



Country Report of Nepal

Presented by:

Megha Karn

Engineer

Ministry of Energy, Water Resources and Irrigation

Nepal

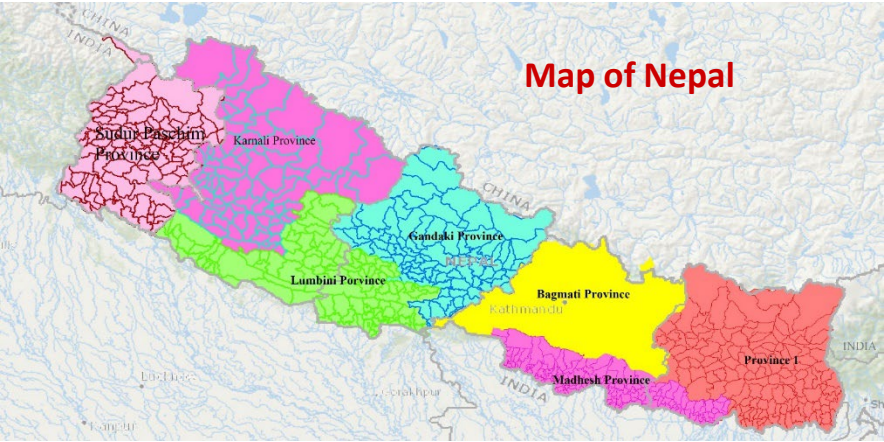




1. General Information - Country Profile & Economic Indicators

Geographical Profile

- Location: South Asia - Federal Democratic Republic State
- Length (E–W): ~885 km | Breadth (N–S): ~193 km
- Area: 147,516 km² | 7 Provinces, 77 Districts
- Latitude: 26°22'N – 30°27'N | Longitude: 80°04'E – 88°12'E
- Landlocked between China and India
- Borders: North - China | East, West & South – India
- Terrain: Terai plains, mid-hills and high Himalayas
- ~6,000 rivers & rivulets
- 8 of 14 tallest peaks on Earth
- Mt. Everest 8,848.86 m – world's highest
- 29 UNESCO heritage sites
- Lumbini – birthplace of Buddha
- Occupies 0.03 % and 0.3% land area of the World and the Asia respectively



Capital	Area
Kathmandu	1,47,516 km ²
Total Population	No. of Households
~30 million	~6.7 million
GDP (2025)	Population Density
USD 45 billion	198 per Km2
Electrification	Population Growth Rate
~99% (2024/25)	0.92%



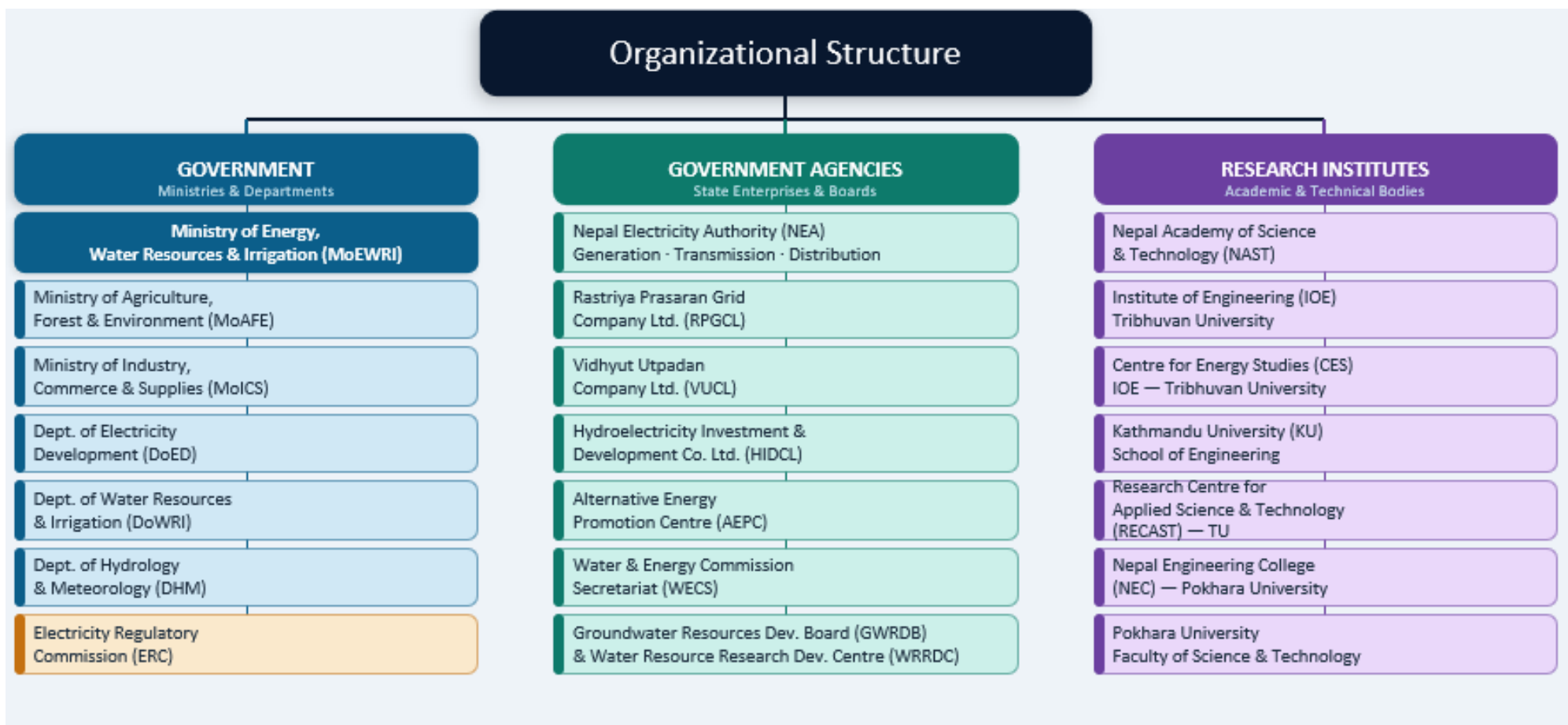
Lord Gautam Buddha



Mount Everest



1. General Information – Organizational Structure related to Energy



Government — Ministries & Departments

Government Agencies & State Enterprises

Research Institutes & Academic Bodies

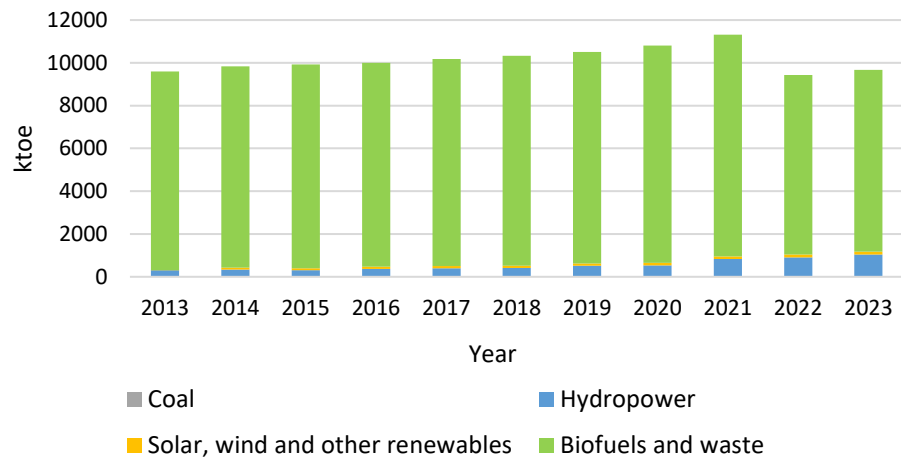
Regulatory Body (ERC)

- There are similar type of Ministry and institution in Seven Province of Nepal.
- 753 Local government also have a office and institution related to energy sector.



2. Past Energy Demand and Supply

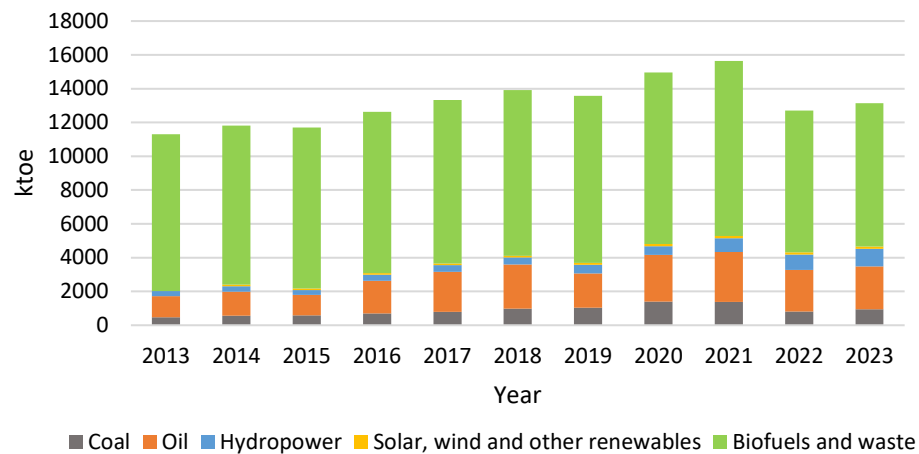
Energy Production by Source



Energy Imports and Exports



Energy Supply by Energy Source

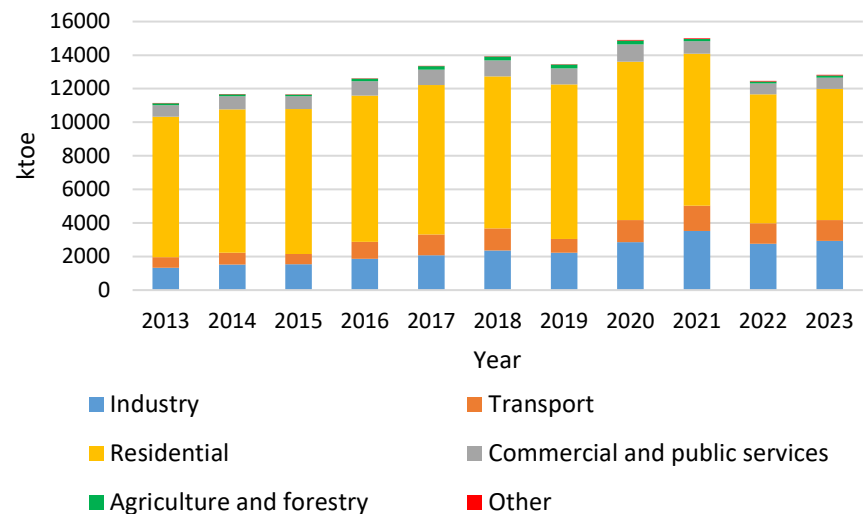


- Total Energy Production by Source: ~ 9700 ktoe, dominated by Biofuels and waste, Hydropower growing fastest.
- Total Energy Imports: ~ 37000 ktoe and Total Energy Exports: ~ 342 ktoe
- Total Energy Supply by Energy Source : ~ 13000 ktoe, Hydropower and Solar, wind and other renewables are rapidly increasing.

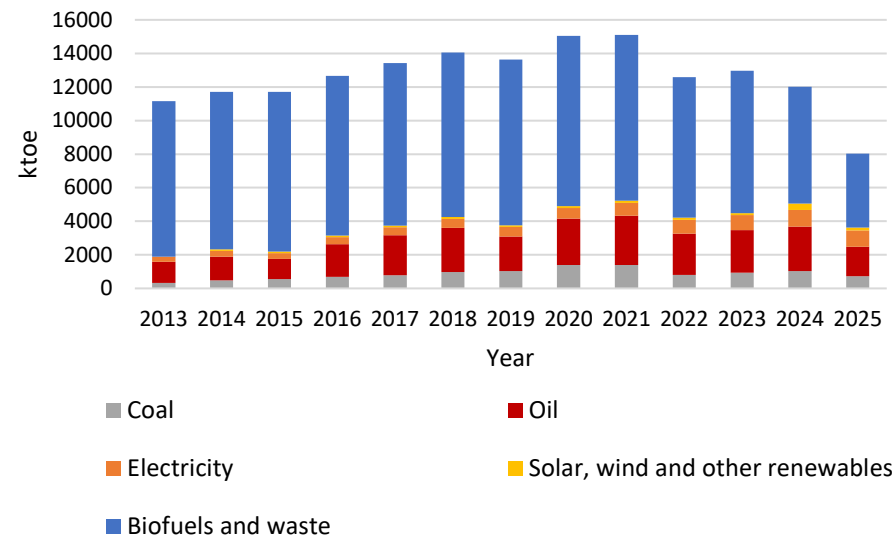


2. Past Energy Demand and Supply

Energy consumption by Sector

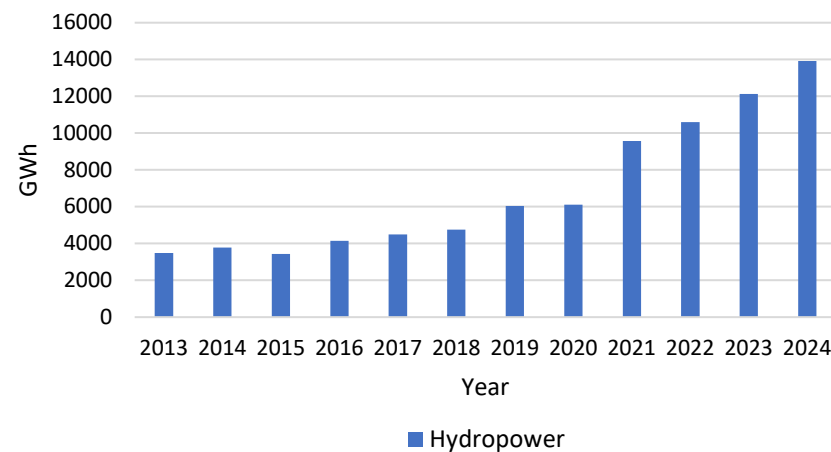


Energy consumption by Energy source

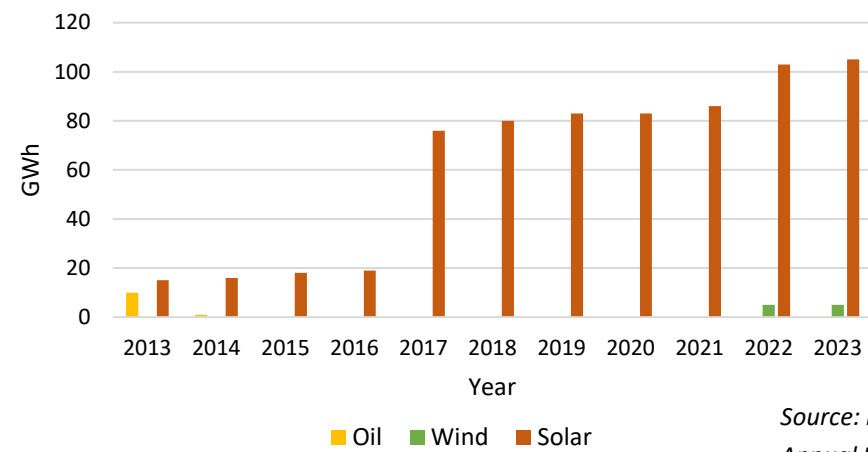


- Residential sector consumes more energy followed by Industrial Sector.
- Though Biofuels and waste is dominating energy source, declining in 2025 with increase in Electricity consumption.
- Electricity Generation from Hydropower and Solar is increasing rapidly.
- Electricity Generation from Hydropower has reached to ~ 14000 GWh in FY 2024/25.
- Target of Electricity Generation for FY 2025/26 is ~ 16500 GWh .

Electricity Generation



Electricity Generation

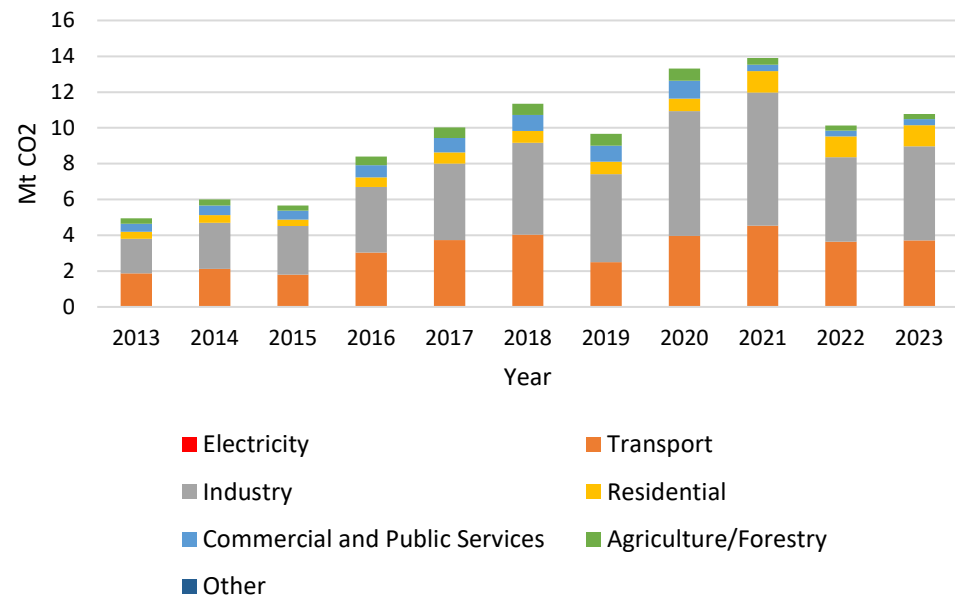


Source: MOF, Economic Survey Report of FY 2023/2024 and NEA Annual Report 2024/25

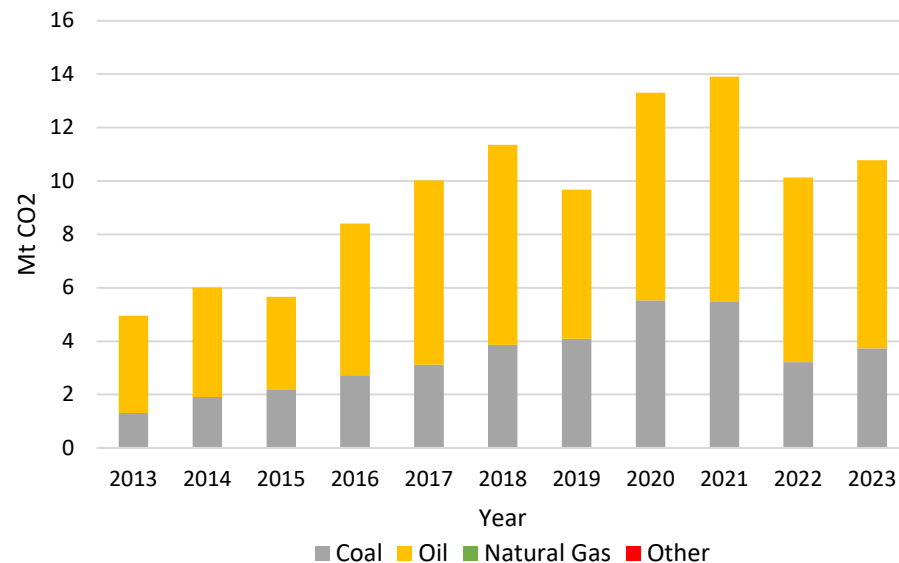


2. Past Energy Demand and Supply

CO2 emission by Sector



CO2 emission by Energy source



- Net CO2 Emission by Sector: ~ 11 Mt CO2 dominated by Industrial Sector in FY 2023/2024.
- Net CO2 Emission by Energy Source: ~ 11 Mt CO2 dominated by Oil Production in FY 2023/2024. No emission of CO2 from Natural Gas.
- Nepal has officially committed achieving net-zero emissions by 2045.



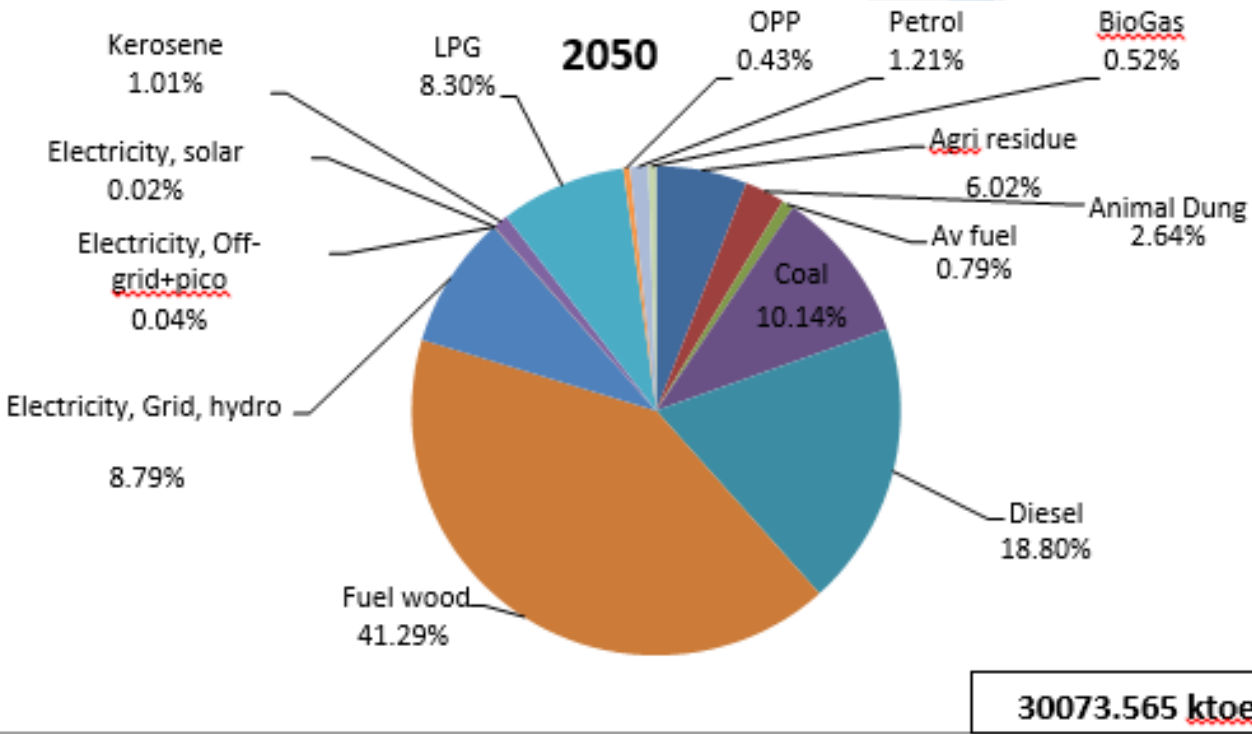
3. Outlook of Energy Demand and Supply

Energy Consumption by Source at Medium Economic growth rate Scenario

Total Energy Consumption in ktoe			
Fuel	2030	2040	2050
Agri residue	621.41	946.02	1811.46
Animal Dung	678.80	743.46	794.16
Av fuel	178.78	205.46	236.10
Coal	783.46	1446.26	3048.61
Diesel	1379.31	2635.21	5655.27
Fuel wood	9609.87	10870.07	12418.65
Electricity, Grid, hydro	837.08	1406.32	2644.00
Electricity, Off-grid+pico	10.92	11.30	10.89
Electricity, solar	2.05	4.42	5.83
Kerosene	107.62	171.30	304.48
LPG	780.19	1333.76	2497.04
OPP	53.17	75.52	128.57
Petrol	191.82	264.00	363.33
BioGas	102.35	128.91	155.15
Total	15336.84	20242.00	30073.57

The major assumptions of the base case scenario are as follows:

- i) GDP growth rate according to Base case, i.e. with an average GDP growth rate of 5.6 percent
- ii) The shares of each demand technology in the energy supply in future years are considered to be invariant i.e. energy mix of total demand will be as similar as in the base year

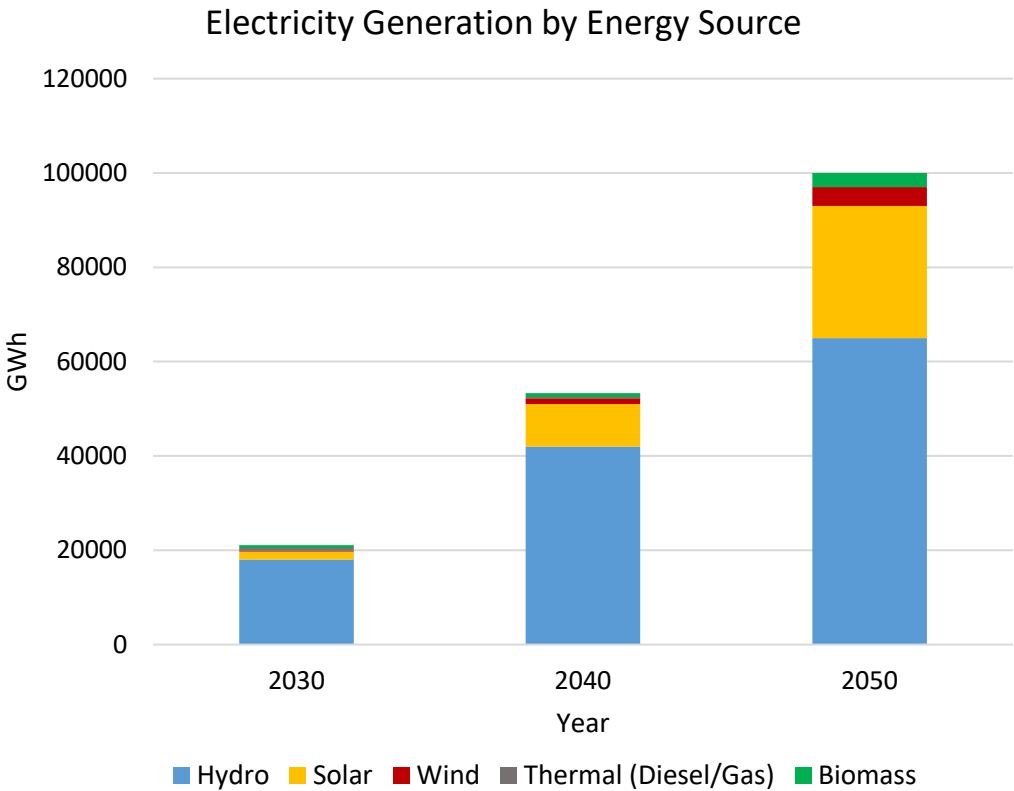




3. Outlook of Energy Demand and Supply

	Sectorial Energy Consumption (ktoe)		
	2030	2040	2050
Agriculture	138	215	368
Commercial	1,181	2,113	4,217
Industrial	1,763	3,260	6,970
Residential	10,659	11,794	12,699
Transport	1,594	2,856	5,814
Total	15,334	20,238	30,068

	CO2 emmision by Energy Source (Mt CO2)		
	2030	2040	2050
Agriculture	0.2	0.2	0.2
Energy	11	9.1	1.7
Industrial	2.9	3.5	1.6
Waste	0	0	0
Total	14	13	4



- Target to increase Electricity Generation from Hydropower followed by Solar and Wind.
- Hydropower Potential estimated: 83000 MW (theoretical), 42000 MW (technically/economically feasible)
- Total Installed Capacity : ~ 4200 MW (Current)



4. Current Energy Policy and Measures

01

16th Five-Year Plan (FY 2024/25–2028/29) · Slogan: Good Governance, Social Justice & Prosperity

ACTIVE PLAN

Generation target: 8,500-11,769 MW installed capacity by FY 2028/29.

Electrification: 100% population access within the plan period (99% achieved as of 2024/25); energy sector contribution to GDP from 0.9% to 4%.

Per capita consumption: 955 kWh target by 2029; electricity exports worth Rs. 41 billion; zero-emission transport transition; 100% clean energy by 2100.

Supporting: Prioritises reservoir projects; FDI from India, Bangladesh & China; private sector participation in projects >500 MW.

02

Energy Development Roadmap & Action Plan 2081 · MoEWRI (Cabinet approved: 31 Dec 2024)

APPROVED DEC 2024

10-year vision: Installed capacity 3,400 MW (2024) → 28,500 MW by 2035 (all investment models open - public, private, FDI, PPP).

Domestic use: 13,500 MW for domestic consumption; per capita electricity 400 → 1,500 kWh; 100% electrification (agriculture, industry & transport).

Export target: 15,000 MW export - 10,000 MW to India, 5,000 MW to Bangladesh/China via tripartite agreement (40 MW to Bangladesh already live).

Investment: USD 46.5 billion required over 10 years; 750,000 + annual jobs; Nepal declared energy-friendly country for clean & green energy.

Target Updated (May 2026), 10-year vision Government Initiatives → Installed capacity 30,000 MW by 2036 .

03

Third NDC 3.0 (May 2025) & Long-Term Net-Zero Strategy - Aligned with Paris Agreement 1.5°C

SUBMITTED MAY 2025

GHG targets: Reduce net GHG emissions by 17.12% by 2030 and 26.79% by 2035 vs. BAU; net-zero CO₂ by 2045 (LTS 2021).

Energy: 28,500 MW RE capacity by 2035; diversify beyond hydro to solar, wind, micro-hydro & bioenergy.

Governance: 400 municipalities to implement local energy plans & energy-efficient building codes; decentralised energy governance.

Finance: Total mitigation cost USD 73.74 billion (Nepal: USD 10.82 B + 85% from international climate finance).



4. Major Difficulties and Bottlenecks currently faced in formulating Energy Policies

⚠ MAJOR DIFFICULTIES

D1

Weak Institutional Coordination & Governance

- No central planning body to coordinate across ministries, provincial and local governments.
- Policy-making lacks meaningful stakeholder participation, leading to fragmented implementation and inconsistency between policy and law.

D2

Insufficient Data & Information Systems

- Lack of reliable, up-to-date energy data makes evidence-based policymaking difficult.
- No integrated energy database or standardized data collection methodology across 753 local governments and 7 provinces.

D3

Unclear Policy on Biomass & Alternative Energy

- Despite biomass comprising 80% + of primary energy supply, there is no clear regulatory framework for its sustainable use.
- Absence of a coherent biomass policy creates barriers to transitioning households from solid fuels.

🔒 BOTTLENECKS

B1

Energy Sector Reform & Restructuring Challenges

- The existing regulatory and institutional framework is outdated.
- Lack of unbundling between generation, transmission and distribution hinders investment, private sector participation and sector efficiency.

B2

Energy Reliability, Security & Urban Planning Gap

- Lack of integrated urban energy planning results in inefficient infrastructure expansion.
- Load-shedding, grid reliability issues and absence of energy security strategy remain major constraints to economic growth.

B3

Financing & Investment Barriers for RE Projects

- High upfront capital costs, limited domestic financing, complex PPA procedures and policy instability restrict private investment in hydropower and other renewable energy projects, especially at the local level.



5. Subject I Like to Learn and Expectation from Superior

Subjects I Would Like to Learn

Energy Data Collection & Database Development

- 1
- Methods to collect annual energy consumption data and establish reliable national energy databases - especially relevant for countries with diverse energy consumption patterns similar to Nepal.

Energy Policy Formulation Tools & Methods

- 2
- Practical tools (software, modelling frameworks, raw data analysis) used in formulating evidence-based energy policies; energy commodity balance analysis methods.

Effective Sectoral Energy Policy Making

- 3
- How to design effective policies across different energy sub-sectors (hydropower, solar, biomass, transport); international best practices in stakeholder engagement and policy implementation.

Superior's Expectations from This Program

Strengthen National Energy Planning Capacity

- 1
- Apply learnings to improve Nepal's energy planning framework - particularly in integrating data-driven approaches into the Ministry's policy formulation process.

Bring Back Knowledge on Energy Transitions

- 2
- Understand how other developing countries have managed energy transitions, addressed energy poverty and scaled up renewable energy and adapt relevant strategies for Nepal's context.

Build Professional & Institutional Networks

- 3
- Establish professional relationships with energy practitioners across JICA member countries for ongoing knowledge exchange, potential cooperation, and collaborative research on shared energy challenges.



APPENDIX

PPA Rate for RoR Hyrdro-electricity

Option	Season	Rate Rs/KWh (upto 100 MW project)	Min. Dry season Energy required
1 (Dry and wet season 6 months each)	Wet(June - December)	4.80	30 %
	Dry (Jan- November)	8.40	
2 (Dry and wet season months 4 and 8 respectively)	Wet (April 16- Nov15)	4.80	15 %
	Dry (Nov16- Apr 15)	8.40	

PPA Rate for PRoR Hyrdro-electricity

Season	Time of Day	Daily hours required to generate at rated capacity	Rate Rs./KWh	Min. Dry season Energy required
Dry (Mangsir16- Jestha 15)	Peak hours	1 hr to less than 2 hrs	8.50	30 %
		2 hrs to less than 3 hrs	8.80	
		3 hrs to less than 4 hrs	9.40	
		4 hrs to 6 hrs	10.55	
	Non-peak hours		8.40	
Wet (Jestha 16- Mangsir 15)	All hours		4.80	

PPA Rate for Storage Hyrdro-electricity

Season	Rate Rs/KWh	Min. Dry season Energy required
Dry (Mangsir 16- Jestha 15)	12.40	35 %
Wet (Jestha 16- Mangsir 15)	7.10 (If wet season energy is more than 50%, this rate shall be decreased by the excess%)	



APPENDIX

Domestic single Phase Consumer tariff

kWh (Monthly)	5 Ampere		15 Ampere		30 Ampere		60 Ampere	
	Minimum Charge (Nrs.)	Energy Charge (Nrs/kWh)	Minimum Charge (Nrs.)	Energy Charge (Nrs/kWh)	Minimum Charge (Nrs.)	Energy Charge (Nrs/kWh)	Minimum Charge (Nrs.)	Energy Charge (Nrs/kWh)
0-10	30.00	0.00	50.00	4.00	75.00	5.00	125.00	6.00
11-20	30.00	3.00	50.00	4.00	75.00	5.00	125.00	6.00
21-30	50.00	6.50	75.00	6.50	100.00	6.50	125.00	6.50
31-50	50.00	8.00	75.00	8.00	100.00	8.00	125.00	8.00
51-100	75.00	9.50	100.00	9.50	125.00	9.50	150.00	9.50
101-150	100.00	9.50	125.00	9.50	150.00	9.50	200.00	9.50
151-250	125.00	10.00	150.00	10.00	175.00	10.00	200.00	10.00
251-400	150.00	11.00	175.00	11.00	200.00	11.00	250.00	11.00
Above 400	175.00	12.00	200.00	12.00	225.00	12.00	275.00	12.00

Domestic single Phase Consumer tariff

kWh (Monthly)	Up to 10 KVA		Above 10 KVA	
	Minimum Charge (Nrs.)	Energy Charge (Nrs/kWh)	Minimum Charge (Nrs.)	Energy Charge (Nrs/kWh)
Up to 400	1100.00	11.50	1800.00	11.50
Above 400		12.00		12.00

1.3 Three phase Medium Voltage (33/11 kV)

kWh (Monthly)	Minimum Charge (Nrs.)	Energy Charge (Nrs/kWh)
Up to 1000	10,000.00	11.00
Above 1001		12.00

4. Community Wholesale Consumer:

Consumer Category	Energy Charge (Nrs/kWh)
1. Medium Voltage (11KV/33KV)	
Upto (N* x 20) units	3.00
Above (N* x 20) units	6.00
2. Lower Voltage Level (230/400 Volt)	
Upto (N* x 20) units	3.00
Above (N* x 20) units	6.25

N* = Total Number of Consumers of a Community Group



APPENDIX

2. Other Consumers

2.1 Low Voltage (230/400 V)

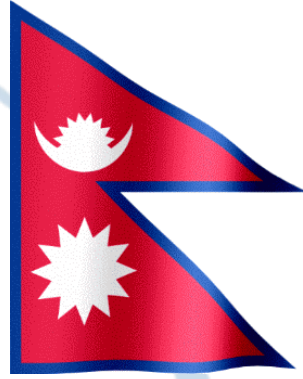
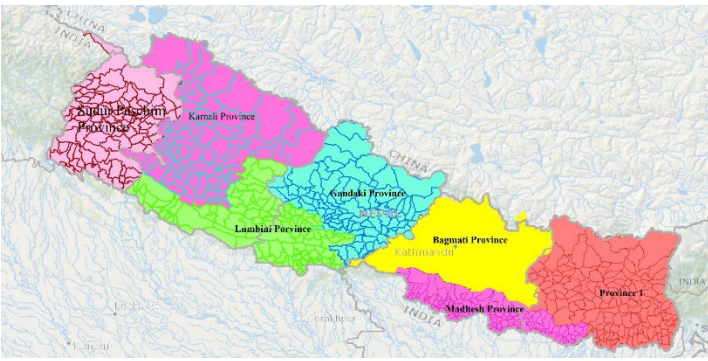
Consumer Category	Demand Charge	Energy Charge
	(Nrs. per kVA/ month)	Nrs/kWh
1. Industrial		
a) Rural and Domestic	60.00	7.80
b) Small Industry	110.00	9.60
2. Commercial	325.00	11.20
3. Non-Commercial	215.00	12.00
4. Irrigation	-	4.30
5. Water Supply		
a) Community Water Supply	-	4.20
b) Other Water Supply	160.00	7.20
6. Transportation		
a) Charging Station	200.00	5.75
b) Other Transportation	220.00	8.90
7. Religious place	-	6.10
8. Street Light		
a) Metered		7.30
b) Non-Metered	2475.00	-
9. Temporary Connection	-	19.80
10. Non-Domestic	350.00	13.00
11. Entertainment Business	350.00	14.00

2.2 High Voltage

3. Time of Day (ToD) Tariff Rate

3.1 Tariff Rate from Balshakh to Mangsir

Consumer Category	Demand Charge Nrs. per KVA/ month	Energy Charge Nrs/kWh		
		Peak Time (17.00-23.00)	Off Peak Time (23.00-5.00)	Normal time (5.00-17.00)
A. High Voltage				
1. Industrial (132 kV)	230.00	10.00	4.65	8.20
2. Industrial (66 kV)	240.00	10.10	4.75	8.30
B. Medium Voltage (33 KV)				
1. Industrial	250.00	10.20	5.25	8.40
2. Commercial	315.00	12.30	6.75	10.80
3. Non-Commercial	240.00	13.20	7.00	12.00
4. Irrigation	-	6.30	3.15	4.70
5. Water Supply				
a) Community Water Supply	-	6.20	3.10	4.60
b) Other Water Supply	150.00	10.20	5.25	8.40
6. Transportation				
a) Charging Station	230.00	7.00	3.70	5.50
b) Other Transportation	255.00	9.35	3.70	8.40
7. Street Light	80.00	8.40	3.50	4.20



Thank You!!!

From **NEPAL** *with the world's only non-rectangular flag*

the country with the world's highest peak and is the birthplace of "The Buddha"....