

Energy transition and war in Ukraine



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For power system expertise



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Energy transition and Global Environment for Sustainable Growth



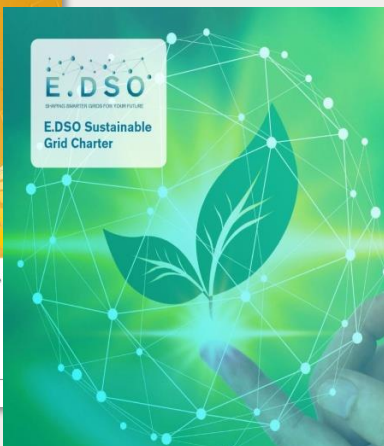
<Energy and Environment>

1. We, the G20 Energy and Environment Ministers, met in Karuizawa Town, Nagano Prefecture, Japan, on 15 June 2019 to discuss the global environment for sustainable growth.

ENTSO-E
Research, Development & Innovation Roadmap 2020-2030

2. We recognize the importance of key global issues and of efficiency, sustainable development, urban environment, air pollution, urban environment, are complex and urgent sustainable and clean energy growth, climate change, low emissions strategies members have and continue to face and also a commitment made in Buenos Aires that the importance of accelerating breakthrough innovation, the enabling environment.

3. We adopt the "G20 Karuizawa Environment for Sustainable Growth" endeavor to facilitate a variety of relevant international stakeholders, especially in



Technical Brochures are globally diverse, comprehensive publications. Over 700 have been published to date, with around 40 new ones added each year.

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- Паризька угода (Paris Agreement) - 2016 рік
- European Green Deal (Європейський зелений курс) – 1 грудня 2019 року

Ukraine has chosen its Energy transition way based on best world practices and standards.

Department of Energy

Securing America's Power Grid from Foreign Threats

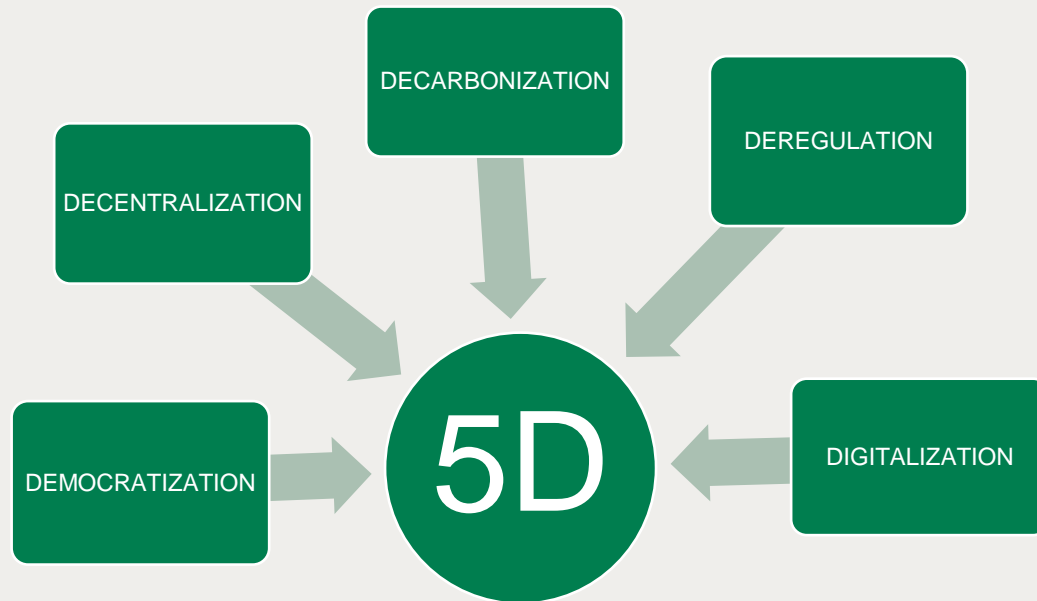
MAY 22, 2020



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World is moving towards 5D



G20 PRINCIPLES FOR QUALITY INFRASTRUCTURE INVESTMENT

Principle 1: Maximizing the positive impact of infrastructure to achieve sustainable growth and development

Principle 2: Raising Economic Efficiency in View of Life-Cycle Cost

Principle 3: Integrating Environmental Considerations in Infrastructure Investments

Principle 4: Building Resilience against Natural Disasters and Other Risks

Principle 5: Integrating Social Considerations in Infrastructure Investment

Principle 6: Strengthening Infrastructure Governance



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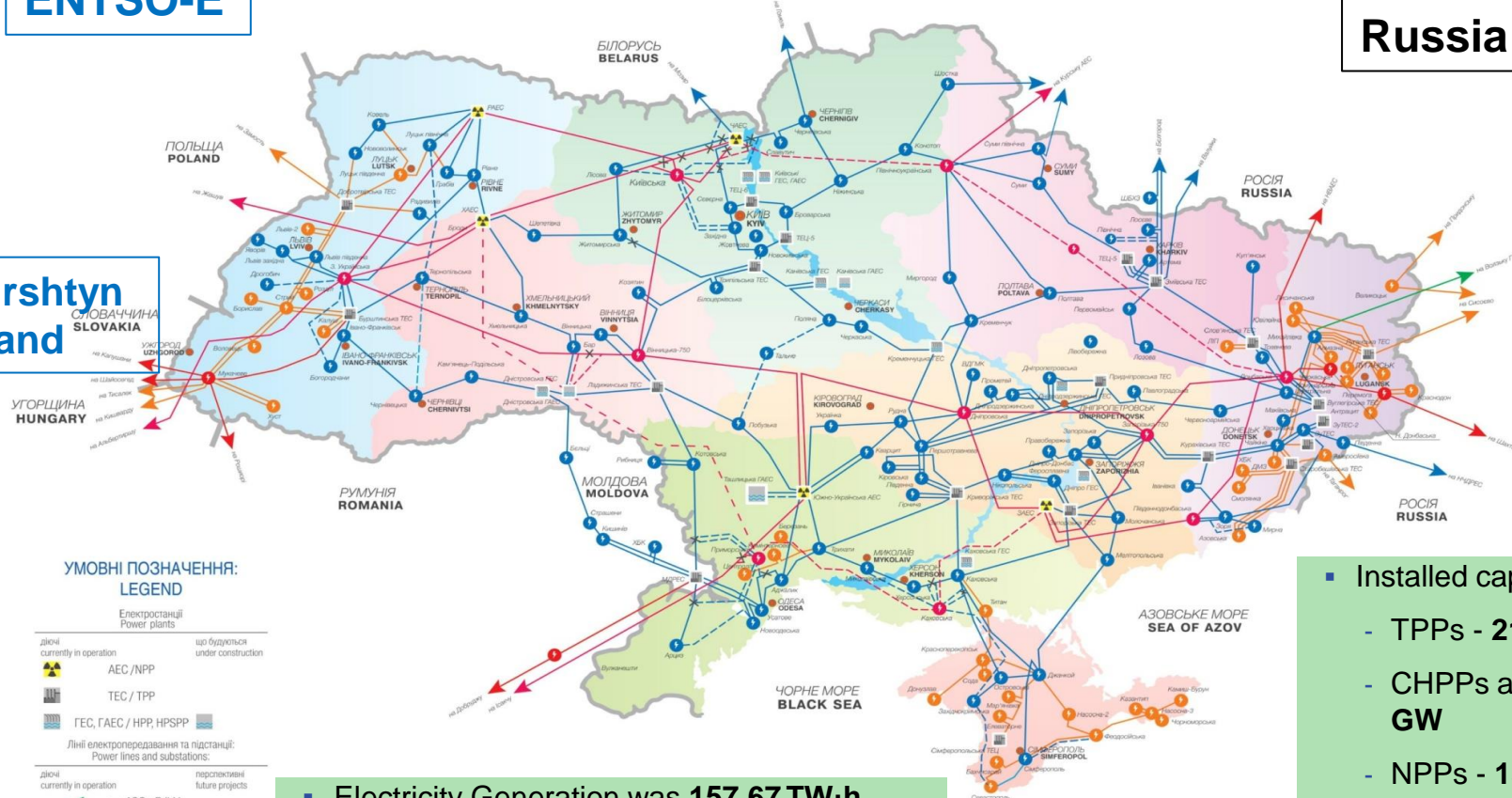
Before 24.02.2022

One of the biggest power systems in Europe, built during 100 years

ENTSO-E

Russia

Burshtyn Island



- Electricity Generation was 157,67 TW·h
- Electricity consumption – 125,5 billion kW/h
- Consumption, capacity max – 24 GW

- Installed capacity 56,64 GW
 - TPPs - 21,80 GW
 - CHPPs and other TPPs - 6,1 GW
 - NPPs - 13,84 GW
 - HPPs, HPSPPs – 6,2 GW
 - Renewable energy– 8,701GW

New power system of Ukraine should be built on:

- 1) The country's electrification and minimizing of gas usage:
- 2) International electrical standards (IEC)
- 3) Innovative technologies (SmartGrid, Renewable energy, Battery Storage, Pump Storage, Small modular nuclear reactors, hydrogen, Power to X ...)
- 4) Protection of Intellectual Property
- 5) Development of Ukrainian Power Industry
- 6) Training of a new generation of electrical engineers using new electrotechnical vocabulary

Now or after the war is finished?

www.electropedia.org

**IEC 60050 -
International
Electrotechnical
Vocabulary -**



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New power system of Ukraine

Transmission and generation

We need to:

- repair more than 40% of substations and high-voltage lines.
- replace about 100 power transformers.
- construct new high-voltage lines towards ENTSO-E.
- reconfigure excitation systems of generators on our power plants.
- install new automation systems (WAMS and SPS)
- reconstruct thermal power plants using hydrogen technology
- Continue construction of pump-storage plants (Dniester, Kaniv, Tashlyk)
- Support Ukrainian energy industries, “Ukrainian energy machines”, transformer factories, etc.,

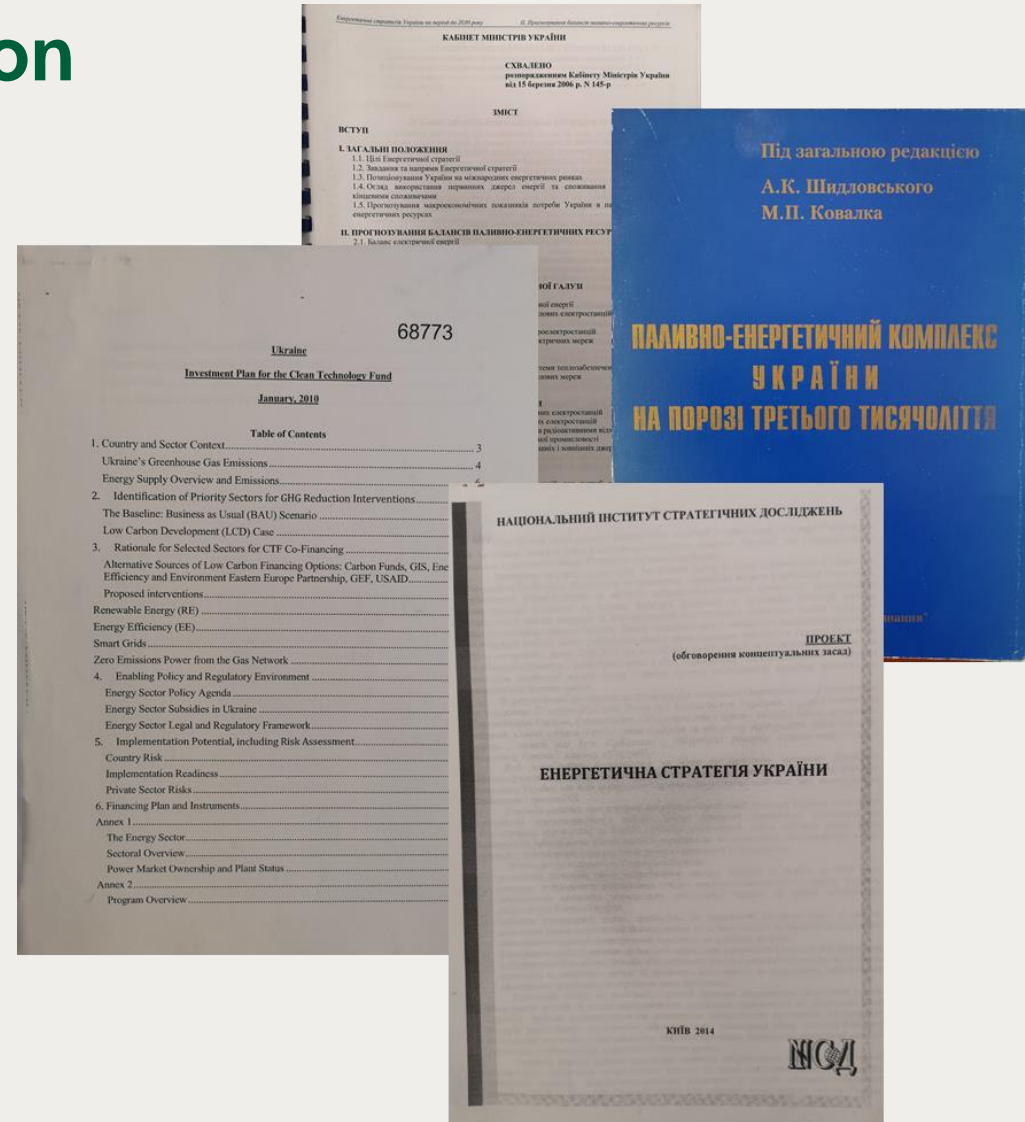


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Conclusion

- A quick association of all organizations, the Cabinet of Ministers of Ukraine, the Ministry of Energy, National Commission for State Regulation of Energy and Public Utilities, DSO's and industry, construction and installation companies, experts is needed to create an emergency headquarters for the restoration of energy sector.
- It is necessary to return the development of technical policy and new scenarios of the industry, with the involvement of foreign and Ukrainian experts to the Ministry of Energy.
- Develop energy recovery programs for each city and village in accordance with the strategies of year 2006 and 2008.
- Innovations and investments should be implemented not at the expense of tariffs, but at the expense of investments.
- We need actions, not words.



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Дякую за увагу!

Thank you for your attention