4.3. ENERGY

4.3.1. Current situation and the sector role

ROLE OF THE ENERGY SECTOR IN THE ECONOMY OF UKRAINE

Before the full-scale invasion, the energy sector played a key role in Ukraine's economic growth and national security and was increasingly contributing to the country's drive to modernise its economy. The electricity sector contributed up to 8% of the Gross Domestic Product. The entire population had access to electricity.

89%
of the population

had access to treated water through pumped water systems.

UKRAINE'S POWER SYSTEM WAS AMONG THE LARGEST IN EUROPE

7th in installed generation capacity **(56 GW)**

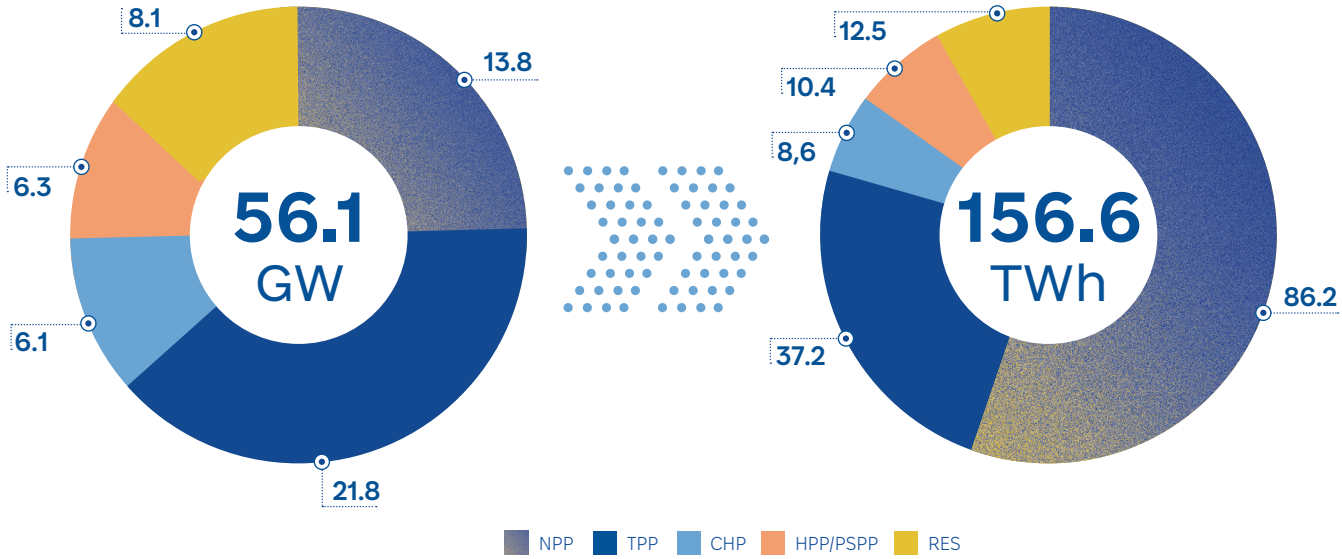
9th in electricity generation **(~156 billion kWh per year)**

Ukraine possesses a great potential for renewable energy sources (RES) development. According to the Institute of Renewable Energy of the National Academy of Sciences of Ukraine, the total potential of renewable energy sources in Ukraine reaches 874 GW, including about 250 GW of offshore wind power capacity. Meanwhile, The International Renewable Energy Agency (IRENA) estimated that Ukraine has the capacity to install more than 320 GW of wind and 70 GW of solar energy. Significant wind intensity in southern Ukraine makes wind power generation economically viable.

The country's energy mix relied heavily on nuclear generation (13.8 GW of capacity which provides 55% generation), with thermal generation utilising coal and natural gas also playing significant roles. Notably, in recent years, there has been a rapid increase in the share of generation from RES, including water, solar, wind, biomass, and biogas. Before the start of the full-scale war, Ukraine's installed renewable energy capacity included ~1.7 GW onshore wind, ~6.4 GW solar and ~6.3 GW hydroelectric power plants.

[1] https://www.ive.org.ua/wp-content/uploads/atlas.pdf

Figure 1: Installed capacity, GW, and electricity generation, TWh in 2021



The electricity sector is highly concentrated. It consists of dominant national players that generate power from coal (privately owned DTEK Energy), hydro resources (PJSC "Ukrhydroenergo"), and nuclear fuel (JSC "National Nuclear Power Generating Company "Energoatom" – Energoatom). The nationwide operator of the transmission system provides transmission and dispatching. Electricity distribution is organised among regional distributed companies that are legally separated from suppliers because of unbundling.

Onshore wind capacity in Ukraine is mostly split between a handful of large investors, including DTEK Renewables, VindKraft Ukraine, Emergy (previously NBT), Wind Parks of Ukraine, Eurocape Ukraine, Ukraine Yuzhne Energy Co. (subsidiary of a Chinese investment company CHN ENERGY Investment Group), VR Global, Eco Optima and Guris.

More than half of investment in solar capacity in Ukraine is done by medium and small companies. Major investors include DTEK Renewables, VR Global, Center Group, Scatec, CNBM, UDP Renewables, Rengy, Tokmak Solar, Eco Optima, Novosvit Energy and TIU Canada.

Ukraine also has significant reserves of natural energy resources (natural gas, oil, coal, uranium, etc.). Further development of deposits and an increase in production using the latest technologies will allow Ukraine to cover domestic consumption and ensure exports to the EU partner countries.

THE IMPACT OF THE WAR ON THE NATIONAL ENERGY SECTOR

The Ukrainian energy sector has suffered significant destruction during the full-scale invasion of russia. Only nuclear generation remains intact, producing the bulk of electricity. The capacity deficit is compensated by supplies from abroad. According to the World Bank's RDNA3 report, the damage **to the energy sector as of December 31, 2023, is estimated at**

USD 10.6 billion
(this excludes ~USD 2.1 billion district heating sector)

The power sector incurred the largest share of damage totalling USD 7.5 billion, with the generation segment contributing USD 4.9 billion. The damage caused to the electricity distribution sector ~USD 430 million, the oil sector (including oil refineries, fuel depots, and fuel stations) ~USD 1.7 billion.

Total recovery and reconstruction needs as of December 31, 2023, are estimated at

USD 47.1 billion

USD 40.4 billion is necessary for power sector reconstruction, including transmission system operators, distribution system operators, and power generation facilities. Approximately USD 2.95 billion is required for the reconstruction of the gas transport system, USD 3.4 billion for the fuel oil sector reconstruction, including oil refinery facilities and distribution networks, and USD 0.3 billion for the recovery of the coal sector.

This exacerbates the need to transform the energy sector and build a modern system of generation, heat supply and energy systems. The creation of distributed generation and heat supply, the construction of new wind turbines, the construction of critical generation facilities in areas protected by air defence will allow the building of a sustainable modern energy supply system.

Recent Developments and Investments in Energy Sector

Despite the ongoing armed hostilities, Ukraine is conducting the most extensive repair campaign at energy facilities in its independence history and commissioning new generation facilities. **By the end of 2023, 100% of the repairs at TPPs and CHPs scheduled for the start of the heating season were completed, and about 3 GW of heat and power generation capacity was restored and added to the energy system**[2].

The equipment for repairs was purchased, among other things, at the expense of the Ukraine Energy Support Fund, established at the initiative of the Minister of Energy of Ukraine, German Galushchenko and European Commissioner for Energy, Kadri Simson. As of spring 2024, the Fund has managed to attract more than EUR 410 million from 13 partner countries and international organisations. Of this amount, more than EUR 393 million has been transferred to the account (the remaining amount is the announced contributions that will be transferred to the Fund's participants shortly). These funds have been used to finance the most urgent needs of Ukrainian energy companies, such as equipment, spare parts, and other technical items, as well as fuels and services needed to repair infrastructure and maintain energy and heat supply in Ukraine.

Moreover, it's critical to provide passive defence and/or fortification structures for critical energy infrastructure facilities to protect them from future russian missile and drone attacks.

Nuclear generation

Together with US-partners, the construction of new KhNPP-5 and KhNPP-6 power units using Westinghouse AP1000 technology at Khmelnytsky NPP has begun. The expected additional capacity is more than 2,000 MW. These power units are manoeuvrable, which is the optimal solution under current conditions. In addition, joint efforts of Westinghouse and Energoatom have developed a new type of nuclear fuel for VVER-440 reactors, which will allow them to compete with russia, which had a monopoly in this market before the full-scale invasion of Ukraine.

In 2023, an agreement was signed with Holtec International on the construction of up to 20 nuclear power units with SMR-160 reactors (with a total capacity of 3,200 MW) in Ukraine. In 2024, an agreement was reached to create facilities in Ukraine to produce and manufacture nuclear systems, structures, and components for small modular reactors and storage and transportation systems for used nuclear fuel.

Renewable energy sources

However, despite the ongoing war, investment in renewable energy in Ukraine has not stopped. In 2023, 182.3 MW of wind power plants, about 500 MW of solar power plants (mainly on the consumer side), and about 100 MW of gas power plants (mainly on the consumer side) were commissioned. Investments in Ukraine's energy infrastructure have been substantial, especially in renewables. For example, in 2023, Ukrainian businesses invested approximately USD 150 million in solar energy. Most of the new-generation facilities have a capacity of 1 megawatt or less. The most significant new power plant operational in 2023 was DTEK's Tyligulska wind farm, located in the Mykolaiv region, with a generation capacity of 78 MW.

At the beginning of 2022, Ukraine had approximately 45 thousand prosumers (solar power plant owners)[3]. At the beginning of 2024, according to the Solar Energy Association of Ukraine, this figure exceeded 54 thousand. It is estimated that out of the 500 MW of total SPP capacity built in 2023, most do not exceed 1 MW each, and they were commissioned primarily to replace their consumption.

Thermal generation

The Ukrainian government and private sector are making concerted efforts to restore and enhance energy infrastructure. In 2023, DTEK, Ukraine's largest private energy group, invested about USD 300 million in thermal power plant repairs and coal mining. Furthermore, the US Agency for International Development (USAID) has significantly supported Ukraine's energy sector. In 2023, USAID provided USD 475 million in emergency energy assistance to help restore and strengthen the energy infrastructure and critical electricity grid components.

[2] https://mev.gov.ua/novyna/herman-halushchenko-my-vidnovyly-i-dodaly-do-enerhosystemy-3-hvt-potuzhnosti
[3] https://www.aseu.solar/about-6

Biomethane

Currently, Ukraine has a potential for biomethane production of about 10 billion m^3 per year, provided mainly by agricultural residues. In 2023, a new biomethane plant was launched. Another one is expected to be launched this year, and 10 in the next 2 years, which will significantly increase the volume of generation from this source in the Ukrainian market.

The further recovery and development of Ukraine's energy sector are prerequisites for its becoming a driver of economic growth. The key to this will be the full integration of Ukraine's energy markets with European ones and the attraction of foreign private capital to the Ukrainian energy sector.

4.3.2. Overview and outlook of key reforms

Until February 24, 2022, Ukraine closely collaborated with international partners to improve state regulation of the energy sector and optimise the industry's environmental impact. **Despite hostilities and ongoing challenges for the energy sector, Ukraine continued to implement EU norms on the functioning of the energy market, achieving the following milestones:**

November 2022

Establishment of JSC "Ukrainian Distribution Grids," increasing the reliability and efficiency of DSO management.

February 2023

Completing the corporatisation of Energoatom as one of the stages of corporate governance reform.

April 2023

Adopting the National Energy Strategy until 2050 (ESU2050).

April 2023

Certification of Ukrtransgaz, the gas storage operator, in accordance with new EU regulations, allowing foreign traders to store more than 3 bcm of natural gas from non-residents into gas storage facilities of Ukrtransgaz in 2023.

December 2023

Full membership of the National Energy Company Ukrenergo (ISO-certified transmission system operator of Ukraine with the functions of operational and technological control of the Integrated Power System of Ukraine, the transmission of electricity via trunk power grids from generation to distribution networks) in ENTSO-E.

December 2023

The process of de-oligarchization of gas distribution networks has been completed. Seventy-seven gas distribution companies have already come under state control, guaranteeing uninterrupted gas supply in times of war (as of 2023, the length of distribution pipelines was 227 thousand kilometres).

January 2024

Presentation of the draft Hydrogen Strategy of Ukraine until 2050.

February 2024

Adoption of the Resolution «On the Introduction of Guarantees of Origin of Electricity Generated from Renewable Energy Sources».

As of the beginning of 2024, several strategies and reforms have been planned together with international partners and considering the current situation in the energy sector, including:

Reform 1: Development and approval of the Integrated National Energy and Climate Plan (Q2 2024)

Potential impact: The reform will introduce a comprehensive approach to energy and environmental policy making. This approach requires alignment of goals across government agencies and provides a level of planning that will facilitate public and private investment. Approval of the plan will ensure synchronisation of the implementation of public policies in energy and climate, coordination of governmental actions for reaching greater policy efficiency in the spheres of energy and climate, promotion of a clear step-by-step approach to achieving the goals of low-carbon development, effective preparation and implementation of policies, synchronisation of national and European policies, practical implementation of the European integration in respective spheres, provision of greater clarity and specification of national policies for investors in order to strengthen trust and inspire investments, and contribute to coordination of donor and partners cooperation in the spheres for a more efficient and practical implementation of policies.

Reform 2: Ensuring the independence of the regulator (National Energy and Utilities Regulatory Commission) (Q4 2024)

Potential impact: Ensuring the independence of the Regulator will become the basis for ensuring the effective functioning and development of markets in the energy and utilities sectors through impartial regulation of markets in order to balance the interests of consumers, business entities operating in the energy and utilities sectors, as well as ensuring energy security, European integration of the electricity and natural gas markets of Ukraine. It will promote NEURC's structured and systematic interaction with ACER (the Agency for the Cooperation of Energy Regulators).

Reform 3: Improving the efficiency of the district heating sector (Q4 2025)

Potential impact: Implementation of the reforms will help improve the sustainability of district heating, enhancing the energy security of settlements, reduce heat and water losses in district heating and improving overall efficiency (including management) to make it the most affordable and secure solution for heat and hot water supply to residents and other final customers in municipalities. As such, it will help create a favourable framework for investments in high-efficiency district heating and high efficiency cogeneration, increase the resilience of the unified energy system and decentralisation of generation facilities and ultimately support decarbonisation and reduction of greenhouse gas emissions. The reduced loss of water and reduced energy consumption resulting from improved efficiency of district heating will contribute positively to the mitigation of climate change and a more sustainable use of water resources, to the extent possible in a context of war or post-war recovery and reconstruction.

Reform 4: Electricity market reform (Q2 2026)

Potential impact: The integration of the Ukrainian electricity markets into the European ones will increase the volume of cross-border trade, improve the security of both Ukrainian and EU markets, making them less sensitive to external factors, unfair competition and possible market abuse.

Reform 5: Liberalisation of electricity and natural gas prices (Q2 2026)

Potential impact: The implementation of the reform will ensure the strengthening of competition in the wholesale and retail natural gas and electricity markets. This, in turn, will attract investment in the energy sector. The improved incentives for businesses and consumers to save energy following the liberalisation of energy prices is expected to contribute positively to the mitigation of climate change, to the extent possible in a context of war or post-war recovery and reconstruction.

Reform 6: Improvement of the regulatory framework for increasing renewable energy and ensuring stable operation of the energy system (Q3 2026)

Potential impact: The reform will ensure the creation of legal, organisational and technical conditions for the sustainable development of renewable energy on a competitive market basis, with the goal to increase the share of renewable energy in the energy balance of Ukraine in accordance with Ukraine's international obligations and national strategies and plans, while ensuring the security of energy supply to consumers. The Improved regulatory framework for increasing renewable energy and ensuring stable operation of the energy system will contribute positively to the mitigation of climate change and to other 'do no significant harm' principles, to the extent possible in a context of war or post-war recovery and reconstruction.

Reform 7: Improvement of energy efficiency in public buildings and public procurement procedures, taking into account energy efficiency requirements (Q1 2027)

Potential impact of the reform: Implementation of reform will help increase the energy sustainability of buildings and municipalities in general by reducing energy consumption in an energy-efficient way, contribute to enhancing quality of life and health by improving the internal environment and thermal comfort, expand opportunities for sustainable energy development in municipalities and reduce greenhouse gas emissions, improve the well-being of residents and the financial capacity of local governments by boosting business activity and creating new green jobs and help reduce energy poverty. The improved energy efficiency in public buildings and increased focus on energy efficiency performance in public procurement will contribute positively to the mitigation of climate change, to the extent possible in a context of war or post-war recovery and reconstruction.

4.3.3. Tendencies and trends

Despite the full-scale war, Ukraine continues to fulfil its international commitments and follow the energy sector agenda:

Phase out coal generation and achieving climate neutrality

Ukraine follows the global trend towards decarbonisation and aims to end the use of coal in the energy sector by 2035, considering all energy security issues since a significant part of Ukraine's thermal generation is using coal as a raw material. The coal-fired generation will be replaced by combined fuel CHPs and TPPs (natural gas biomethane) and biofuel CHPs (solid waste, agricultural waste, wood, etc.).

Also, in 2023, Ukraine adopted ESU2050, which defines one of the key strategic goals: achieving climate neutrality in the energy sector by 2050 and ensuring a 100% carbon-free energy mix by 2050.

European integration

Ukraine aims to develop the energy sector in synergy with the EU. Thus, in 2023, Ukraine fulfilled all the technical requirements in the Agreement on the Future Interconnection of the Power System of Ukraine and Continental Europe. The Ukrainian power grid was finally synchronised with the European, and Ukrenergo became a full member of ENTSO-E. Ukraine and Poland expanded their electricity exchange capabilities through a joint power transmission line of almost 400 km. **The capacity for electricity imports was also increased to 1,700 MW (in 2022-2024, electricity imports amounted to 1 billion kWh, and exports to the EU countries – 3 billion kWh).**

The operator of gas storage facilities Ukrtransgaz has been certified in accordance with the new EU regulations. Ukraine also joined the AggregateEU joint natural gas procurement platform in 2023.

Ukraine takes into account the EU's goals in the energy sector in its own strategic documents, particularly the Energy Strategy, as well as in other draft strategic documents, namely the Hydrogen Strategy of Ukraine until 2050 and the National Energy and Climate Plan, etc.

Integration of Ukraine's national energy sector with the European one remains an important goal for the country in 2024.

Development of renewable energy sources (RES)

For Ukraine, the development of clean energy is one of the key factors in ensuring energy independence and security, especially in the context of russia's full-scale military aggression. The share of RES in Ukraine's energy mix remains significant – in 2023, about 10% of electricity was generated by wind and solar power plants. **Considering sizable hydroelectric power plants, (more than in the pre-war period)** **the share of clean energy produced reached 20.3% (more than in the pre-war period).**

The Energy Strategy of Ukraine, adopted last year, envisages a course towards producing clean energy. In 2030, the share of renewable energy sources should be at least 25% in the energy mix, and by 2050, Ukraine will achieve climate neutrality.

Energy efficiency

The State Fund for Decarbonization and Energy-Efficient Transformation in Ukraine was established in 2023, thereby introducing the European "polluter pays" principle as provided for by the EU Energy and Climate Action Regulation. The fund is also planned to attract international loans and grants, with the funds received earmarked for introducing new technologies to reduce emissions, the thermal modernisation of buildings and social facilities, and other projects. **By 2030, according to the National Energy Efficiency Action Plan, final energy consumption in Ukraine is projected to be reduced by 17%.**

In 2023, a unique multi-level and multi-component IT tool, the Ukrainian National Decarbonization Platform (UANDP), was developed. The platform will serve several functions, including project collection and implementation (from technical solutions to funding), popularisation and education, and monitoring and verifying national goals.

Establishing a network of regional decarbonisation and energy efficiency offices has commenced, with the first offices opening in Dnipro and Kropyvnytskyi for cooperation with local governments.

4.3.4. Prospects and potential for the sector

Energy hub of Europe

The destruction of a significant part of Ukraine's energy infrastructure will be the impetus for rebuilding with the latest technologies. Interaction with European markets will increase as Ukraine moves closer to EU accession. The development of the Ukrainian energy sector will help European countries eliminate their dependence on russian energy products. This will improve the energy sustainability of the Ukrainian and the EU energy systems. **According to the ESU2050, exports to the EU countries are planned to increase, namely green electricity (6 GW from 2032 and 10 GW from 2050), hydrogen, ammonia, green steel, and biomethane.** Europe's largest gas storage facilities (30.95 billion m³) will also be used, and modern energy equipment will be produced for Ukraine's reconstruction and international exports.

Decentralised generation

The decentralisation approach effectively counters russia's terror against Ukraine's energy-generating capacities. **Ukraine considering the possibility of building hundreds of small power plants (from 5 MW to 30 MW) that can operate independently of each other.** This approach will ensure the stability of electricity supply in the event of a partial capacity failure. Diversification implies a large number of generating facilities and their diversity. Since wind farms and solar power plants depend on weather conditions, other facilities (gas plants, biogas heat generation, electricity storage systems, and other fuels) are being considered to balance capacity.

Hydrogen hub

Ukraine is well-positioned to become a key supplier of hydrogen to Central Europe due to the several competitive advantages. Abundant renewable energy resources combined with high land availability could enable at-scale build-out of renewable hydrogen production. Substantial existing zero-carbon energy capacity (hydro and nuclear) could serve as a transition energy source for clean hydrogen production and provide baseload power to ensure high electrolyzer utilisation. The country also has an extensive natural gas pipeline network that connects it to Central Europe, making it an attractive potential supplier of hydrogen to the region.

Even before the outbreak of the full-scale war, Ukraine was included in Hydrogen Europe's 2X40 GW Initiative, which envisages cooperation and construction of electrolysers with a total capacity of 8 GW in Ukraine by 2030 for export. Currently, the Hydrogen Strategy of Ukraine until 2050 and an operational action plan for its implementation are being developed. **The strategy defines the achievement of low-carbon hydrogen exports of 0.3 to 0.4 million tons in 2035 and 1.5 to 2.0 million tonnes in 2050, depending on the demand of importing countries.**

For more information about the Hydrogen Strategy of Ukraine until 2050, please refer to paragraph 4.4.2. "Overview of hydrogen opportunity in Ukraine".

The primary market for Ukrainian hydrogen exports is the EU market. Targeted infrastructure for hydrogen imports to the EU is planned in three priority supply corridors: the Mediterranean, the North Sea region, and Ukraine. On November 28, 2023, the European Commission adopted the first list of Projects of Common Interest (PCI) and Projects of Mutual Interest (PMI), which fully meets the objectives of the European Green Deal, including the Central European Hydrogen Corridor, which should ensure competitive transportation of renewable hydrogen from Ukraine through Slovakia and the Czech Republic to Germany and other EU countries. The project is scheduled to be implemented by 2030 with a design capacity of up to 1.5 million tonnes per year.
For more details about hydrogen production and its prospects in Ukraine, please refer to the paragraph 4.4 "Hydrogen" of this investment guide.

Localisation of power equipment manufacturing

Ukraine has a great potential for localising the manufacture of solar panels, ESUs (energy storage units), electrolysers, turbines, small modular reactors, nuclear fuel components, grids, transformers, and other energy equipment.

The production of integrated solar modules, racks, and other electronic components will help meet growing domestic demand and reduce EU countries' dependence on China. The GoU is ready to provide sites for privatisation to promote localisation.

Localisation of wind generation involves the production of all components of the tower, base, nacelle, and rotor. To facilitate localisation development, the possibility of privatising the facilities of Zaporozhtransformator and JSC Ukrainian Energy Machines is being considered.

The localisation of energy storage unit production in Ukraine is possible based on the use of explored lithium reserves at the Polokhivske, Shevchenkivske, Dobra, and Kruta Balka deposits. According to the Ukrainian Geological Survey, as of 2023, lithium and graphite reserves are sufficient to produce cathode and anode materials for lithium-ion batteries with a capacity of 1,000 GWh, which would power nearly 20 million electric vehicles.

In close cooperation with Holtec International, facilities are planned to produce and manufacture nuclear systems, structures, and components for small modular reactors and storage and transportation systems for used nuclear fuel.

ENERGY

Highlighted investment projects

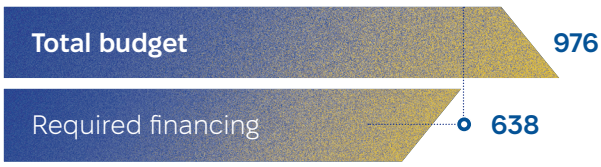
«DTEK RENEWABLES» LLC

DTEK POLTAVSKA WIND POWER PLANT

POLTAVA REGION

- **Brief Description:** Construction of a new wind power plant with a capacity of 650 MW and a projected annual electricity generation of over 2 billion kWh in the Poltava region
- **Target Market:** Upon completion of the Project's construction, the WPP will strengthen Ukraine's energy independence and partially compensate for the deficit of electricity due to lost and damaged generation capacities.
- **Products/Services:** Wind power generation of over 2 billion kWh.
- **Technologies and Innovations:** Wind power plant.
- **Unique Selling Proposition**: Increasing the share of renewable energy, strengthening energy independence, partial compensation of electricity shortages due to lost and damaged capacities.
- **Project Status:** Feasibility study/pre-feasibility study

Projects Highlights[1] ($, mln)



Type of financing – to be discussed with potential investors

Financing structure: CAPEX – 80% / Other costs – 20%

Expected Financial Indicators:

- NPV – subject to financing model
- DPP (months) – subject to financing model
- Revenue – 148 (1st full year)
- IRR – 10% (standard level for wind projects in Ukraine)
- Project launch period – 2024
- EBITDA – 123 (1st full year)

BUSINESS MODEL

DTEK Renewables is the operating company managing the renewable energy assets of DTEK Group. The company's green portfolio is 1.1 GW of solar and wind capacities, which located in the Mykolaiv, Zaporizhzhia, Dnipropetrovsk, and Kherson regions and 0.4 GW will be constructed in 2024-2025.

KEY FINANCIALS DTEK GROUP IN 2020 (MLN UAH)

Revenue	EBITDA	Total assets
116.1	32.8	180.4

Key partners

The Project will use WTGs as well as major technical equipment from world leading manufacturers

Key Points of Project Implementation:

2024 Start of project implementation → **2026** Commissioning → **650 MW of new WPP capacities**

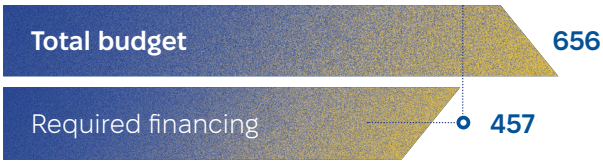
1 - The project information and financial indicators are provided by company-initiator of the project.

«DTEK RENEWABLES» LLC | PODILSKA WPP

VINNYTSIA REGION

- **Brief Description:** Project capacity – 500 MW. At the development stage. Measures are being taken to assess decisions on connection to electrical networks
- **Target Market:** Upon completion of the Project's construction, the WPP will strengthen Ukraine's energy independence and partially compensate for the deficit of electricity due to lost and damaged generation capacities.
- **Products/Services:** Wind power generation 1.5 billion kWh.
- **Technologies and Innovations:** Wind power plant.
- **Unique Selling Proposition:** Compensation for destroyed TPP capacities, helping Ukraine fulfill green transition obligations and the tasks of the Energy Strategy 2050. WPPs are at a lower risk of destruction from the terrorist attacks

Projects Highlights[1] ($, mln)



Type of financing – to be discussed with potential investors

Financing structure: CAPEX – 85% / Other costs – 15%

Expected Financial Indicators:

- NPV – subject to financing model)
- DPP (months) – subject to financing model
- Revenue – 113 (1st full year)
- IIRR – 10% (standard level for wind projects in Ukraine)
- Project launch period – 2025
- EBITDA – 94 (1st full year)

- **Project Status:** Feasibility study/pre-feasibility study

BUSINESS MODEL

DTEK Renewables is the operating company managing the renewable energy assets of DTEK Group. The company's green portfolio is 1.1 GW of solar and wind capacities, which located in the Mykolaiv, Zaporizhzhia, Dnipropetrovsk, and Kherson regions and 0.4 GW will be constructed in 2024-2025.

KEY FINANCIALS DTEK GROUP IN 2020 (MLN UAH)

Revenue	EBITDA	Total assets
116.1	32.8	180.4

Key partners

The Project will use WTGs as well as major technical equipment from world leading manufacturers

Key Points of Project Implementation:

2024	Q2 2025	Q4 2026	500 MW
Start of project implementation	Completed development	Completed development	of new WPP capacities

1 - The project information and financial indicators are provided by company-initiator of the project.

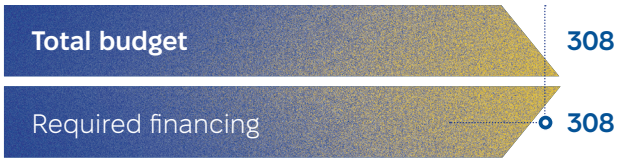
«WIND PARK WEST R» LLC

WPW «WIND PARK WEST R»

RIVNE REGION

- **Brief Description:** Construction of a wind farm with a total capacity of 200.6 MW (34 wind turbines), including a new electric substation PS 330/35 on the southern part territory of Rivne regions
- **Target Market:** strengthening Ukraine's energy sector.
- **Products/Services:** Wind power generation.
- **Technologies and Innovations:** Wind farm with a capacity of 200.6 MW (34 wind turbines), new electrical substation PS 330/35.
- **Unique Selling Proposition:** The annual projected capacity of 680 000 MWh*, the connection of 330 kV.
- **Project Status:** 50% Ready for implementation

Projects Highlights[1] ($, mln)



Type of financing – equity financing

Financing structure: CAPEX – 90%* / OPEX – 10%*

Expected Financial Indicators:

- NPV ~ 4.7*
- DPP (months) ~ 67*
- Revenue ~ 72.4* (annually)
- IRR ~ up to 17.5%
- Project launch period ~ Q2 2025
- EBITDA ~ 60.5* (annually)

BUSINESS MODEL

Includes the selection of suitable sites (completed), wind measurement campaign 24 months (completed), financing and implementation of the construction, installation and operation stages of a 200.6 MW wind power plant with 34 turbines and a new electrical substation on the southern part the Rivne regions. It includes site evaluation, investment attraction, detailed planning, construction, operation, power distribution and project management to ensure successful project execution and long-term viability.

Key partners

Energy equipment suppliers, energy companies, and financial institutions

Key Points of Project Implementation:

2025
Start of project implementation

→

2027
Commissioning

→

200.6 MW
of new WPP capacities

1 - The project information and financial indicators are provided by company-initiator of the project. * - approximately

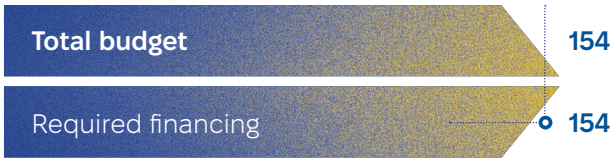
«WIND PARK WEST L» LLC

WPW «WIND PARK WEST L»

LVIV REGION

- **Brief Description:** Construction of a wind farm with a total capacity of 100.3 MW (17 wind turbines), including a new electric substation PS 110/35 on the territory of Lviv regions
- **Target Market:** strengthening Ukraine's energy sector.
- **Products/Services:** Wind power generation.
- **Technologies and Innovations:** Wind farm with a capacity of 100.3 MW (17 wind turbines), new electrical substation PS 110/35
- **Unique Selling Proposition:** The annual projected capacity of 345000 MWh*, the connection of 110 kV
- **Project Status:** 50% Ready for implementation

Projects Highlights[1] ($, mln)



Type of financing – equity financing

Financing structure: CAPEX – 90%* / OPEX – 10%*

Expected Financial Indicators:

- NPV ~ 2.4
- DPP (months) ~ 67*
- Revenue ~ 36.2* (annually)
- IRR ~ up to 17.5%
- Project launch period ~ Q2 2025
- EBITDA ~ 30.2* (annually)

BUSINESS MODEL

Includes the selection of suitable sites (completed), wind measurement campaign 24 months (completed), financing and implementation of the construction, installation and operation stages of a 200.6 MW wind power plant with 34 turbines and a new electrical substation on the southern part the Rivne regions. It includes site evaluation, investment attraction, detailed planning, construction, operation, power distribution and project management to ensure successful project execution and long-term viability.

Key partners

Energy equipment suppliers, energy companies, and financial institutions

Key Points of Project Implementation:

2025
Start of project implementation

→

2027
Commissioning

→

100.3 MW
of new WPP capacities

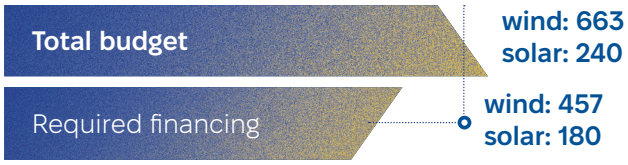
1 - The project information and financial indicators are provided by company-initiator of the project. * - approximately

GURIS | PLAKHTIYIVKA ENERGY COMPLEX

ODESA REGION

- **Brief Description:** 460 MW wind farm, 460 MW solar farm, 100 MW/200MWh energy storage facility
- **Target Market:** Strengthening Ukraine's energy sector.
- **Products/Services:** Energy generation (hybrid wind and solar) and storage.
- **Technologies and Innovations:** A combination of a wind farm, a solar farm and an energy storage facility.
- **Unique Selling Proposition:** The combination of wind, solar and battery storages allows reliable and stable supply of green electricity all across the day and the year. Potential private PPA with 500MW Hydrogen in Zakarpattia of the same investors
- **Project Status:** Ready for implementation in Q4 2024

Projects Highlights[1] ($, mln)



Type of financing – Debt financing (MFIs, commercial banks)
Financing structure: CAPEX equity 25% / debt 75%, OPEX equity 100%

Expected Financial Indicators:

- NPV – wind: 1066, solar: 705
- DPP (months) – wind: 84, solar: 72
- Revenue – wind: 130, solar: 53 (annually)
- IRR : up to 18%
- Project launch period – 2025
- EBITDA – wind: 88, solar: 50 (annually)

Highlights are given for wind and solar only as energy storage is very dependent on changes in the grid code.

BUSINESS MODEL

Güriş is a privately owned engineering and construction company founded 67 years ago, currently working in Turkey, Europe, the Middle East, Ukraine, and North Africa. Güriş, as an EPC contractor, executes diverse construction projects. Since the early 2000s, Güriş has put more emphasis on investments in renewable energy. Right now, company operates 1,132 MW of renewable projects (of which 766 MWs is wind) and develops additional projects totaling more than 500 MWs in Turkey and in neighboring countries.
N1 Capital excels in developing utility-scale green hydrogen projects, typically over 100 MW, integrating wind, solar, and battery storage. The current pipeline includes over 1 GW of green hydrogen, 800+ MW of PV, and 300+ MW of wind power.

Key partners

Energy equipment suppliers, energy companies, and financial institutions

Key Points of Project Implementation:

2024
Start of project implementation
→
2026
Commissioning
→
460 MW WPP
460 MW SPP
100 MW/200MWh energy storage system

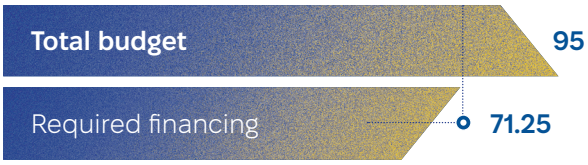
1 - The project information and financial indicators are provided by company-initiator of the project.

GURIS | OVID NORTH

ODESA REGION

- **Brief Description:** 66 MW extension of existing 32MW Ovid Wind power plant
- **Target Market:** Strengthening Ukraine's energy sector.
- **Products/Services:** Wind power generation
- **Technologies and Innovations:** Wind farms.
- **Unique Selling Proposition:** 20km away from Odesa, Ovid Wind was in 2022 one of the wind farm allowing to keep the lights of the city on. Its extension, Ovid North can be implemented very rapidly.
- **Project Status:** Ready for implementation

Projects Highlights[1] ($, mln)



Type of financing – Debt financing (MFIs, commercial banks)

Financing structure: CAPEX equity 25% / debt 75%, OPEX equity 100%

Expected Financial Indicators:

- NPV – 160
- DPP (months) – 84
- Revenue – 20.5 (annually)
- IRR – 18%
- Project launch period – 2025
- EBITDA – 14 (annually)

BUSINESS MODEL

Güriş is a privately owned engineering and construction company founded 67 years ago, currently working in Turkey, Europe, the Middle East, Ukraine, and North Africa. Güriş, as an EPC contractor, executes diverse construction projects. Since the early 2000s, Güriş has put more emphasis on investments in renewable energy. Right now, company operates 1,132 MW of renewable projects (of which 766 MWs is wind) and develops additional projects totaling more than 500 MWs in Turkey and in neighboring countries.

Key partners

Energy equipment suppliers, energy companies, DFC and other financial institutions

Key Points of Project Implementation:

2024
Start of project implementation

→

Dec 2024 / Jan 2025
Commissioning

→

66 MW
of new WPP capacities

1 - The project information and financial indicators are provided by company-initiator of the project.

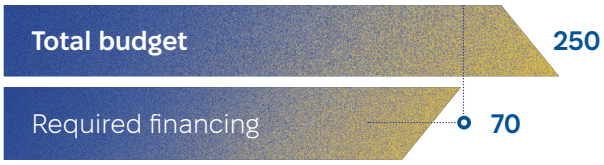
PJSC «UKRHYDROENERGO»

HYBRID POWER GENERATION SYSTEMS INSTALLATION

5 REGIONS

- **Brief Description:** installation of hybrid storage systems at five generating facilities of PJSC "Ukrhydroenergo"
- **Target Market:** Strengthening Ukraine's energy sector
- **Products/Services:** Electricity generation and storage
- **Technologies and Innovations:** installation of hybrid storage systems – 197 MW and solar systems – 35.9 MW.
- **Unique Selling Proposition:** Enhances energy system reliability, supports operations in ENTSO-E conditions, enables integration of new renewable energy capacities, and minimizes limitations on renewable sources.
- **Project Status:** Feasibility study/pre-feasibility study

Projects Highlights[1] ($, mln)



Type of financing – credit and own funds

Financing structure: CAPEX – 98.5% / OPEX – 1.5%

Expected Financial Indicators:

- NPV – 198.3
- DPP (months) – 51
- Revenue – 46.88
- IRR – 27.7%
- Project launch period – 2023
- EBITDA – TBD

BUSINESS MODEL

Ukrhydroenergo is the largest hydropower generating company in Ukraine, 100% shares of which belong to the state. The company is on the list of 15 enterprises in the public sector of the economy, the total assets comprising 70% of the total indicator in the public sector.

KEY FINANCIALS 31.12.2021 IN MLN UAH

Income	Profit	Total assets
23 437.7	11 260.8	49 325.9

Key partners

European Bank for Reconstruction and Development, Climate Investment Funds

Key Points of Project Implementation:

2024
Start of project implementation

→

2027
Commissioning

→

Installation of 197 MW of new hybrid energy storage systems and 35.9 solar systems at the company's 4 HPPs

1 - The project information and financial indicators are provided by company-initiator of the project.

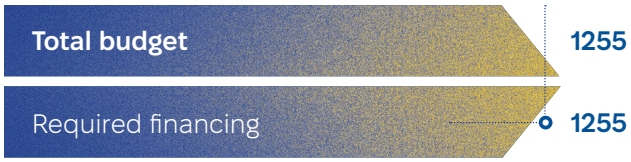
PJSC «UKRHYDROENERGO»

CONSTRUCTION OF THE THIRD PHASE OF THE DNISTER HPP

CHERNIVTSI REGION

- **Brief Description:** Construction and commissioning of new highly maneuverable generating capacities of the 972 MW HPP
- **Target Market:** Strengthening Ukraine's energy sector.
- **Products/Services:** Hydroelectric power generation
- **Technologies and Innovations:** hydro units No. 5-7, new production facilities of the Dniester HPP.
- **Unique Selling Proposition:** The project is already underway, having been developed, approved, and expertly assessed. Contracts for general contracting and the development of working documentation have been finalized

Projects Highlights[1] ($, mln)



Type of financing – credit and own funds

Financing structure: CAPEX – 100% / OPEX – 0%

Expected Financial Indicators:

- NPV – 814.18
- DPP (months) – 112
- IRR – 21.6%
- Project launch period – 2023

- **Project Status:** Implementation stage

BUSINESS MODEL

Ukrhydroenergo is the largest hydropower generating company in Ukraine, 100% shares of which belong to the state. The company is on the list of 15 enterprises in the public sector of the economy, the total assets comprising 70% of the total indicator in the public sector.

KEY FINANCIALS DTEK GROUP IN 2020 (MLN UAH)

Income	Profit	Total assets
23 437.7	11 260.8	49 325.9

Key partners

Energy equipment suppliers, energy companies, and financial institutions

Key Points of Project Implementation:

2023 Start of construction → **2028** Commissioning → **976 MW of new generating capacity**

1 - The project information and financial indicators are provided by company-initiator of the project.

ENERGY

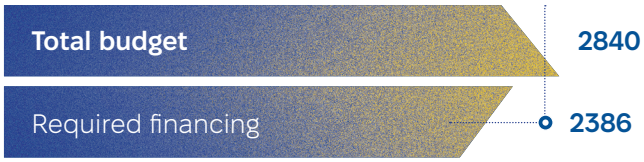
PASSIVE DEFENSE OF CRITICAL ENERGY INFRASTRUCTURE

14 REGIONS

PUBLIC SECTOR SPONSOR: MINISTRY FOR COMMUNITIES, TERRITORIES AND INFRASTRUCTURE DEVELOPMENT OF UKRAINE

- **Brief Description:** Construction of passive defense and/or fortification structures for 22 critical energy infrastructure facilities to protect facilities from future russian missile and drone attacks
- **Impacted Populations:** Sufficient and stable access to electricity is a need for all economic sectors and populations within Ukraine, particularly as russian aggression continues to target energy infrastructure
- **Impact:** Increased resiliency of energy infrastructure across 14 regions of Ukraine, ~3k temporary construction jobs, reduced disruptions to grid operations .
- **Value Proposition:** Intended to increase resiliency of critical energy infrastructure to future russian attacks and reduce risk of blackouts and other interruptions to millions of Ukrainians.
- **Project Status:** Ongoing, began in 2022

Projects Highlights[1] ($, mln)



Type of financing – 2 years

Additional Details: Includes 2 types of defense to be implemented across 22 critical infrastructure facilities across Ukraine:

- Level II: Unmanned aerial vehicle (UAV) protection (USD 2,372 mln)
- Level III: Anti-missile protection (USD 467 mln)

Trigger Event: russian attacks have damaged 40% of transmission infrastructure, damaged 20% of distribution system, and reduced generation capacity by 50%. The Project is needed to protect remaining infrastructure to deliver reliable electricity and heat for the 2024-2025 winter

BUSINESS MODEL

Design-Build (DB) business model, as well as procurement of equipment for some components

LINK TO REFORMS

A resilient energy system will enable Ukraine to withstand competitive pressures and market forces in the EU.

Aligns with UN Sustainable Development Goal 7: To ensure that people have access to affordable, reliable, sustainable, and modern energy sources

Key partners

Ministry of Restoration
Ministry of Energy
Local entities

Key Points of Project Implementation:

Began in 2022, expected to be completed in 2025
Testing has been carried out on the effectiveness of the protections
Level III & Level II are two separate passive defense systems built according to individual project designs, which are carried out at one electrical substation
Procurements subject to martial law

1 - The project information and financial indicators are provided by company-initiator of the project. * - approximately

ENERGY

STATE FUND FOR DECARBONIZATION AND ENERGY TRANSFORMATION

PUBLIC SECTOR SPONSOR: MINISTRY FOR COMMUNITIES, TERRITORIES AND INFRASTRUCTURE DEVELOPMENT OF UKRAINE

UKRAINE

- **Brief Description:** Support of State Fund for Decarbonization and Energy Transformation (Fund) to finance energy efficiency and decarbonization projects

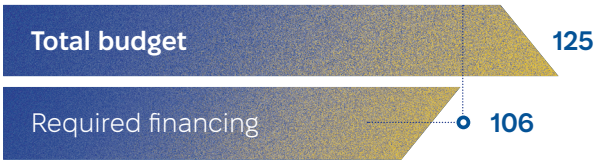
- **Impacted Populations:** Improved energy efficiency will impact all productive sectors and populations of Ukraine by reducing energy costs.

- **Impact:**
  - ~15% energy production efficiency improvement ~10%+ greenhouse gas emission reduction
  - ~20%+ replacement of fossil fuels with alternatives and renewables
  - ~20k new jobs in renewable energy
  - ~20% reduction in motor fuel consumption due to shift to EVs
  - Improved energy efficiency of buildings

- **Value Proposition:** Intended to improve energy efficiency and decarbonize Ukrainian economy, improving energy independence, reducing environmental impact and facilitating compliance with EU Energy Community standards.

- **Project Status:** Ongoing, need additional funding

Projects Highlights[1] ($, mln)



Implementation Period: Ongoing

Additional Details: CAPEX – 85% / Other costs – 15%

Expected Financial Indicators: Will provide financial support for energy efficiency and decarbonization initiatives, including compensation, reimbursement, and cost reduction through credit and leasing agreements. Financial mechanisms include partial reimbursement of interest paid on commercial bank loans and issuance of preferential loans. Selected projects will be carried out by a commission established by State Agency for Energy Efficiency and Energy Saving

Trigger Event: Law No. 3035-IX signed in April 2023 amended Budget Code to charge taxes on CO2 emissions, which supply the Fund with capital. Due to ongoing war, CO2 taxes are held fixed, increasing need for external funding to meet EU goals

BUSINESS MODEL

Fund will finance projects through two agreement models:
- Partial reimbursement of interest for commercial loans
- Preferential loans
- Underlying projects may include a wide range of models (e.g., ESCO-contracts, Design-Build, DBFM-DBFOM, etc.)

KEY FINANCIALS DTEK GROUP IN 2020 (MLN UAH)

Contributes to meeting the EU Energy Community Agreement requirements for EU accession, particularly the achievement of goals to reduce energy consumption and decarbonize the economy

Project also aligns with multiple UN Sustainable Development Goals (e.g., poverty alleviation, healthy living, sustainable energy sources, etc.)

Key partners

Ministry of Restoration
Commission established by State Agency on Energy Efficiency and Energy Saving
Commercial banks

Key Points of Project Implementation:

Funding received from CO2 emission tax and other partners (continuous)
Project selection carried out by Commission (continuous)
Projects funded (continuous)

All project information is provided by sponsor-initiator of the project and all monetary values are denominated in USD.