



Project to develop wind parks in Zhytomyr region of Ukraine

2022

Summary

- Wind Solar Energy LLC (WSE) has assembled a 178,5MW wind park project portfolio in the Zhytomyr region of Ukraine.
- WSE signed Power Purchase Agreements (pre-PPAs) with the Ukrainian state authorities in December 2019 to receive a green tariff of €88.2/MWh until 2030 on its full project pipeline.
- WSE has completed long-term wind measurements, and received all relevant permissions on its full project pipeline.
- WSE agreed with Zhytomyr Regional State Administration in March 2021 to cooperate on developing an integrated green energy plan for Zhytomyr region.



Zhytomyr Region – present electricity supply

Zhytomyr Region

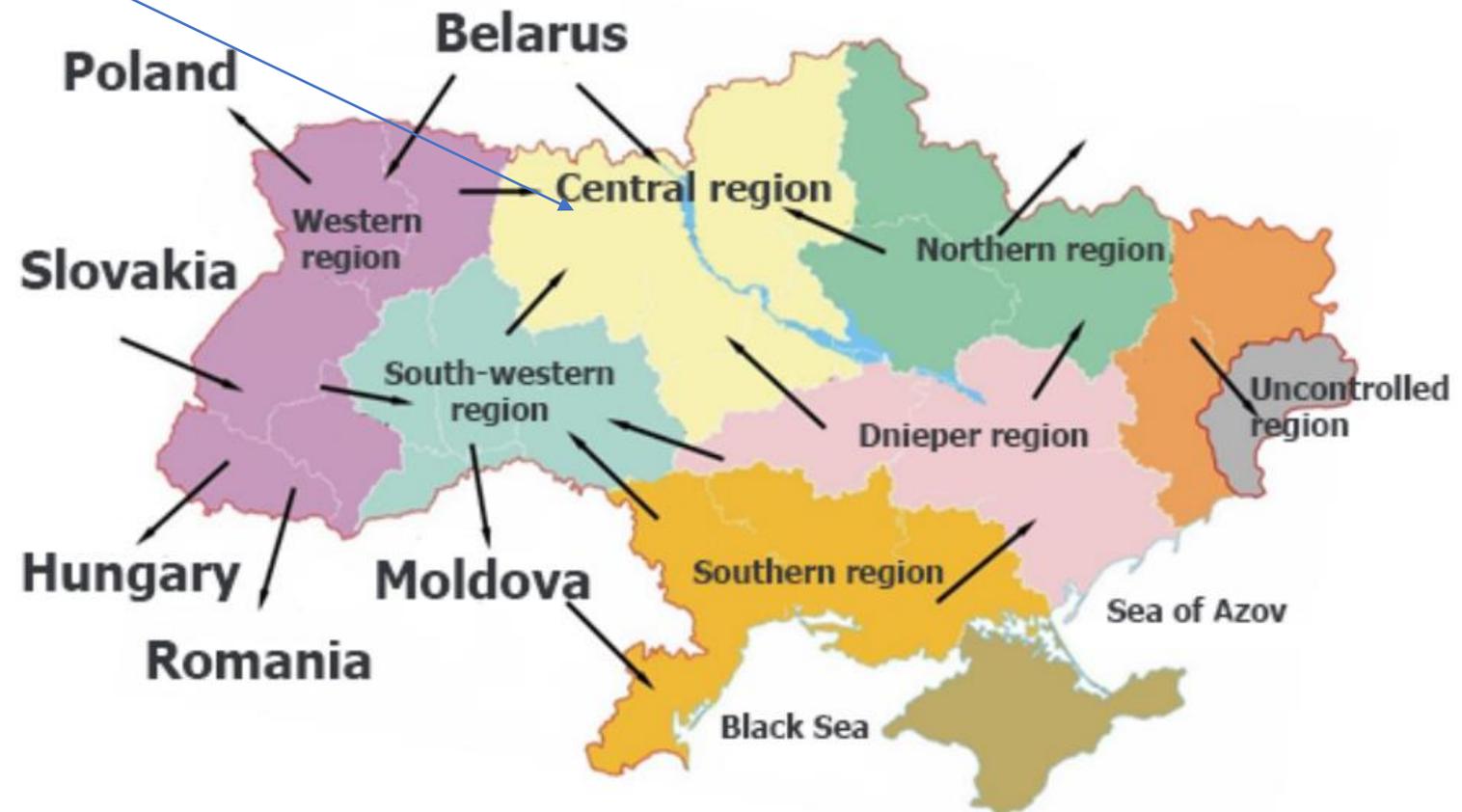
- Zhytomyr lacks its own significant electricity generation capacity
- The region relies upon electricity supplies from other regions of Ukraine
- Most of this is from nuclear reactors.
- Previously it was supplied by the nuclear reactors at Chernobyl now supply comes from from the nuclear power stations at Rivne



Ukraine, the main directions of flows in the transmission system

Zhytomyr Region

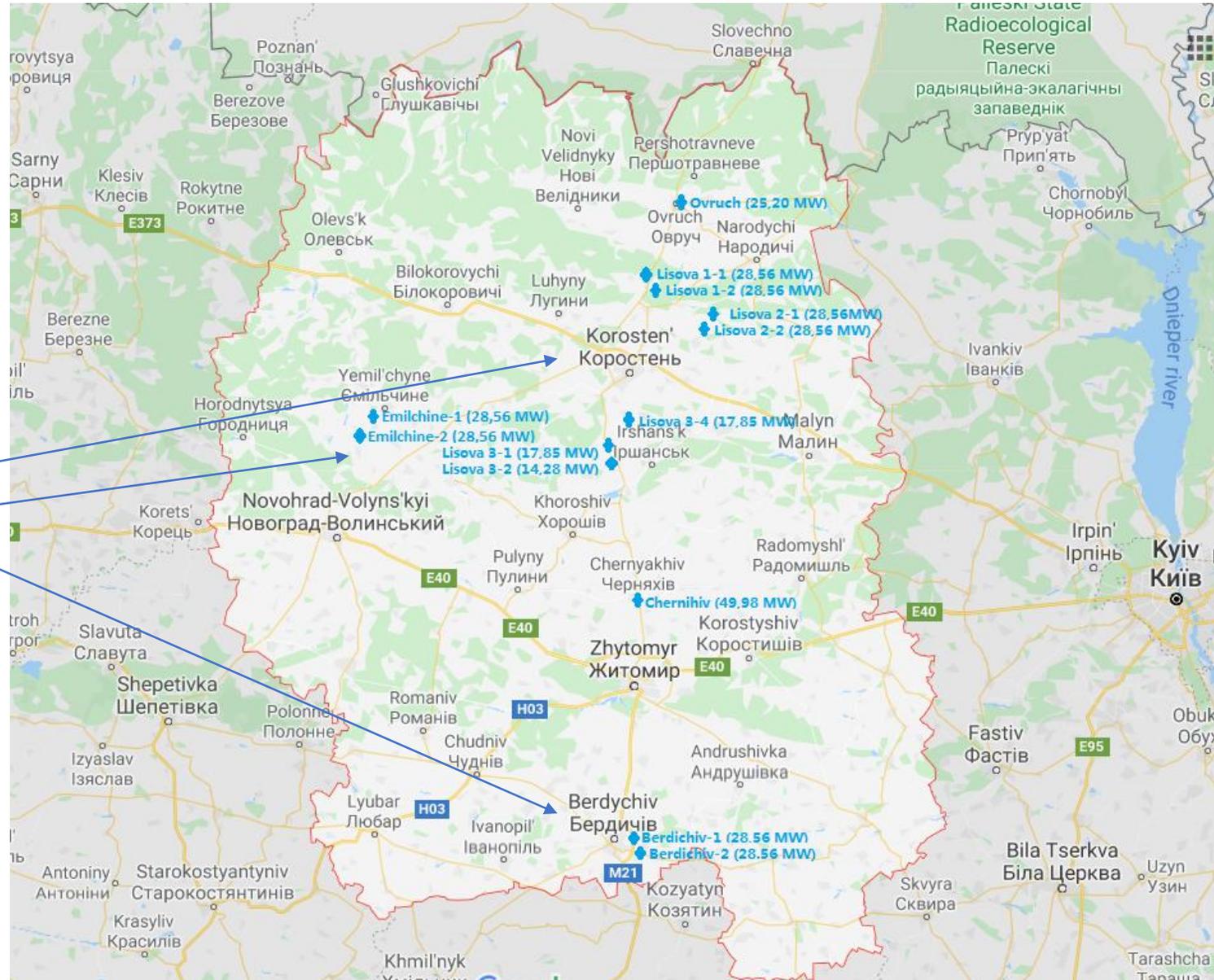
- The central power plant is deficient in both capacity and electricity. The maximum value of the power deficit exceeds 2500 MW;



Planned WSE wind parks in Zhytomyr Region

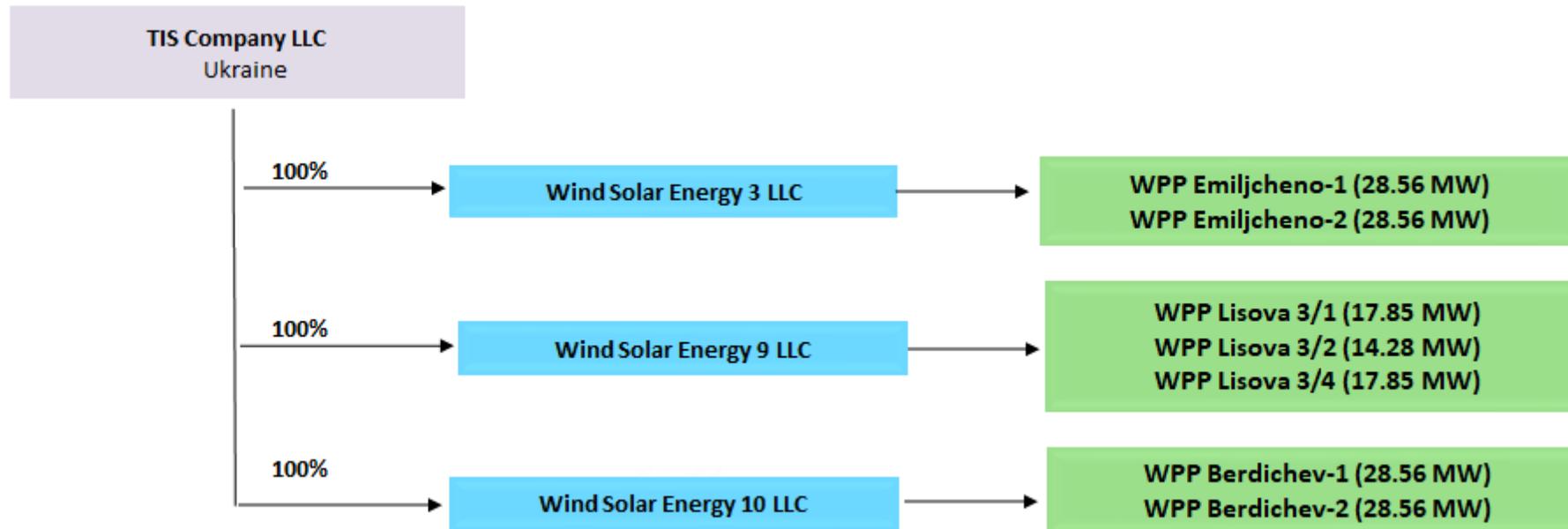
- Completed wind measurements show consistent, medium strength wind of approx. 6.5 -7,1 m/s on wind park sites.

Location of planned WSE wind parks and generation capacity



- Attractive prices for electricity make the parks very profitable, with IRRs of 17-20%, and pay-back periods of 5-6 years, after which they will generate profits with low opex for a further 20+ years.

WSE company structure for 190 MW wind park pipeline



Milestones achieved to sign pre-PPAs

Wind park	Emiljcheno 1 Emiljcheno 2	Lisova 3/1 Lisova 3/2 Lisova 3/4	Berdichev 1 Berdichev 2
WSE subsidiary company	WSE-3	WSE-9	WSE-10
Capacity (MW)	57.12 (28.56+28.56)	49.98 (17.85+14.28+17.85)	57.12 (28.56+28.56)
Distance for connection to electricity (sub-)station (km)	8-12 for each	0,5-12 for each	3-7 for each
Land Use Permit	Received	Received	Received
Measured wind data over one -year period	In process	Completed	Completed
Geological report	Received for 3 plots	Received for 3 plots	Received for 3 plots
Technical Condition (TY)	Received	Received	Received
Technical Economic Basis (TЭO)	Received	Received	Received
Grid Connection Agreement	Received	Received	Received
Environmental Impact Assessment (OБД)	Received	Received	Received
Building Permit	Received	Received	Received
Preliminary-Power Purchase Agreement (Pre-PPA)	Signed	Signed	Signed

WSE management team

Gorbunov Aleksandr

Director

Mr Gorbunov has over 20 years' experience working in business organisations in Ukraine including as a deputy head and head of several commercial departments. He has fulfilled the role of Deputy Director or Director of several firms in grain trading and fuel retail businesses. He holds a Master's in Public Administration from National University of life and environmental sciences of Ukraine and has additional management of organisations.



Serhii Zanoza

Head of Financial Analysis and Planning Department

Mr Zanoza has over 15 years' experience in financial analysis and modelling, including developing business plans, comparing the effectiveness of different strategies, analysis of cash flow and budgeting. For 12 years of this he has worked within the Factor Group of companies in Ukraine where he has fulfilled a variety of different analytical roles. He holds a Master's in management from Kiev National Economic University.



Ukraine wind energy market

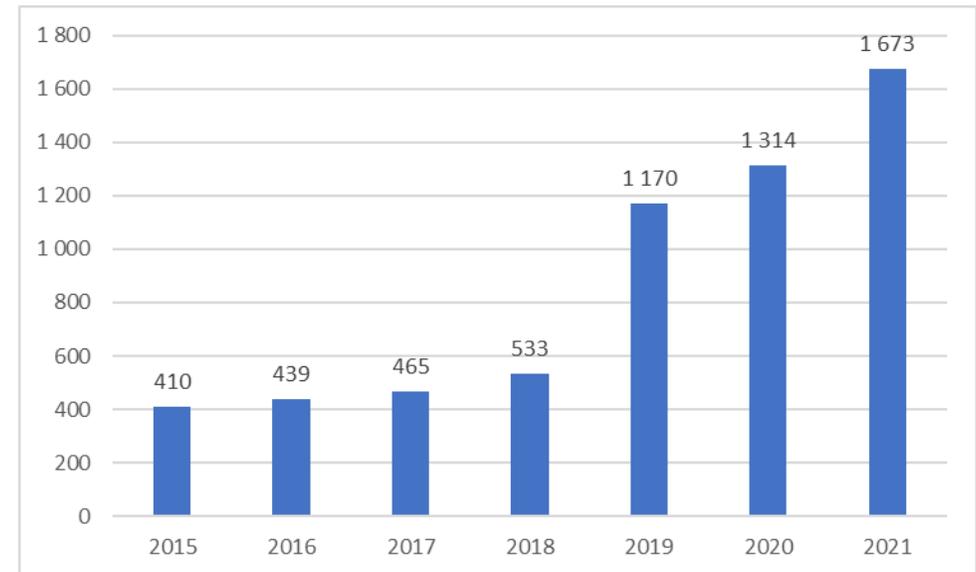
Overview

- The main form of state incentive and support for renewable energy in Ukraine has been the Green Tariff, a feed-in tariff (FiT) introduced in 2009 as a special preferential price for electricity produced from alternative energy sources, and paid until 2030.
- As a result of attractive FiT rates, an onshore wind energy sector has developed with installed wind capacity increasing from 88MW in 2009 to over 1.67GW in 2021.
- The FiT is established at the date the energy plant is commissioned, and runs until 1st January 2030.
- FiT is fixed in EUR, and is recalculated quarterly based on the official EUR/UAH exchange rate set by the national bank, resulting in minimal currency risks.
- The state wholesale electricity market purchaser Guaranteed Buyer is required to purchase renewable power before other forms of energy (nuclear, coal...).
- Negotiations between the Ukrainian government and renewable energy suppliers in 2019-2020 which concluded in an agreement in June 2020 established the FiT levels for 2020-2030.
- This agreement confirms the government’s commitment to the development of wind energy in Ukraine, and its important role in the country’s future energy balance.
- FiTs are not available for projects where producers did not sign preliminary power purchase agreements (pre-PPAs) before 31 December 2019, and for projects that are commissioned after 31 December 2022. Tariff rates for these will be determined by auctions with winners chosen according to technical and price criteria.

Green Tariff for wind energy in Ukraine (EUR/kWh)

Date of commissioning	Turbine power > 2MW
2017-2019	0.102
2020-2022	0.0882

Wind energy installed capacity in Ukraine 2015-2021 (MW)



Ukraine economy

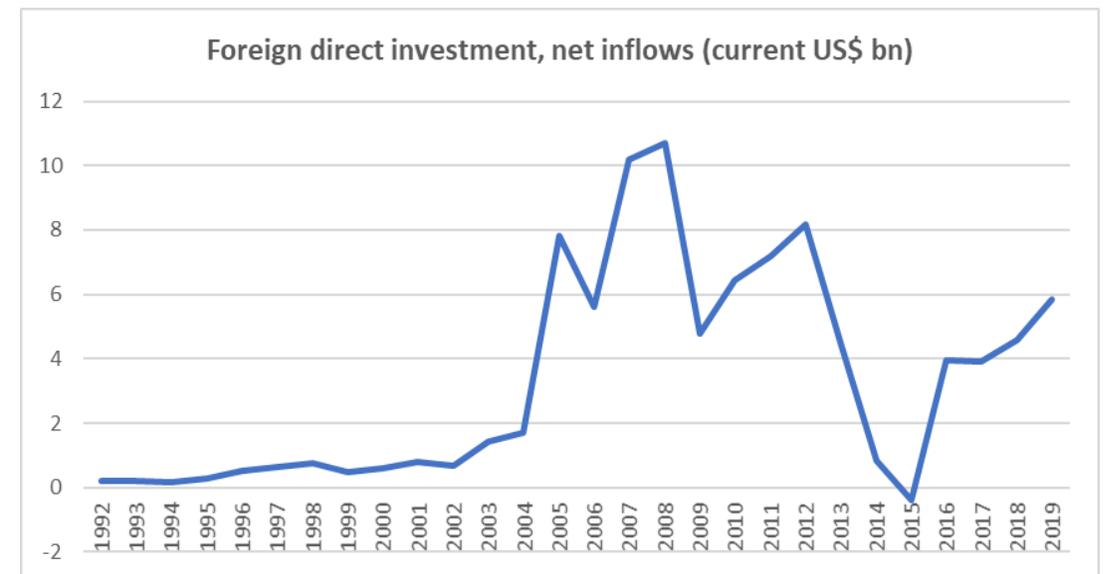
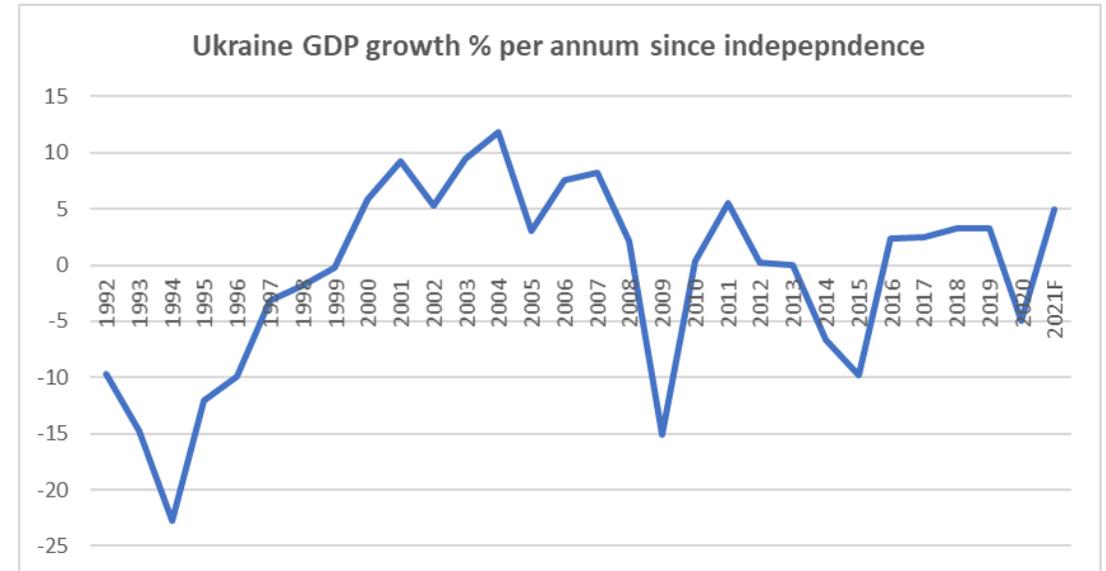
Overview

- Ukraine is the largest country in Europe by area, and with 42 million inhabitants the eighth largest country by population.
- It possesses rich farmlands, a well-developed industrial base, a well-educated labour-force, and substantial mineral resources.
- Since independence in 1991 the country has been buffeted by successive economic shocks – dislocation from the collapse of the Soviet Union, the financial crisis, the conflict with Russia, and most recently the global pandemic. But it has weathered the storm better each time, and looks set to rebound strongly in 2022 and thereafter boosted by strong inflows of foreign direct investment.
- In recent years, considerable Western support, in particular from the IMF, EBRD, World Bank, US government agencies and EU institutions, has helped Ukraine to make significant reform progress, and to address the long-term challenges of underdeveloped infrastructure and institutions.
- The development of renewable energy has been a key objective for Western multilateral agencies. They have directly funded its development and made financial support conditional upon the government's continued support.

Reform progress

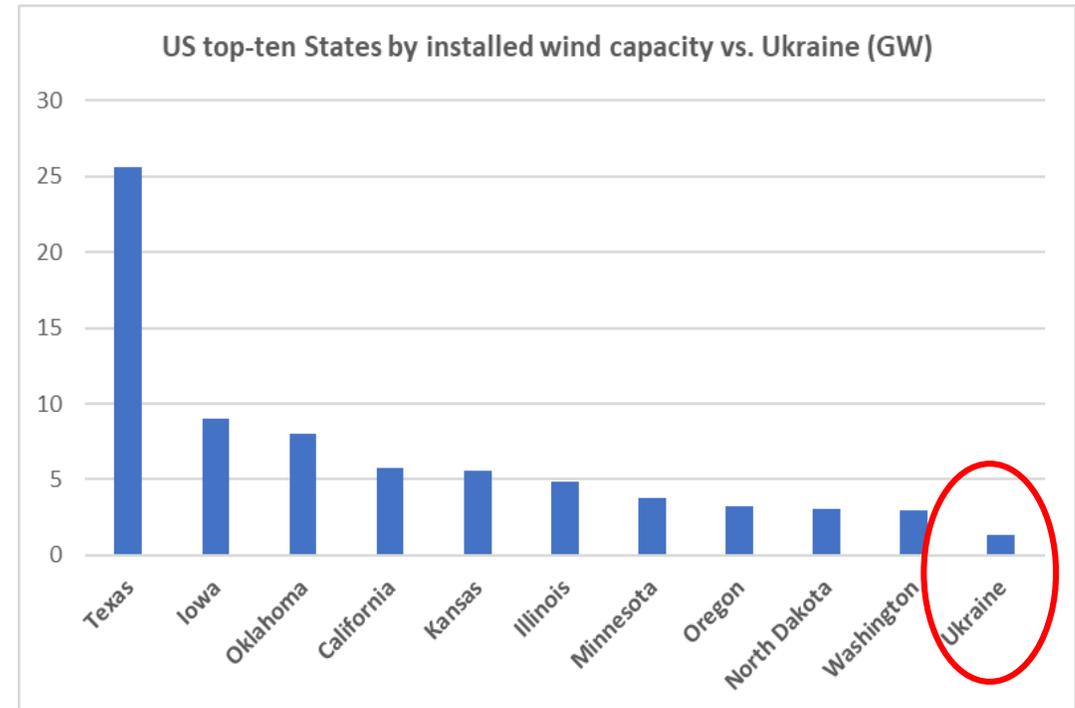
- Tax reform
- Anticorruption drive and improved transparency
- Currency stability and reduction in inflation
- Global Doing Business rank has improved from 152 in 2011 to 64 in 2019

Key macroeconomic indicators



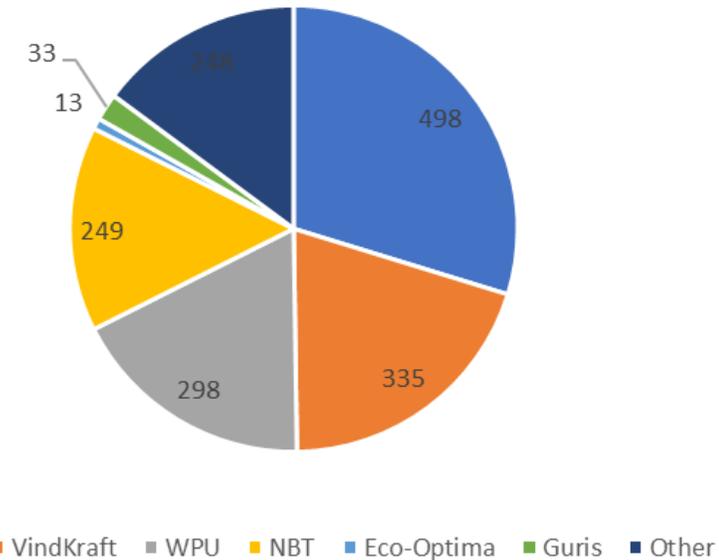
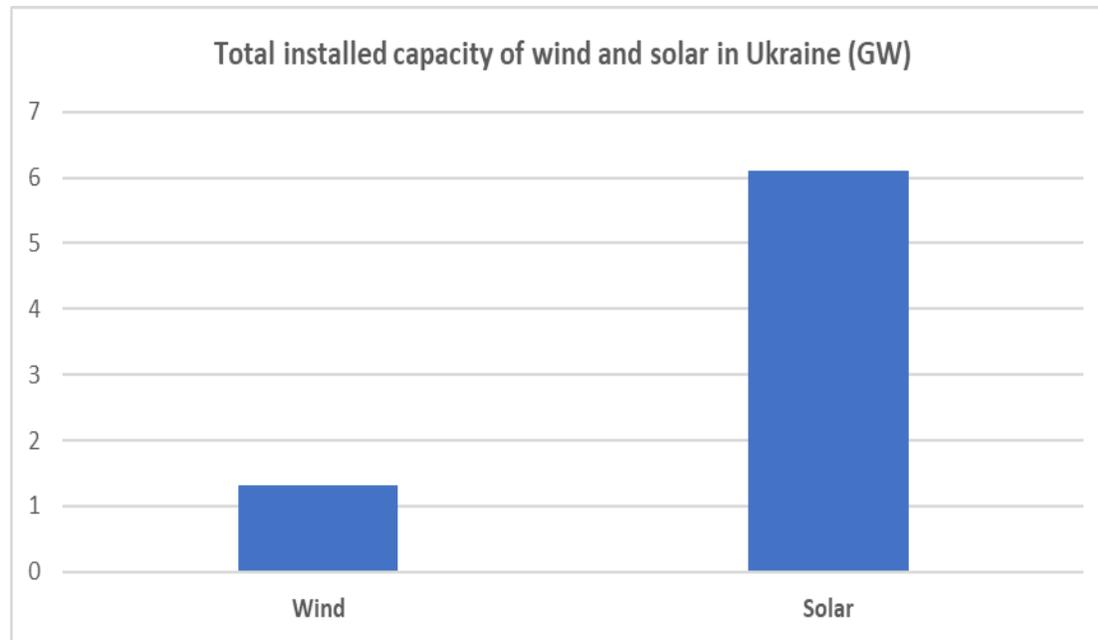
The need to expand wind energy in Ukraine (1)...

- To reduce Ukraine’s energy dependency. Ukraine has an energy deficit – it is reliant on imports of natural gas, coal, oil and uranium.
- A lot of existing electricity generation capacity in Ukraine – both thermal and nuclear - is due for replacement. Many power plants are approaching or have already exceeded their operational lifetime.
- The wind energy sector in Ukraine is still very small by international standards with just 1.67GW of installed capacity, while as a comparison Texas alone has over 25GW.
- In 2021 wind energy contributed just 2.47% of Ukraine’s total electricity supply, with renewable energy sources (excluding large hydro) combined accounting for 8% of output.



... the need to expand wind energy in Ukraine (2)

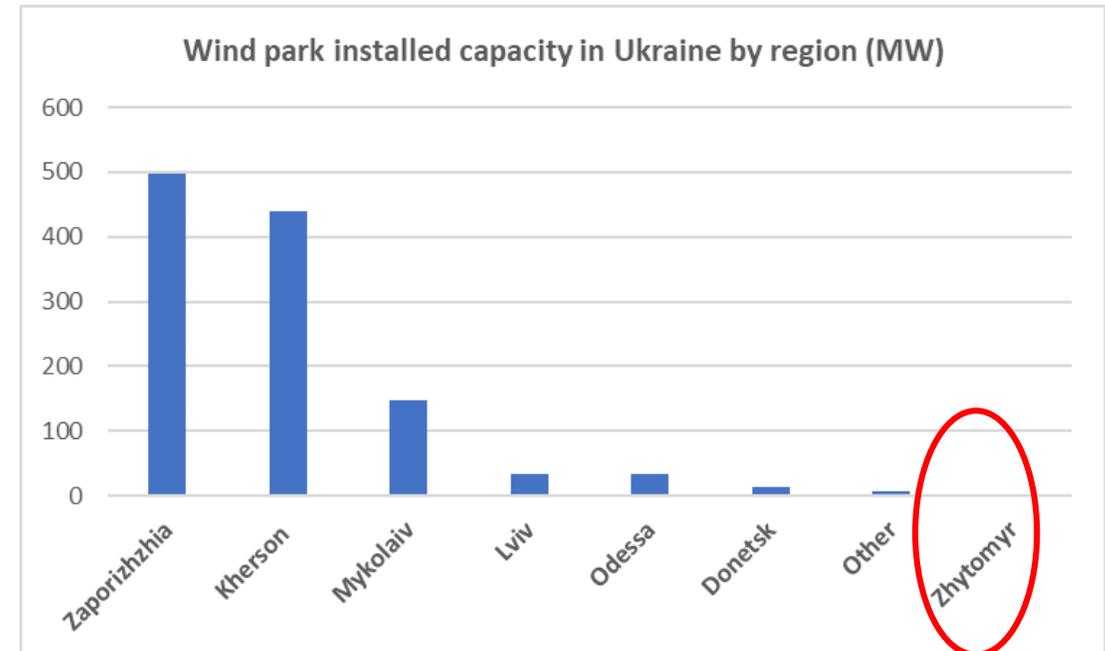
- The rate of expansion of wind power has been slower than official state targets – a national plan in 2014 aimed for 2.3 GW by 2020 so development has fallen short by 1GW, and also in comparison with solar power which now exceeds 6GW.



- Currently ownership of wind capacity in Ukraine is overly concentrated with the top-three owners controlling 85% of installed capacity. The best way to reduce this potential oligopoly is for new entrants such as WSE to develop parks.

The need to develop wind parks in Zhytomyr

- At present there are no wind parks (i.e. zero) in Zhytomyr region. This compares unfavourably with regions such as Zaporizhzhia and Kherson which each have 400-500MW of installed capacity.
- Planned 178,5 MW of wind parks by WSE will generate 0,51 TWh of electricity per annum which will be able to supply approx. 141,000 households.
- This will considerably reduce the region’s reliance on electricity from nuclear and thermal power stations. Annual electricity consumption of the biggest enterprises of the Zhitomir region in 2021 is 635 GWh.
- Enterprises in the Zhytomyr region that consume the most electricity per year, GWh:
 - Irshan Mining and Processing Plant - 200;
 - PJSC "Korostensky MDF Plant" – 192;
 - LLC "Cersanit Invest" - 50
 - LLC "Zhytomyr cardboard plant" - 46
- Direct benefit to local economy – construction of wind parks, maintenance, and conversion of local machine engineering plants to activities associated with construction and maintenance of wind parks.
- Support for local budget via taxes and reduction of financial transfers out of region for purchase of electricity.



Zhytomyr Region - overview

- At 30,000 sq. km, Zhytomyr region is similar in size to Belgium or the US state of Maryland.
- Though with just 1.3 million inhabitants the region has low population density.
- The main economic activities of the region include forestry, agriculture, machine manufacturing and mining (of granite).
- In its northern part the region is adjacent to the Chernobyl Exclusion Zone, and inhabitants of the area were evacuated to Zhytomyr after the accident there.



Contact

Gorbunov Aleksandr

Director

+3 8 044 391-50-50

gorbunov@windsolarenergy.info

Serhii Zanoza

Head of Financial Analysis and Planning Department

+3 8 044 391-50-50

szanoza@windsolarenergy.info

Wind Solar Energy LLC

9-11 Zhylianska Street,

Kyiv, Ukraine 01033

info@windsolarenergy.info

<https://www.windsolarenergy.info/>

Disclaimer

- *This document is issued by Wind Solar Energy LLC “the Company” and may not be distributed or reproduced in whole or in part.*
- *This document does not constitute or form part of any offer to issue or sell, or any solicitation of any offer to subscribe or purchase, the Shares or a prospectus nor shall it or the fact of its distribution form the basis of, or be relied on in connection with, any contract therefore.*
- *This document does not form a fiduciary relationship or constitute advice and is not and should not be construed as an offer or a solicitation of an offer or an invitation, or inducement to engage in investment activity, and cannot be relied upon as a representation that any particular transaction could have been or can be effected at any stated price. All information contained herein is subject to change without notice and neither the Company or its associates or affiliates is under any obligation to update or keep current the information contained herein or in any other medium.*
- *Neither the Company nor its directors or employees warrant the accuracy, adequacy or completeness of the information contained herein and Wind Solar Energy LLC expressly disclaims liability for errors or omissions in such information.*
- *No warranty of any kind implied, express or statutory is given by the Company or any of its directors or employees in connection with the information contained herein.*
- *Under no circumstances may this document or any part thereof, be copied, reproduced or redistributed without the express permission of a director of Wind Solar Energy LLC.*
- *Any projections, forecast, estimate or other “forward looking” statement in this document only illustrates hypothetical performance under specified assumptions of events or conditions, which may include, but are not limited to, prepayment expectations and interest rates. Such projections, forecasts estimates or other “forward looking” statements are not a reliable indicator of future performance.*
- *This document is not intended for distribution to, or use by, any person or entity in any jurisdiction or country where such distribution or use would be contrary to law or regulation.*
- *Neither Wind Solar Energy LLC nor its directors, representatives or employees accept any liability for any direct or consequential loss or damage arising out of the use of all or any part of the information herein.*