

# THE CHANGING WORLD OF POWER GENERATION AND CONSUMPTION

*Viacheslav Hruzytskyi, Vladyslav Chepel*

*Educational and Research Institute of Nuclear and Heat Power Engineering,  
National Technical University of Ukraine “Igor Sikorsky Kyiv Polytechnic Institute”*

In modern times power generation and consumption has become basically a question of further development of the world. Now as computers and devices are almost everywhere, electricity has become a part of our life, we can't imagine our lives without it. The world demands more and more electricity to meet its needs.

Server farms and data centers are being built to cover humanity's needs in digital services. Those facilities require a massive amount of power, as the rooms and hardware have to be cooled, and servers consume power for computation. Such facilities become descent consumers of energy and water, as well as generators of excessive heat.

With advancing of artificial intelligence, cryptocurrency mining, and rising need of computation powers, datacenters will reach a global electricity consumption of approximately 945 TWh by 2030. Current consumption is approximately 415 TWh.

One of the main challenges identified by International Energy Agency (IEA) is growing pressure on electrical grid. Datacenters could simply meet a problem of delaying due to grid connection bottleneck, as power grid demands transformers and cables.

Although AI requires more energy, it can also help to lower a grid's electricity consumption and optimize its generation.

With a great need for energy and appearing danger of climate change humanity found other, more reliable and efficient way to sustain itself – nuclear fission.

It was taken with doubt at first, but now it's one of the main energy sources in

EU and other developed countries.

According to World Nuclear Association about 70 reactors are under construction across the world, and more than a hundred planned.

Nuclear energy draws mostly large countries' attention, such as the USA and Asian countries, which care deeply for their self sustainability and ensuring they can provide their large population with electricity, as well as businesses and computation facilities that were mentioned earlier.

And equally important sector in generating electricity is taken by alternative sources of energy, such as thermal and radiant energy of the Sun, mechanical energy of wind and water flow, and many others.

These sources of energy were used by humanity for thousands of years, but only now we are truly able to use its full potential to reduce fossil and nuclear fuel usage, and make green energy, as well as take some pressure off traditional power plants.

And this tendency keeps rising, for example as for June 2025, the solar energy was the main source of electricity produced in the EU, with it being 22% of total energy produced, which is ahead of nuclear (21.6%), wind (15.8%), hydro (14.4%) and natural gas (13.8%).

Speaking about the energy situation in Ukraine it's impossible not to notice the heroism, bravery, professionalism and reliability of our specialists in this field.

After Russia has launched its full-scale attack on territory of Ukraine in 24<sup>th</sup> of February, 2022, the energy infrastructure has become one of the most important targets to strike.

As of March, 2022, Russian forces annexed Zaporizhzhia Nuclear Power Plant, halting its work and drafting 6 GWh of energy from Ukraine's energy grid.

As war advances, Russia starts to attack energy grid even more, targeting the crucial hubs for distributing energy, destroying transformers and other crucial equipment, as well as attacking Thermal Power Plants.

So, for Ukraine energy situation in state of surviving and mid-war upgrading because of outdated Soviet equipment, which can't be synchronized with modern

European or Ukrainian pieces, but crucial for the grid's stability and quality.

Ukrainian's grid has already been integrated with the grid of the EU, taking some pressure off our generation capabilities.

#### **References:**

1. Lardizabal, E. (2025, April 14). Data center energy consumption will double by 2030: more than 450 TWh of additional renewable energy will be. *Strategic Energy Europe*. <https://strategicenergy.eu/data-center>
2. Plans for new reactors worldwide - World Nuclear Association. (n.d.). <https://world-nuclear.org/information-library/current-and-future-generation/plans-for-new-reactors-worldwide>
3. Eurostat. (2025, September 29). Solar: main source of EU electricity in June with 22%. *Eurostat*. <https://ec.europa.eu/eurostat/web/products-eurostat-news/w/ddn-20250929-3>
4. Katoch, G., Sharma, G., Alaghbari, M., Ved, A., Kaur, J., Rajiv, A., Singh, A., Yadav, Y., & Khairandish, M. I. (2025). Fusion energy: a sustainable pathway to meeting future global energy demands. *Discover Sustainability*, 6(1). <https://doi.org/10.1007/s43621-025-00906-6>