporting Energy Sector Reform in Ukraine, funded by the Government of Norway.

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