

## **HYDROPOWER ENERGY IN BELARUS**

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Hydropower, as one of the important pillars of renewable energy on a national level, plays a crucial role in energy security, economic stability and environmental management of Belarus. This analysis puts together the development of hydropower in Belarus, including historical overview, technical disciplines, as well as socio-economic dimensions and international cooperative movements. The Concept for Development of Power Generating Capacities till 2030 is also discussed.

Hydropower in Belarus dates back to small-scale early 20th century schemes that used the country's large networks of rivers. Little progress was notable after 1991, the year of Belarus's independence, and the time when the long-term legacy of the 1986 Chernobyl disaster was finally addressed. These crises forced policymakers to pursue safe energy alternatives that could be sustained. In this context, hydropower took the lead, especially along the Dnieper and Western Dvina rivers. This strategic pivot was crucial because it not only diversified the energy mix but provided a platform for innovation and economic resilience.

Belarus's hydropower capability is mainly actively organized in the areas of the main rivers, e.g. the Western Dvina and Neman river, focused on their waterway plan from the condition viewpoint. Recent improvements in drilling and pipeline systems have performed well despite challenges such as the country's flat landscape and varying seasonal climates, where low water levels during the summer months and ice during the winter can affect performance. More than 1,000 kilometers of new transmission lines have been incorporated into the national grid, and modern-day startup complexes have been engaged to improve efficiency. These developments are consistent with the 2030 strategic plan and represent a concerted effort toward the modernization of the energy system, despite geographic challenges.

Collaboration internationally through partnerships with CIS nations and European entities for technology exchange and adherence to global environmental standards has mattered, too. A striking example is that of the Vitebsk Hydropower Plant, which was commissioned in 2017 with a capacity of 40 MW and annual output of 138 million kWh. Finally, by 2021, the total capacity of all hydropower stations in Belarus was 96 MW. This progress emphasizes the nation's robust approach to dual challenges – energy diversification and preservation of the environment.

Environmentally, hydropower is a pillar of sustainable development in Belarus. It supports different industrial sectors from manufacturing to agriculture, by offering an affordable and reliable supply of energy that decreases reliance on imported fossil fuels. Since 2004, the National Programme on Local and Renewable Energy Sources Development has been supported by government initiatives. It has delivered energy security and economic competitiveness. Especially on a small scale, where startup and operational costs are seemingly on the low end, hydropower is considered to be more economically advantageous.

But the socio-environmental challenges remain high. Construction of large hydropower installations usually results in habitat losses, thereby flooding land and disrupting aquatic habitats, particularly affecting migratory fish. In the long term energy production can be reconciled with environmental and social sustainability.

In summary, although hydropower has played an undeniable role in driving Belarus towards sustainability, its key challenges remain unresolved. It is time to find a solution which combines technological innovations, thoughtful policy reforms and community engagement necessary to ensure the flexibility, cost-effectiveness and environmental safety of the energy system.

## References

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