

Nepal's Impressive Progress in the Hydroelectricity Sector

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Summary

Nepal has been making impressive progress in the generation, transmission and distribution of hydroelectricity in the domestic market as well as in its exports. However, a significantly large part of its hydropower potential remains to be exploited. If Nepal can attract the massive investments required to fully develop its hydropower sector, address the environmental impacts of hydropower projects, and plan and implement measures to minimise the risks of natural disasters to such projects, the country can experience a huge boost in its development endeavours.

Nepal's fiscal year (FY) starts mid-July. Annual data on Nepal's economic performance during FY2023-24 have been [published recently](#). If we consider gross domestic product (GDP) as an aggregate indicator of a country's economic performance, Nepal neither performed superbly nor too badly in the last FY. The country's real GDP at FY2010-11 prices grew by 3.9 per cent compared to FY2022-23. While this growth is good news against the current popular perception in Nepal that most economic activities are stagnant and the country might be heading towards a recession, it is significantly less than the [government target](#) of six per cent growth. Moreover, negative growth in the manufacturing (-1.6 per cent) and construction (-2.1 per cent) sectors and lower growth in the agriculture sector (three per cent) do not bode well in terms of job creation.

By industrial classification, the sectors that performed very well were accommodation and food service activities, transportation and storage, and electricity, gas, steam and air conditioning supply, which grew by 21.8 per cent, 11.9 per cent and 17.4 per cent respectively. While the first two can be attributed largely to a rise in tourism activities, growth in the electricity, gas, steam and air conditioning supply industry has been chiefly driven by the progress made in Nepal's hydropower sector.

Nepal's total electricity generation installed capacity has reached [3,157 megawatts](#) (MW), of which hydropower contributes 2,990 MW, solar 107 MW, thermal 53 MW and bagasse 6 MW. This is more than double the capacity three years ago when the total installed capacity was about 1,450 MW, which in itself was nearly double the capacity in 2013-14. Thus, over the past decade, Nepal's hydropower generation capacity has grown significantly, and much more remains to be exploited.

Along with the growth in installed capacity for electricity generation, Nepal has also been making progress in electricity transmission and distribution infrastructure. By the end of the last FY, its total transmission line length reached [6,508 circuit kilometres](#), which was an increment of 766 circuit kilometres from the previous FY. Of this, the highest increment was in the 400 kilovolts (kV) transmission line, from 148 circuit kilometres by the end of FY2022-23

to 644 circuit kilometres by the end of FY2023-24. The priority given to high-capacity transmission lines is also in view of the rising prospects of electricity trade with neighbouring countries.

The total capacity of the electricity sub-stations in Nepal also increased from 8,867 mega volt-amperes (MVA) in FY2022-23 to 13,050 MVA in FY2023-24. While this is the largest increment in sub-station capacity in a single year, thus far, in Nepal, the progress compared to a decade ago is [even more astounding](#). In FY2014-15, the total capacity of sub-stations in Nepal was only 2,132 MVA.

Nepal's progress in hydroelectricity generation and development of associated infrastructure has resulted in an increase in domestic consumption and export of electricity. Ten years ago, only [62 per cent of Nepal's population](#) had access to electricity, which increased to 95 per cent in FY2022-23 and 99 per cent in the last FY. Expansion in the consumer base, along with a rise in electricity use in industries and residences, have increased Nepal's national peak demand for electricity from 1,291 MW in FY2014-15 to 1,870 MW in FY2022-23 and 2,212 MW in FY2023-24.

Nepal has also been able to [continuously increase](#) its electricity exports to India. Until FY2022-23, Nepal used to be a net importer of electricity from India, that too by a big margin. However, in the last FY, for the first time in history, Nepal became a net exporter of electricity to India. While it imported 1,895 million units (MU) of electricity worth NPR16.9 billion (\$S\$169 million) in FY2023-24, it exported 1,946 MU of electricity worth NPR17 billion (\$S\$170 million).

Nepal's electricity exports to India have been enabled by the bilateral agreement on electricity trade between the two countries. Since November 2021, India has permitted Nepal to [sell up to 690 MW of electricity](#) in the Indian market through the Indian Energy Exchange. During the recent visit of Nepal's foreign minister, Arzu Rana Deuba, to India from 18 to 22 August 2024, India agreed to import an [additional 251 MW of electricity](#) from Nepal.

Nepal has also signed an agreement with Bangladesh to export 40 MW of hydroelectricity. With the agreement on electricity tariffs that Nepal would charge to Bangladesh, Nepal was ready to start exporting electricity to Bangladesh after a tripartite agreement between Bangladesh, India and Nepal since the export would have to be facilitated by India. The tripartite agreement was scheduled for 28 July 2024, but due to the sudden political change in Bangladesh, this has been [stalled for the time being](#).

Nepal also has [plans to export electricity to China](#) from projects constructed in the northern parts of the country close to China. Initially, it plans to export electricity from the Chilime project to Kerung in China through the construction of a 220kV transmission line between Chilime and Kerung.

The progress that Nepal has made in the hydroelectricity sector is encouraging, and there is greater potential for Nepal to benefit from this sector as only less than a tenth of its hydro potential has been exploited so far. However, most of the existing projects generate electricity only in the wet season and operate significantly below capacity in the dry season. This is the reason for Nepal's reliance on electricity imports from India in the dry season.

There are also other challenges, particularly the lack of adequate investments, the environmental impacts of hydropower projects, and the proneness of the country to climate change and natural disasters that could seriously affect electricity generation, transmission and distribution. If Nepal is able to manage these challenges, the hydroelectricity sector will provide a major boost to Nepal's development.

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