

ENERGY



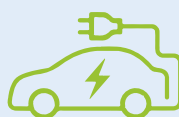
GOVERNMENT OF NEPAL
INVESTMENT BOARD NEPAL

APRIL 2024

1. OVERVIEW



Global investment in clean energy has surged by 40% since 2020, with notable expansion in manufacturing capacity for key components like solar PV modules and EV batteries.



Global predictions for 2030 indicate increased renewable electricity generation in the United States and Europe, **a rise in electric vehicle adoption, and growth in clean energy technology revenue in Latin America and the Caribbean**



North India projected to experience the highest energy requirement in 2023, with **a 1.2% deficit in energy availability**



Nepal ranked 84th in the 2022 Trilemma Index Report, demonstrating significant improvement in energy security indicators. Energy cooperation is emphasised in both the SAARC and BIMSTEC through initiatives like the SAARC Framework Agreement on Energy Cooperation and the BIMSTEC Grid Interconnection Agreement



Per capita energy consumption in Nepal reached 1,608 kWh in 2021, a notable increase from 979 kWh in 2015



Domestic electricity consumption reached 9,358 GWh in FY 2022/23, reflecting a 7.76% increase over the year-earlier period



NEA has signed power purchase agreements (PPAs) for projects that will produce 7,758 MW



In 2022/23, the Nepal Electricity Authority (NEA) managed 12,369 GWh of power from various sources. NEA and its subsidiaries contributed 43.80%, imports from India 14.82%, and Independent Power Producers (IPPs) accounted for 41.38%. The peak demand that year was 1,870 MW



Hydropower projects with combined capacity of 3,153 MW are under construction. The Investment Board Nepal (IBN) has attracted USD 9.27 billion for 42 projects, 28 in energy



Nepal's electricity demand is projected to increase significantly by 2025 and 2035, requiring total installed capacities of 5,787 MW and 13,242 MW, respectively, under various growth scenarios

Cross-Border Transmission Lines

Nepal's transmission infrastructure comprised 5,141.43 circuit km in 2022/23, including lines of various voltage levels. Another 2,852-circuit km was under construction or development. Fourteen cross-border transmission lines (CBTL) facilitate electricity trade between Nepal and India. In addition, the SJVN Arun-3 Power Development Company Pvt. Ltd. is building a dedicated 400 kV double circuit transmission line to carry electricity generated in Nepal to Sitamari, India. The Nepal section of the transmission line is to be about 217 km. The following are the proposed Nepal-India CBTLs.

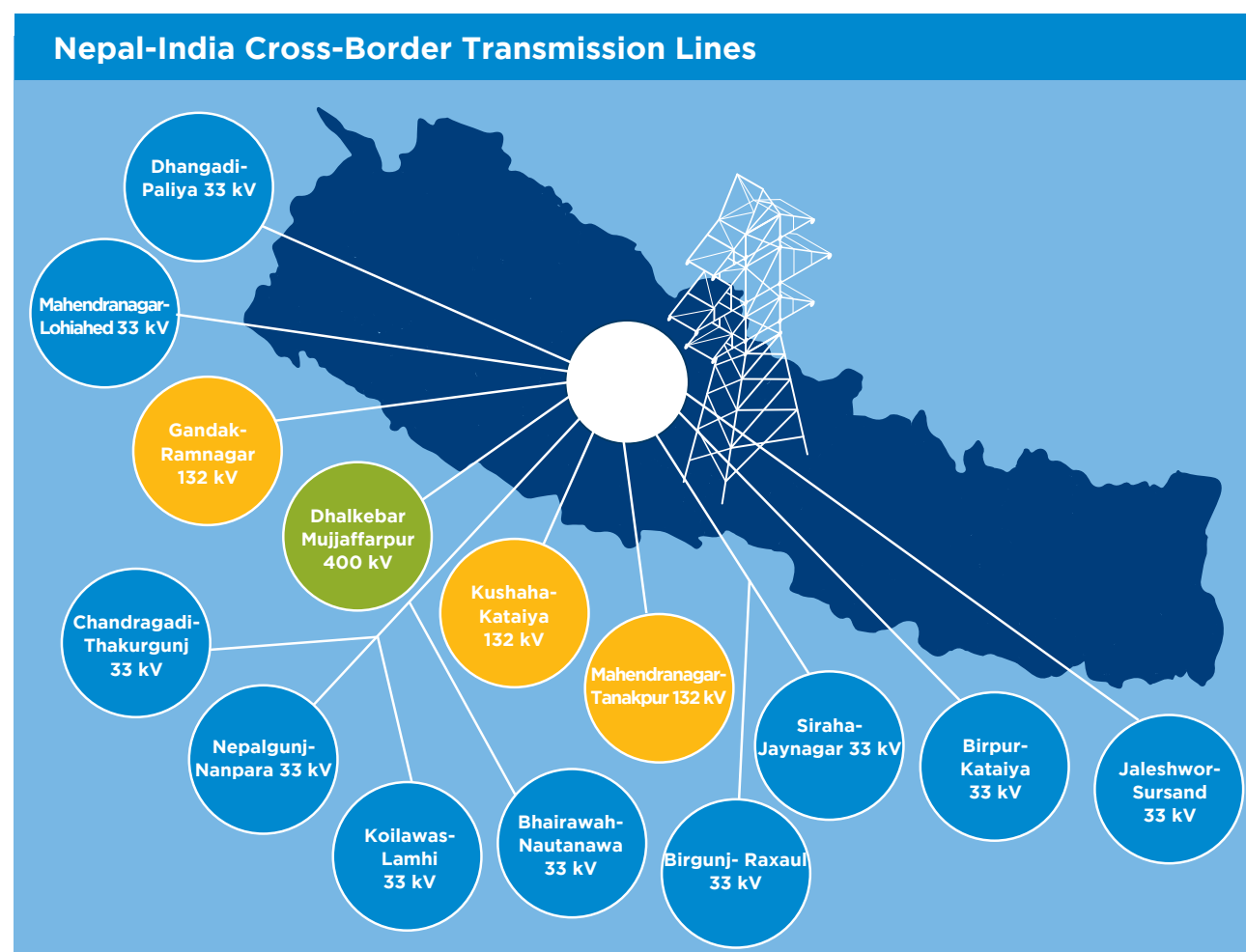
- 400 kV, Double Circuit, Attariya-Bareilly Cross-Border Transmission Line, 140 km
- 400 kV Double Circuit, Dododhara-Bareilly Cross-Border Transmission Line, 200 km
- 400 kV, Double Circuit, Phulbari-Lukhnow Cross-Border Transmission Line, 200 km
- 400 kV, Double Circuit, New Butwal-Gorakhpur Cross-Border Transmission Line, 125 km

- 400 kV, Double Circuit, Dhalkebar - Muzaffarpur Cross-Border Transmission Line, 130 km
- 400 kV, Double Circuit, Inaruwa - Purnea - Cross-Border Transmission Line, 110 km

Among these, the New Butwal-Gorakhpur CBTL has received highest priority from governments both in Nepal and India. The two countries have agreed on establishing a commercial entity to fund the construction of this CBTL. Nepal has also considered building cross-border transmission lines to export electricity to China by 2040. The proposed lines are:

- 400 kV, Double Circuit, Chilime-Keyrung Cross Border Transmission Line, 80 km
- 400 kV, Double Circuit, Kimanthanka - Latse Cross Border Transmission Line, 250 km

The NEA and State Grid Corporation of China have signed a cooperation agreement to execute the project.



2. INVESTMENT OPPORTUNITIES

Nepal has recently shifted from having chronic electricity shortage to a surplus, which the NEA has begun trading with India. Leaders of Nepal and India have agreed to further increase power exports from Nepal. NEA has agreements with NTPC Vidyut Vyapar Nigam Ltd. (NVVN) and Power Trading Corporation (PTC) India for exporting 200 MW and 300 MW of power to India, respectively.

Nepal's energy trade with India

FY	Import	Export
FY 2021/22	1,543 GWh	493 GWh
FY 2022/23	1,854 GWh	1,346 GWh
Trends	20.16% up	173% up

Energy imports from India increased by 20%, while energy exports rose by 173% in FY 2022/23 compared to the previous year.

Renewables

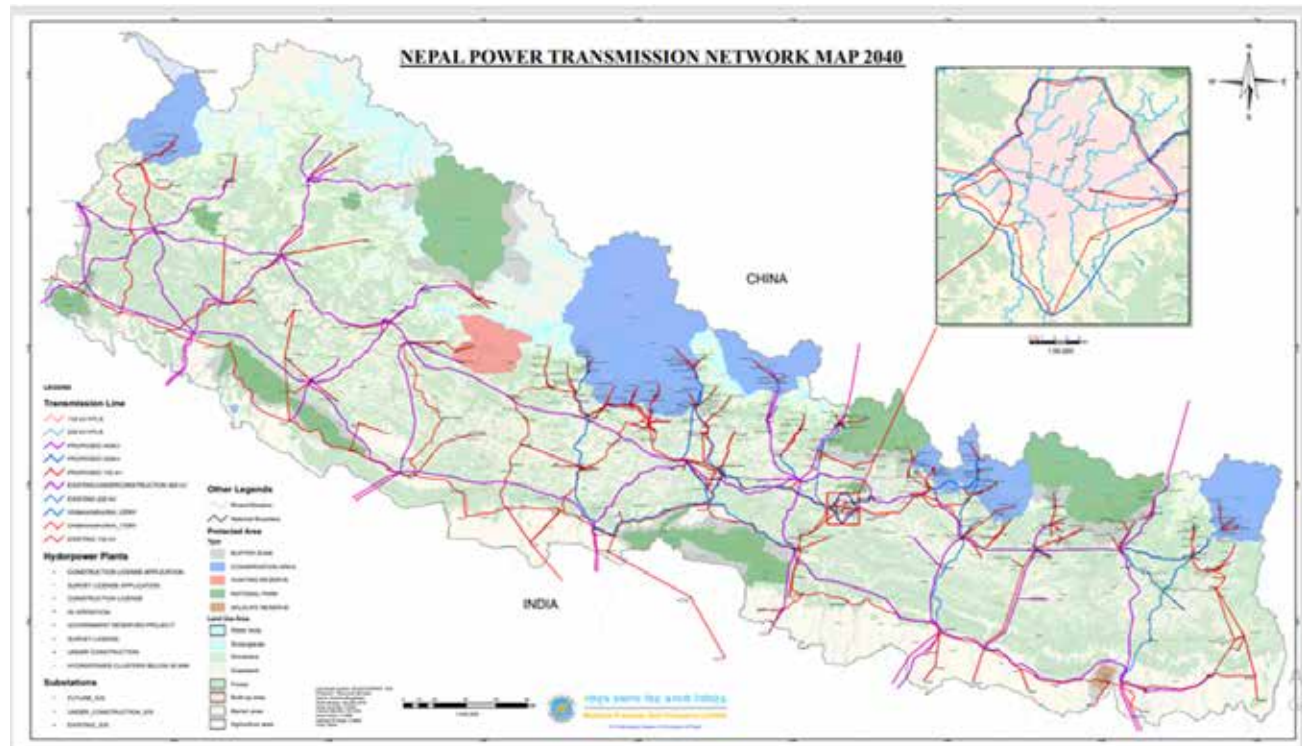
• Hydropower

Nepal possesses significant hydro-resources. Studies indicate an annual mean flow estimation of 103,341 MW and a gross hydropower potential of generating 72,544 MW, with 94% of the capacity distributed across the Koshi, Gandaki, and Karnali river basins.

The growing domestic demand and the possibility of power export to India, China and Bangladesh has made hydropower an attractive investment.

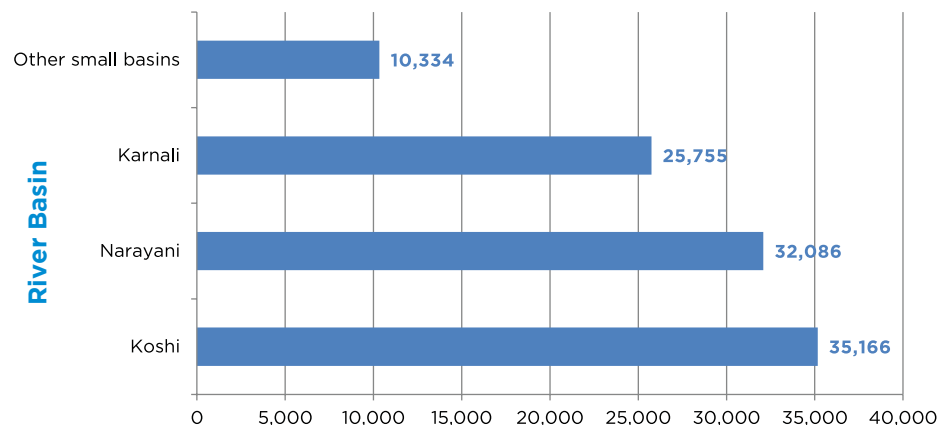


Power development map of Nepal



Source: Rastriya Prasaran Grid Company Limited

Hydropower potential in Nepal (MW)



Source: Bajracharya 2015

• Solar power

Nepal has significant potential for tapping solar energy. In 2008 the Alternative Energy Promotion Centre (AEPC) estimated the commercial potential for grid-connected solar power at 2,100 MW. Nepal experiences average solar radiation ranging from 3.6 to 6.2 kWh/m²/day, with about 300 sunny days annually, which is ideal for solar power generation.

Independent Power Producers are already generating about 61,940 kW, and AEPC has produced about 10,080 kW through rooftop solar systems and 2,929 kW through solar mini grids. NEA has been leading the development of grid-connected solar PV systems, while AEPC has been involved in both on-grid and off-grid systems, institutional solar PV systems, solar pumping systems, and solar/wind hybrid systems.

The IBN has been preparing two large solar energy projects: a grid-connected solar project in Kohalpur and Banganga (250 MWp with 40 MW storage), and a grid-connected project with BESS technology (245 MWp with 20 MW storage). The two projects are to cost USD 158.5 million and USD 176.43 million, respectively. NEA has estimated the economic potential of solar power at around 1,829 Megawatt-peak (MWp).



• Biogas

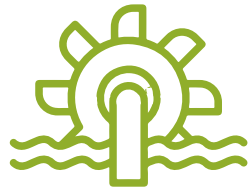
Around 50.4% of the population is engaged in agriculture. The biomass produced in the process can be used for generating biogas. Nepal has developed large biogas plants with capacity of over 12 cubic meters. Such installations can be institutional, community-wide, and commercial.



AEPC has commissioned 7 large waste-to-energy facilities, leveraging the approximately 6 million tons of waste – with 54% organic content – that is collected annually. Prefeasibility studies have identified investment potential in provinces, where there are opportunities to use waste to generate energy.

• Micro/ mini hydro

Despite operational challenges, micro/mini hydro projects have remained promising and had generated 37,734 kW of energy in 2021/22. Nepal aims to address and capitalize on the growing trend in micro/mini hydro through private investments.



• Wind energy

Nepal has potential to use wind to generate energy in an area of about 6,074 sq. km. Studies have suggested the potential to generate over 3000 MW of electricity from wind. The Nepal Wind Mapping Project, supported by the Energy Sector Management Assistance Program (ESMAP) has indicated significant investment opportunities in wind energy.



• Other sources

Geothermal, green hydrogen, and Waste Heat Recovery System (WHRS) are sources of energy remain untapped in Nepal and have potential for investment and exploration. Nepal hosted a Green Hydrogen Summit in 2022, which signals the growing interest in research into green hydrogen as an alternative energy source.



3. SUPPORT SYSTEM

1. Incentives

Applicable income tax for hydro power generation and transmission: 20%

Category	Income tax holiday
Hydropower, solar, wind and biofuel, starting commercial production, transmission, or distribution within April 2028	100% exemption for 1 st 10 years and 50% exemption for next 5 years
Peaking ROR (PROR) and storage hydropower plant more than 200 MW (financial closure by April 2029)	100% exemption for 1 st 15 years and 50% exemption for next 6 years.

VAT exempted projects	VAT exempted items
All hydro-power and solar plants	Construction equipment, machinery, tools, and spare parts required for generation, transmission, and distribution
PROR and storage hydropower plant more than 200 MW (financial closure by April 2026)	Construction equipment, machinery, tools, and spare parts required for generation, transmission, and distribution, in addition to explosives, penstock pipe and steel plates
Biogas, solar, wind energy industries	Equipment and machines, tubular batteries, solar lead batteries
Solar energy producing industries	Batteries produced and supplied by Nepali industries

Hedging fee borne by

Project Type	GON	Relevant GON entity
PROR and storage projects over 100 MW	5%	40%
Transmission line of 220 volt and above, with transmission line above 30 km	20%	35%



Electricity (Amendment) Bill 2022

The proposed Electricity (Amendment) Bill 2022 aims to modernise the power sector. The bill has provisions on renewable energy, cross-border trade, and enforcement authority indicating Nepal's proactive approach to adapting quickly to the changes taking place in the industry.

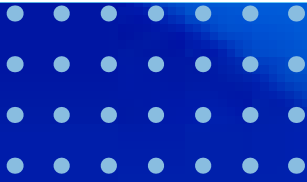


Institutional framework

- The Public Private Partnership and Investment Act 2019, has provisions to facilitate investments in large projects.
- Existing law provides for Power Purchase Agreement with the national utility.
- Nepal's Electricity Regulatory Commission regulates generation, transmission, distribution, tariff fixation and power trade.

Scan for full sectoral profile, including the data sources.





For this document



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