

# NEPAL ENERGY SECTOR ASSESSMENT, STRATEGY, AND ROAD MAP

ASIAN DEVELOPMENT BANK



# NEPAL ENERGY SECTOR ASSESSMENT, STRATEGY, AND ROAD MAP

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# Abbreviations

ADB	–	Asian Development Bank
AEPC	–	Alternative Energy Promotion Center
DOED	–	Department of Electricity Development
EIA	–	environmental impact assessment
IEE	–	initial environmental examination
FY	–	fiscal year
GDP	–	gross domestic product
IPP	–	independent power producer
JICA	–	Japan International Cooperation Agency
NEA	–	Nepal Electricity Authority
PPP	–	public–private partnership
PRC	–	People’s Republic of China
PV	–	photovoltaic

## Weights and Measures

GWh	–	gigawatt-hour
ktoe	–	kilotons of oil equivalent
km	–	kilometer
kV	–	kilovolt
kW	–	kilowatt
Mtoe	–	million tons of oil equivalent
MW	–	megawatt
toe	–	ton of oil equivalent

## Notes

The fiscal year (FY) of the government ends on 15 July. “FY” before a calendar year denotes the year in which the fiscal year ends, e.g., FY2016 ends on 15 July 2016.

## Currency Equivalents (as of 4 November 2016)

Currency unit	–	Nepalese rupee/s (NRe/NRs)
NRe1.00	=	\$0.00936
\$1.00	=	NRs106.79

# I Sector Assessment: Context and Issues

## A. Introduction

1. This energy sector assessment, strategy, and road map (ASR) sets out the current assessment made by the Asian Development Bank (ADB) and the investment priorities of the Government of Nepal and ADB. It gives background information about the sector, and highlights key development constraints, government plans and strategy, past ADB support and experience, support from other development partners, and ADB's future support strategy for the country. Linked to ADB's country partnership strategy (CPS) 2013–2017 for Nepal, this energy sector ASR is intended to provide guidance for future investment and technical assistance operations of ADB. It will be updated as development strategies and programs change.

## B. Sector Overview

### 1. Socioeconomic Development

2. Nepal is a small, landlocked, and developing economy situated between 26° and 30° north latitude, and between 80° and 88° east longitude. It covers an area of about 147 square kilometers (km<sup>2</sup>) and stretches about 145–241 kilometers (km) north to south, and 850 km east to west. The altitude ranges from less than 100 meters above sea level to 8,848 meters at the highest point on earth—Mt. Everest, where the climate varies from subtropical to arctic. The population, 28.5 million in 2015, grew by an average of 1.2% per year from 2010–2015; about 50% of the total is in the low-lying Terai region in the south, about 43% in the mid-hill region running east to west in the central part of the country, and the remaining 7% in the high-altitude Himalayan region. Nepal shares borders with the People's Republic of China (PRC) to the north and with India to the south, east, and west.

3. Despite recent conflict and a complex political transition, the country was making reasonably good economic and social progress until the catastrophic earthquake of 7.8 magnitude on 25 April 2015. Annual gross domestic product (GDP) growth averaged over 5.5% from 2010 to 2015. Gross national income per capita tripled from \$210 in 1990 to \$730 in 2015. Agriculture, the mainstay of the economy, accounts for almost one-third of GDP. Industry is a distant second, at around 15%, followed by services (wholesale and retail trade, and the transport, storage, and communication sectors). Exports—mostly industrial products, garments, and food such as tea and spices—go mainly to Bangladesh, Germany, India, and the United States. Imports consist for the most part of petroleum and industrial products, gold, silver, and food, and are typically sourced from the PRC, India, Indonesia, and the United Arab Emirates. Carbon dioxide (CO<sub>2</sub>) emissions per capita have recently increased, largely because of greater use of fossil fuels, particularly in the energy sector. Table 1 shows Nepal's socioeconomic development in 1990–2015.

Table 1: Key Data and Economic Profile, 1990–2015

Socioeconomic Data	1990	1995	2000	2005	2010	2013	2015
Population (thousand)	18,742	21,391	23,740	25,507	26,876	27,835	28,514
Population growth rate, annual (%)	2.5	2.5	1.8	1.2	1.1	1.2	1.2
Life expectancy at birth, total (years)	54.2	58.5	62.3	65.5	68.0	69.2	...
GDP (billion current \$)	3.6	4.4	5.5	8.1	16.0	19.3	20.9
GDP growth rate, annual (%)	4.6	3.5	6.2	3.5	4.8	4.1	3.4
GNI per capita (current \$)	210	210	230	310	540	720	730
CO <sub>2</sub> emissions per capita (metric tons)	0.034	0.095	0.129	0.121	0.188	0.234	...

... = data not available, CO<sub>2</sub> = carbon dioxide, GDP = gross domestic product, GNI = gross national income.  
Source: World Bank. <http://databank.worldbank.org>

4. While Nepal met most of the Millennium Development Goal targets, accelerating growth and reducing disparity will remain major challenges. Investments in infrastructure, particularly in the energy sector, are crucial to improving the quality of life and invigorating the economy and social development.

5. Nepal is among the countries that are most vulnerable to climate change and its effects, including more severe water-induced disasters and extreme hydrometeorological events, such as drought, storms, flooding and inundation, landslides, debris flows, soil erosion, and avalanches. According to the National Adaptation Programme of Action (NAPA) 2000, 29 out of 75 districts are highly vulnerable to landslides, 22 districts to drought, 12 districts to glacier lake outbursts, and 9 districts to flooding.<sup>1</sup>

## 2. Energy Supply and Consumption

6. Nepal has no known deposits of oil, gas, or coal except for some lignite deposits.<sup>2</sup> Biomass, oil products, coal, hydro, and electricity are its main sources of primary energy. Among these, biomass, in the form of firewood, agricultural waste, and animal dung, has consistently dominated supply because of the lack of other alternative energy sources and the poor state of the economy, particularly in the rural areas. The largest share of energy consumption goes to the residential sector. The share of industry and transport is now small, but these sectors are growing fast. From 1990 to 2014, total final energy consumption rose from 106 kilotons of oil equivalent (ktoe) to 665 ktoe for the industry sector, and from 111 ktoe to 858 ktoe for the transport sector. Table 2 shows how energy supply and consumption in the various sectors have increased since 1990.

7. The country's energy imports—mainly oil products, coal, and electricity—have been growing fast, from 312 ktoe in 1990 (5.4% of the supply of primary energy that year) to 2,069 ktoe in 2014 (17.7%). On the other hand, the increase in the production of indigenous primary energy has been moderate, from 5,501 ktoe in 1990 to 9,740 ktoe in 2014. Figure 1 shows how energy imports and domestic energy production have grown since 1990. Figure 2 presents the major energy sources and their percentage share of the total supply of primary energy in 2014. The share of each sector in total final energy consumption in 2014 is shown in Figure 3.

<sup>1</sup> Ministry of Population and Environment. 2016. *Intended Nationally Determined Contributions* (INDC). Communicated to the United Nations Framework Convention on Climate Change (UNFCCC) Secretariat in February. Kathmandu.

<sup>2</sup> Oil product and coal imports come mainly from India, as does some of the country's electricity supply.

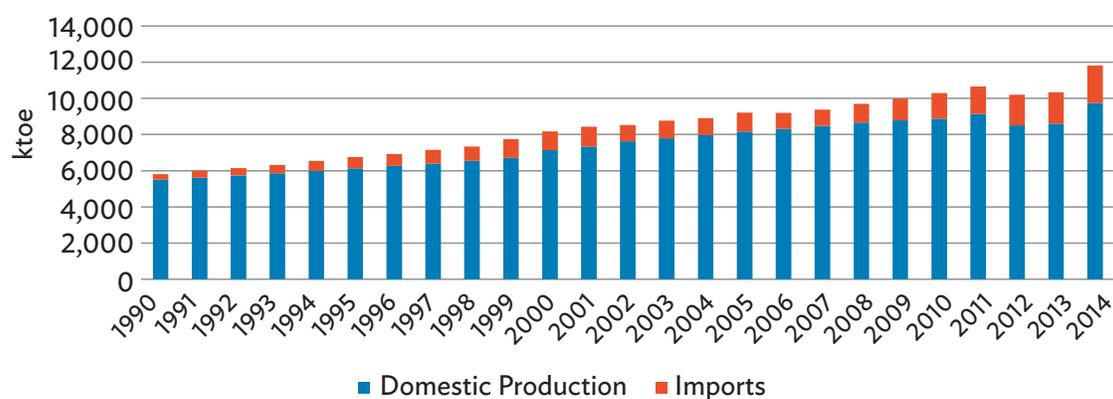
**Table 2: Energy Supply and Consumption Trend, 1990–2014**  
(ktoe)

Item	1990	1995	2000	2005	2010	2014
<b>Total Primary Energy Supply</b>	<b>5,789</b>	<b>6,712</b>	<b>8,108</b>	<b>9,132</b>	<b>10,211</b>	<b>11,690</b>
Coal	49	74	258	248	303	484
Oil products	244	501	713	724	983	1,359
Natural gas	0	0	0	0	0	0
Hydro	75	100	140	216	276	326
Biomass	5,425	6,039	6,988	7,928	8,592	9,403
<b>Total Final Energy Consumption</b>	<b>5,761</b>	<b>6,667</b>	<b>8,041</b>	<b>9,050</b>	<b>10,107</b>	<b>11,534</b>
Industry	106	161	379	388	449	665
Transport	111	203	270	275	637	858
Residential	5,465	6,170	7,199	8,128	8,718	9,624
Commercial and public services	43	60	97	165	171	219
Agriculture/Forestry	33	60	75	72	118	151
Non-energy use	4	7	11	20	10	8

ktoe = kilotons of oil equivalent.

Source: International Energy Agency (IEA). <http://www.iea.org/statistics>

**Figure 1: Domestic Energy Production and Import Trend, 1990–2014**

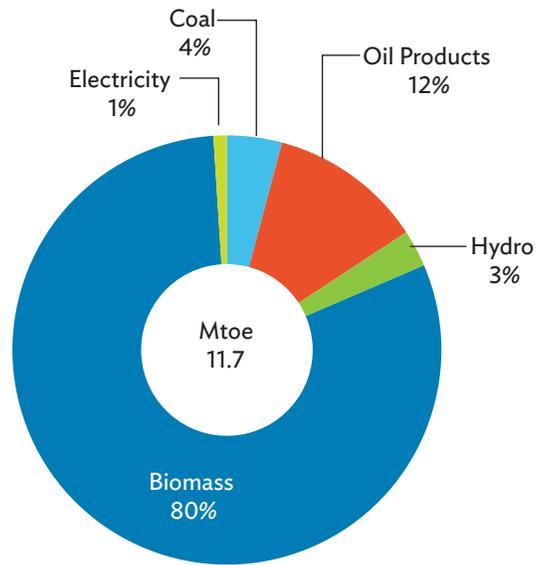


Item	1990	1995	2000	2005	2010	2014
Domestic production	5,501	6,138	7,138	8,152	8,876	9,740
Imports	312	616	1,037	1,052	1,418	2,069
Total	5,813	6,754	8,175	9,204	10,294	11,809

ktoe = kilotons of oil equivalent.

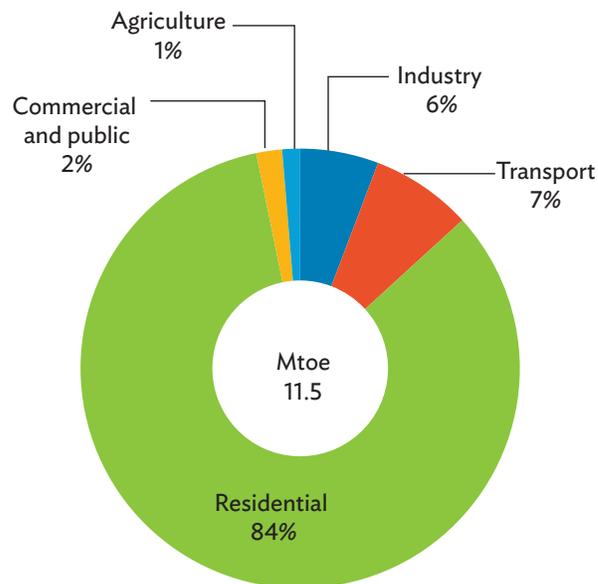
Source: International Energy Agency (IEA). <http://www.iea.org/statistics>

Figure 2: Primary Energy Supply Mix, 2014



Mtoe = million tons of oil equivalent.  
Source: International Energy Agency (IEA). <http://www.iea.org/statistics>

Figure 3: Final Energy Consumption Mix, 2014



Mtoe = million tons of oil equivalent.  
Source: International Energy Agency (IEA). <http://www.iea.org/statistics>

### 3. Coal

8. Some peat, lignite, and coal deposits are known to exist in different parts of Nepal, and 19 small coal mines are currently operating.<sup>3</sup> However, coal production is insignificant—only about 10 ktoe per year—and coal makes up only about 4.4% of total final energy consumption, most of it consumed by the industry sector. In 2014, more than 97% of coal demand in Nepal was met by imports.

### 4. Oil and Gas

9. Nepal has no oil refinery and produces no oil. For its refined oil product needs, it depends entirely on imports from India. The country increasingly relies on petroleum products to meet its energy demand. Annual demand for petroleum products, such as motor spirit, high-speed diesel, superior kerosene oil, air turbine fuel, and liquefied petroleum gas, is about 1.0 million tons of oil equivalent (Mtoe) and is growing by around 10% each year on average. Petroleum products represented about 11% of final energy consumption in 2014, and this share is projected to increase to over 12% by 2035.

10. The seaport nearest to Nepal is Kolkata, India, about 900 km away from the India–Nepal border. Long transportation distance is the main constraint on imports of petroleum products from third countries. All the petroleum products consumed in Nepal are imported from the Indian Oil Corporation under a 5-year contract agreement signed on 27 April 2012. The Nepal Oil Corporation, a state-owned trading company established in 1980, imports, transports, stores, and distributes all petroleum products in the country. At present, the country's oil storage capacity is only 71,662 kiloliters, just enough for 20 days of oil product sales. Given its vulnerability to supply shocks—border blockades in 1989 and the most recent border closure in late 2015 resulted in rationing and long queues for the fuel—Nepal should build larger storage facilities across the country in a phased manner. It can increase its storage capacity to 60 days to start with, and later to 120–180 days. It should build quickly to be able to take advantage of the low oil prices at this time.

### 5. Power

11. Nepal is rich in hydro resources, with development potential of 83,000 megawatts (MW) and commercially exploitable hydropower generating potential of about 42,000 MW.<sup>4</sup> However, by the end of fiscal year (FY) 2016, existing hydropower stations had a total installed capacity of only 802.4 MW, or less than 2% of the total commercially exploitable generation potential. The slow progress of hydropower development is attributable to (i) inadequate planning and investment in generation, transmission, and distribution capacity; (ii) concerns about the ability of the Nepal Electricity Authority (NEA) to honor take-or-pay contract obligations; and (iii) delays in project development, caused partly by legal and regulatory inadequacies. As a result, Nepal now suffers from a severe shortage of power. Load shedding is frequent, and the country ranks 137th out of 147 countries in quality of electricity supply.<sup>5</sup> Furthermore, since most of the existing hydropower plants are of the run-of-the-river type, electricity generation fluctuates and is highly seasonal.

12. The government recognizes that it must accelerate the development of its abundant hydropower potential as an important step forward in its efforts to reduce poverty and stimulate economic growth. Hydropower development will (i) provide clean energy to enhance economic and social development in the rural and urban areas, and (ii) enable Nepal to generate revenue from exports of excess energy to neighboring countries.

<sup>3</sup> Ministry of Industry. <http://www.dmgnepal.gov.np/resources/fuel-minerals>

<sup>4</sup> ADB. 2014. *Technical Assistance for the South Asia Economic Integration Partnership - Power Trading in Bangladesh and Nepal (Subproject 1)*. Manila (TA 8658-REG).

<sup>5</sup> ADB. 2015. *Asian Development Outlook 2015: Financing Asia's Future Growth*. Manila.

13. **Generation.** Installed power generation capacity has grown steadily, from 706 MW in FY2011 to 856 MW in FY2016, or by an average of 3.9% yearly. But peak demand for electricity during the same period grew even faster, from 946 MW to 1,385 MW, or by an average of 7.9% yearly, thus significantly widening the supply–demand gap. This gap has been bridged to some extent by imports from India, which rose by an average of 20.4% per year in FY2011–FY2016, and has been managed through administrative load shedding in most parts of the country.

14. Peak demand in Nepal in FY2016 was 1,385 MW, with 534 MW of load shedding.<sup>6</sup> This resulted in daily load shedding of up to 11 hours during the dry months of January–April. Electricity demand peaks during the dry season or the winter months, when generation from hydropower plants is at its lowest. On the other hand, generation is at its highest during the rainy season, when there is less demand. Table 3 shows installed capacity and generation in Nepal over the past 6 years, and Appendix 1 lists the existing power plants and their installed generation capacity.

**Table 3: Electricity Demand and Supply, Fiscal Year 2011–Fiscal Year 2016**

Item		FY2011	FY2012	FY2013	FY2014	FY2015	FY2016	Annual Growth Rate (%)	
Installed capacity (MW) <sup>a</sup>		706	719	762	787	787	856	3.9	
Peak demand (MW)		946	1,027	1,095	1,201	1,292	1,385	7.9	
Supply capacity shortage (MW)		240	308	333	414	505	529	17.1	
Electricity requirement (GWh)		4,833	5,195	5,446	5,910	6,335	6,920	7.4	
Supply (GWh)	NEA	Hydro	2,122	2,357	2,273	2,288	2,366	2,168	0.4
		Thermal	3	2	19	10	1	0.1	0
		Total NEA	2,125	2,359	2,292	2,298	2,367	2,169	0.3
	IPPs	1,039	1,074	1,176	1,070	1,269	1,173	2.5	
	Imports	694	746	790	1,319	1,370	1,758	20.4	
	Total	3,858	4,179	4,258	4,687	5,006	5,100	5.7	
Supply shortage (GWh)		975	1,018	1,188	1,223	1,329	1,820	13.3	

FY = fiscal year, GWh = gigawatt-hour, IPP = independent power producer, MW = megawatt, NEA = Nepal Electricity Authority.

<sup>a</sup> Includes power generation capacity of both the NEA and IPPs.

Sources: Nepal Electricity Authority. 2016. *A Year in Review: Fiscal Year 2015/2016*. Kathmandu; ADB. 2014. *Technical Assistance for South Asia Economic Integration Partnership – Power Trading in Bangladesh and Nepal (Subproject 1)*. Manila (TA 8658-REG).

15. Until 1990, hydropower development was the responsibility of the NEA. However, the passage of the Hydropower Development Policy in 1992 brought the private sector into hydropower development. In FY2016, 93.8% of total power generation capacity was hydro based, and the remaining 6.2% was met by multi-fuel and diesel plants; solar made up an insignificant portion (Table 4). About 50 power plants have been built by private developers. Independent power producers (IPPs) accounted for 37.9% of total installed capacity in FY2016, and 23.0% of the country's power supply. Table 4 shows the generation mix in FY2016.

<sup>6</sup> Nepal Electricity Authority. 2016. *A Year in Review: Fiscal Year 2015/2016*. Kathmandu.

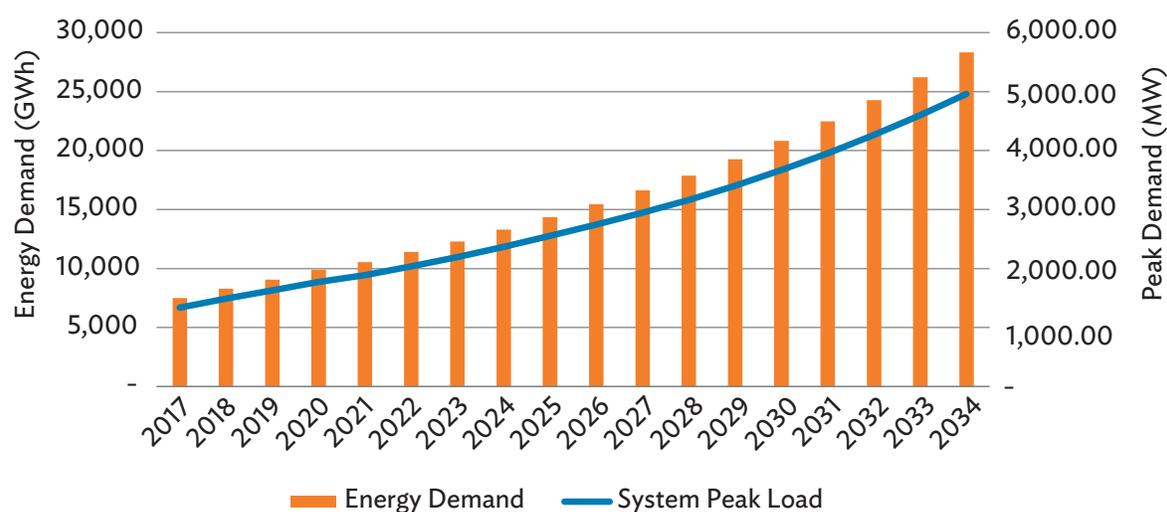
Table 4: Generation Mix, Fiscal Year 2016

Generation Source		Capacity (MW)	% of Total
Hydro	NEA grid connected	473.4	55.4
	NEA small hydro	4.5	0.5
	IPP	324.4	37.9
	Subtotal	802.4	93.8
Thermal	NEA	53.4	6.2
Solar	NEA	0.1	0.0
<b>Total Installed Capacity</b>		<b>855.9</b>	<b>100.0</b>

IPP = independent power producer, MW = megawatt, NEA = Nepal Electricity Authority.  
Source: Nepal Electricity Authority. 2016. *A Year in Review: Fiscal Year 2015/2016*. Kathmandu.

16. In the short to medium term, the power shortfall in the dry season is likely to continue, but the deficit is projected to decrease with the commissioning of the hydro project in the next 3 years, adding 1,047.1 MW of new power plants and easing the supply situation. Furthermore, the power sector looks forward to self-sufficiency in power requirements once 2,091 MW of additional capacity is put into operation by FY2022. According to the NEA's load demand forecast, peak system demand will increase from 1,292 MW in FY2015 to 2,379 MW by FY2022. If all power plants are built as planned, there will be a supply margin of nearly 600 MW in FY2022. Figure 4 shows the NEA's load forecast, and Appendix 2 presents a list of planned power plants.

Figure 4: Electricity Load Forecast, Fiscal Year 2017–Fiscal Year 2034



Item	FY2017	FY2018	FY2020	FY2022	FY2025	FY2030	FY2034
Peak load (MW)	1,559.7	1,742.2	2,203.8	2,378.9	3,203.0	4,280.7	5,785.3
Energy demand (GWh)	7,491.1	8,287.0	9,889.9	11,398.9	15,460.0	20,811.8	28,329.9

GWh = gigawatt-hour, MW = megawatt.

Source: Nepal Electricity Authority. 2016. *A Year in Review: Fiscal Year 2015/2016*. Kathmandu.

17. **Transmission.** The NEA is responsible for planning, developing, implementing, and operating the transmission system in Nepal. It also monitors, operates, and constructs transmission lines and substation facilities to evacuate power generated by NEA- and IPP-owned power plants, and undertakes transmission system reinforcements. The main load center in Nepal is in the central zone, which includes Kathmandu Valley. The main transmission system consists of 66 kilovolt (kV) and 132 kV transmission lines running from east (Anarmani) to west (Mahendranagar), parallel to the Indian border, and major substations are located in Hetauda, Syuchatar, and Balaju. A 220 kV east–west corridor connecting the load centers in Nepal is undergoing commissioning, and expected for energizing by the end of 2016, and the first-ever 400 kV Nepal–India cross-border transmission link for import of at least 300 MW is expected for commission by December 2016.<sup>7</sup> Table 5 gives an overview of Nepal’s transmission network.

**Table 5: Transmission Network**

Voltage	Transmission Line Length (ckm)		
	Existing	Under Construction	Planned and Proposed
66 kV	511.2		
132 kV	2,416.7	775.0	1,400.0
220 kV		1,049.0	570.0
400 kV		740.0	1,560.0

ckm = circuit kilometer, kV = kilovolt.

Source: Nepal Electricity Authority. 2016. *A Year in Review: Fiscal Year 2015/2016*. Kathmandu.

18. The lack of infrastructure to deliver electricity from generation plants to load centers has been a significant bottleneck. The previous Three-Year Plan (2010–2013) was aimed at adding 700 km of transmission lines by FY2013 to the 1,916 km already existing, but as of FY2011, only 64 km had been added to the network. The absence of a clear plan for developing the country’s power transmission system impedes IPP investment in new hydropower development. The country’s inadequate cross-border transmission infrastructure also makes it difficult to develop hydropower on a large scale for export. Except for certain border areas, transmission connectivity with India is limited to about 150 MW. To improve power trading with India, the government began building a major 400 kV cross-border transmission link in 2010. The hydropower sector relies on this expanded network to progress more rapidly. But delays in land acquisition threaten its timely completion.<sup>8</sup>

19. Transmission line losses in Nepal are relatively high (Table 6). In FY2016, they amounted to 4.8%. Although the losses have moderated, from 5.8% in FY2012, they must be reduced further to around 2–3% to be considered acceptable.

<sup>7</sup> Nepal is to increase the cross-border transmission capacity to about 1,000 megawatt (MW).

<sup>8</sup> ADB. 2013. *Country Partnership Strategy, Nepal 2013–2017*. Manila

Table 6: Transmission Line Losses

Fiscal Year (FY)	Energy Input (GWh) (A)	Energy Output (GWh) (B)	Transmission Line Losses (GWh) (C = A - B)	Losses (%) (C/A * 100)
2012	3,736.8	3,520.9	215.9	5.8
2013	3,772.9	3,574.9	198.0	5.3
2014	4,120.2	3,889.8	230.4	5.6
2015	4,394.0	4,193.0	201.0	4.6
2016	4,476.7	4,260.9	215.7	4.8

Source: Nepal Electricity Authority. 2016. *A Year in Review: Fiscal Year 2015/2016*. Kathmandu.

20. **Distribution.** The NEA has a de facto monopoly on the distribution of electricity in Nepal, and manages the distribution services and networks. The power distribution function involves planning, expanding, operating, maintaining, and rehabilitating the power distribution networks, including substations up to the 33 kV level, and providing consumer services such as new connections, meter reading, billing, and revenue collection. In FY2016, consumers reached 2.97 million—4.8% more than the previous year’s 2.83 million. The 3,746 gigawatt-hours (GWh) of electricity sold during the year brought NRs32.21 billion (\$301.6 million), compared with the previous year’s sales of 3,743 GWh and revenue of NRs30.80 billion (\$288.4 million). The domestic consumer category made up 94.2% of consumers in FY2016, contributing to 48.4% of sales. On the other hand, the industrial and commercial consumer categories combined represented only 2.1% of consumers but accounted for 40.0% of sales and 42.9% of revenue. Table 7 breaks down the consumer, sales, and revenue totals in FY2016.

Table 7: Breakdown of Nepal Electricity Authority Consumers, Sales, and Revenue, Fiscal Year 2016

Consumer Category	No. of Consumers (% of Total)	Sales (%)	Revenue (%)
Domestic	94.2	48.4	46.0
Noncommercial	0.6	3.7	6.1
Commercial	0.6	7.7	11.7
Industrial	1.5	32.3	31.2
Irrigation	2.8	2.7	1.6
Other	0.4	5.2	3.5
Total	100.00	100.00	100.00

Source: Nepal Electricity Authority. 2016. *A Year in Review: Fiscal Year 2015/2016*. Kathmandu.

21. **Electricity access.** Nepal’s electrification rate of about 76% is comparable to that of other countries in the region.<sup>9</sup> However, there is a significant disparity between the urban and rural areas. About 97% of the urban population, but only about 72% of the population in the rural areas has access to electricity.

22. **Electricity tariff.** From 2001 until September 2016, when the government adjusted electricity tariffs (Appendix 3), no such change was made despite the sharp rise in the costs of energy purchases and operations

<sup>9</sup> Electrification rate in the region in 2012: Bangladesh, 60%; India, 79%; Pakistan, 94%; Sri Lanka, 89%. (Source: World Bank. <http://data.worldbank.org/indicator/EG.ELC.ACCS.ZS>)

during the period. The NEA's financial performance, already weak to start with, deteriorated further as a result. There is a need for an automatic tariff adjustment mechanism that takes into account inflation, increases or decreases in petroleum product prices, and exchange rate fluctuations as Nepal purchases power from India. The Electricity Tariff Fixation Commission (ETFC) must build capacity to implement the mechanism, as well as to determine the wheeling charges for IPPs using the NEA transmission system to evacuate power into India.

## 6. Renewable Energy

23. Nepal is richly endowed with renewable energy resources, comprising hydropower, solar, wind, biogas, and various forms of biomass energy. As of 2013, around 12% of the population had access to electricity through renewable energy sources.<sup>10</sup> Around 23 MW of electricity generation came from microhydro schemes, 12 MW from solar photovoltaic (PV) systems, and less than 20 kilowatts (kW) from wind energy. Nepal should transform its energy supply system into a more sustainable system using clean and renewable energy resources, given the high costs of grid connection, the low consumption rate, and the scattered population, especially in remote areas. Decentralized renewable energy supply systems, such as microhydro, solar PV, biogas, and improved cooking stoves, can provide feasible and environment-friendly supply options. Renewable energy technologies that can be used in Nepal include (i) microhydro (up to 100 kW); (ii) biomass and biogas (coal briquettes, gasifiers, improved cooking stoves); (iii) solar PV (solar home systems, solar water pumps, solar battery chargers); and (iv) solar thermal energy (solar water heaters, solar dryers, solar cookers).

24. The government issued a subsidy policy for renewable energy in 2013 to accelerate the delivery of better-quality renewable energy services, using various technologies, to households, communities, and micro, small, and medium enterprises in rural areas. The intent is to benefit all social groups, leading to equitable economic growth. The Alternative Energy Promotion Centre (AEPCC) has prepared a subsidy delivery mechanism for renewable energy, and this is now being considered by the Parliament.

## 7. Energy Efficiency

25. Nepal's total primary energy consumption per capita of 0.41 tons of oil equivalent (toe) in 2014 was among the lowest in the world. The world average in 2014 was 1.89 toe, and the average for Asia (excluding the PRC) was 0.72 toe.<sup>11</sup> However, Nepal's energy intensity is about four times higher than the world average and it is the highest in the region (Table 8), largely because of inefficiencies in energy consumption.

**Table 8: Energy Intensity Trend in Selected Countries**  
(Toe/\$'000 [2010])

Country	1990	1995	2000	2005	2008	2011	2014
World	0.23	0.22	0.20	0.20	0.19	0.19	0.19
Nepal	0.86	0.78	0.74	0.71	0.66	0.64	0.61
Bangladesh	0.30	0.30	0.27	0.27	0.26	0.26	0.24
Sri Lanka	0.27	0.22	0.24	0.22	0.18	0.17	0.15
Viet Nam	0.61	0.50	0.47	0.48	0.47	0.48	0.46

Toe = tons of oil equivalent.

Source: International Energy Agency. <http://www.iea.org/statistics>

<sup>10</sup> Ministry of Science, Technology and Environment. 2013. *Subsidy Policy for Renewable Energy 2013*. Kathmandu.

<sup>11</sup> Total primary consumption per capita of neighboring countries in 2014: Bangladesh, 0.22 toe; India, 0.64 toe; Myanmar, 0.36 toe; Sri Lanka, 0.52 toe; Viet Nam, 0.73 toe.

26. Recognizing the need to improve energy efficiency, the government launched the Nepal Energy Efficiency Programme (NEEP) in 2010 with technical assistance from German International Cooperation (GIZ). The first phase of the NEEP was completed in June 2014. The second phase, which started in July 2014, will (i) introduce market-based energy efficiency services for the private and public sectors; (ii) support the development and introduction of biomass-based improved cooking stoves for rural households; and (iii) provide direct advice and expertise to the government for the establishment of a policy and institutional framework to encourage energy efficiency in the country. However, although Nepal has been implementing energy efficiency measures for more than a decade on a different scale and at different levels, it lacks a nodal agency to lead and promote energy efficiency.

## 8. Energy Demand Forecasts

27. ADB projects a 1.9% annual increase in the country's final energy demand through 2035. This is slower than the projected GDP growth rate of 3.7% for the same period.<sup>12</sup> Final energy demand in the residential, commercial, and agriculture and fishery sectors, which had the largest share of the total in 2010 at 90.2%, will grow moderately at 1.7%, but these sectors will decrease their share to 84.9% by 2035. On the other hand, energy demand will increase faster in the industry (by 4.0% yearly) and transport sectors (3.5%) over the same period, to reach 6.0% of their respective share by 2035, in the case of the industry sector, and 9.1% for transport.

28. The share of electricity in the energy demand of the industry sector will increase from 25% in 2010 to 35% by 2035, or by 5.4% per year; the share of oil and coal will increase by 4.3% and 3.7%, respectively. Most of the energy demand in the residential, commercial, and agriculture and fishery sectors is met by noncommercial biomass. This trend is likely to continue until 2035, remaining at over 90% of energy demand in these other sectors, although the share of biomass will be slightly smaller. Electricity demand in these sectors will grow by a relatively high 5.3% per year through 2035. However, it will account for only 4% of the sectors' total energy demand. Oil will also constitute 4% of total energy demand in the other sectors by 2035.

29. Overall, the primary energy demand of Nepal is projected to increase from 10.2 Mtoe in 2010 to 16.6 Mtoe by 2035, or by 2.0% yearly. Given this growth, energy demand per capita is likely to be 0.40 toe by 2035, compared with 0.34 toe in 2010. Table 9 presents the energy outlook for Nepal.

**Table 9: Energy Outlook, 2020 and 2035**

Energy Demand, by Source and Sector		Mtoe			Share (%)			AAGR (2010–2035)
		2015	2020	2035	2015	2020	2035	
<b>Primary energy demand</b>	Coal	0.2	0.3	0.5	2.0	2.2	2.0	3.5
	Oil	1.1	1.3	2.1	9.9	10.5	12.4	3.0
	Natural gas	0.0	0.0	0.0	0.0	0.0	0.0	n.a.
	Hydro	0.4	0.5	1.0	3.4	4.0	6.2	5.4
	Other <sup>a</sup>	9.7	10.5	13.1	84.8	83.3	78.5	1.6
	<b>Total</b>	<b>11.4</b>	<b>12.7</b>	<b>16.6</b>	<b>100.0</b>	<b>100.0</b>	<b>100.0</b>	<b>2.0</b>

*continued on next page*

<sup>12</sup> ADB. 2015. *Energy Outlook for Asia and the Pacific*. Manila.

continued on next page

Energy Demand, by Source and Sector		Mtoe			Share (%)			AAGR (2010–2035)
		2015	2020	2035	2015	2020	2035	
Final energy demand, by source	Coal	0.2	0.3	0.5	2.0	2.2	2.9	3.5
	Oil	1.1	1.3	2.1	9.9	10.6	12.6	3.0
	Natural gas	0.0	0.0	0.0	0.0	0.0	0.0	n.a.
	Electricity	0.3	0.4	0.9	2.9	3.4	5.4	5.4
	Other <sup>a</sup>	9.6	10.5	12.9	85.2	83.7	79.1	1.6
	<b>Total</b>	<b>11.3</b>	<b>12.5</b>	<b>16.3</b>	<b>100.0</b>	<b>100.0</b>	<b>100.0</b>	<b>1.9</b>
Final energy demand, by sector	Industry	0.4	0.5	1.0	3.9	4.4	6.0	4.0
	Transport	0.7	0.9	1.5	6.5	7.1	9.1	3.5
	Other sectors	10.1	11.1	13.8	89.6	88.5	84.9	1.7
	Non-energy	0.0	0.0	0.0	0.0	0.0	0.0	n.a.
	<b>Total</b>	<b>11.3</b>	<b>12.5</b>	<b>16.3</b>	<b>100.0</b>	<b>100.0</b>	<b>100.0</b>	<b>1.9</b>

n.a. = not available, AAGR = average annual growth rate, Mtoe = million tons of oil equivalent.

<sup>a</sup> The category “Other” includes biomass, geothermal, solar, wind, and other renewable energy, and electricity imports and exports.

Source: ADB. 2015. *Energy Outlook for Asia and the Pacific*. Manila.

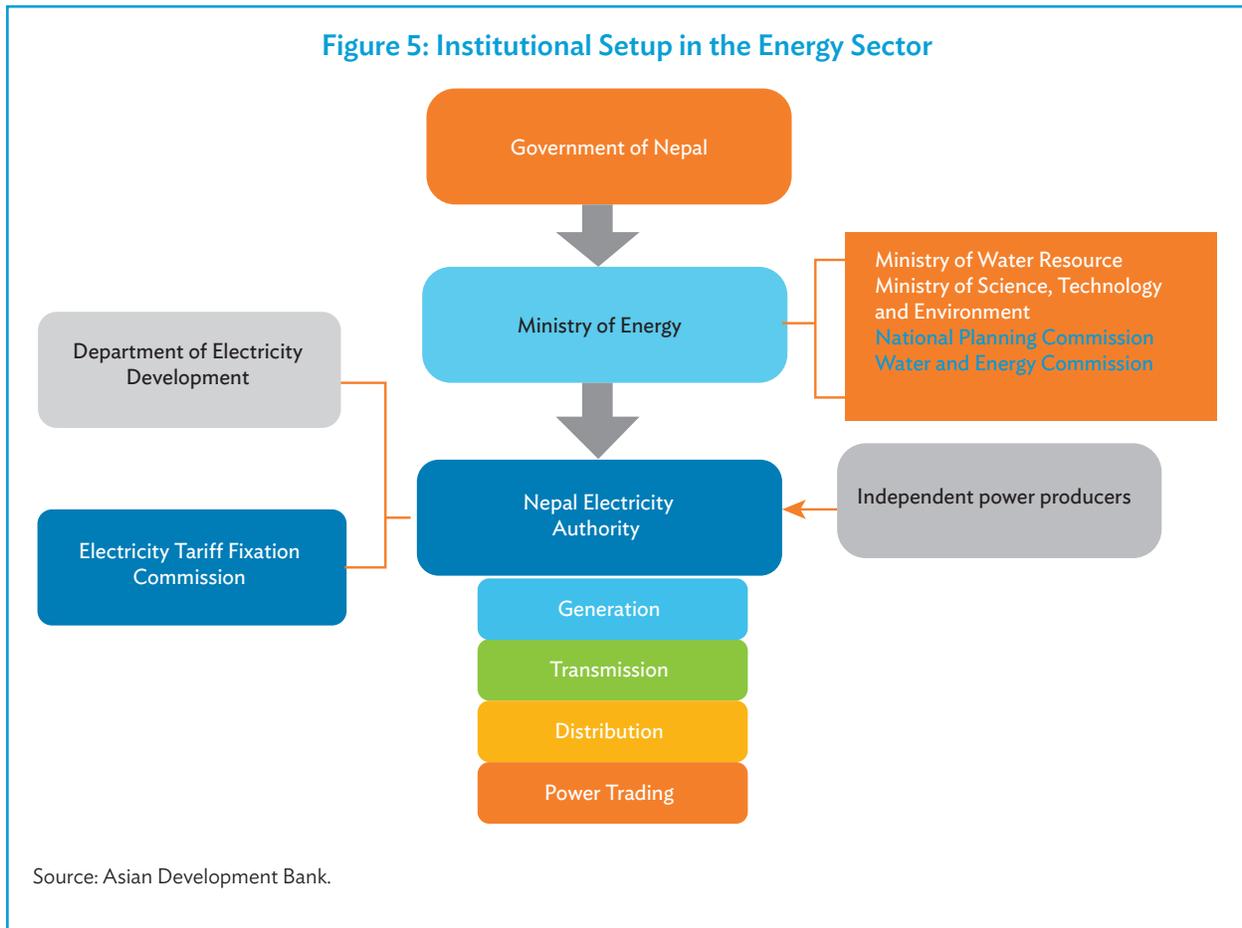
## C. Institutional Setup

30. The Ministry of Energy is the line ministry with primary jurisdiction and authority for the energy sector.<sup>13</sup> The country has four levels of institutional arrangements (Figure 5): (i) policy, (ii) regulatory, (iii) operational, and (iv) implementation. The activities of institutions at each level are stated below.

- (i) Policy-Level Institutions
  - (a) Ministry of Energy: Power sector policy formulation, water resource development, oversight and regulation of the NEA and private power development
  - (b) National Planning Commission: Coordination and development of the government’s 5-year multisector investment program
  - (c) Water and Energy Commission: Policy advice to the government on technical, legal, environmental, financial, and institutional matters related to water resource planning and development
  - (d) National Water Resources Development Council: Government guidance on strategic issues and policy regarding integrated water resource development
  - (e) Environment Protection Council: Policy development and preparation of environmental regulations and environmental protection guidelines for environmental assessments, permits, licensing, inspection, and monitoring of environmental licenses

<sup>13</sup> The Ministry of Suppliers is responsible for all petroleum products, and the Alternative Energy Promotion Centre under the Ministry of Environment, Science and Technology, for rural electrification, hydropower up to 10 MW, and other forms of renewable energy.

Figure 5: Institutional Setup in the Energy Sector



## (ii) Regulatory-Level Institution

ETFC: Review and approval of tariff applications submitted by the NEA

## (iii) Operational-Level Institutions

- (a) NEA: electricity generation, transmission, and distribution throughout Nepal; energy exchange with India; and purchase of electricity from IPPs as single-buyer agency
- (b) Butwal Power Company: Nonprofit organization under the United Mission of Nepal, undertaking rural electrification in Nepal
- (c) IPPs: Development of private power plants and generation of electricity

## (iv) Implementation-Level Institution

Department of Electricity Development, Ministry of Energy: Implementation and promotion of the government's private power policy, management of bidding process for IPPs, issuance of survey licenses, provision of guidance to private investors and technical support to the ETFC

## D. Core Sector Issues, Constraints, and Opportunities

### 1. Energy Crisis

31. Nepal is now facing an unprecedented energy crisis due to the acute shortage of power and petroleum products. Because of inadequate planning, delays in project implementation, and significant underinvestment in baseload generating capacity, the country has a total installed hydro power generation capacity of only 802.4 MW<sup>14</sup>—less than 2% of its commercially exploitable hydropower generation potential. Imports from India supplement this low generation capacity, but the supply is still inadequate to meet the ever-increasing demand. The result is up to 11 hours of daily load shedding, and the situation could get worse if action is not immediately taken. Moreover, the blockade by people in the Terai region along the Indian border has created a serious fuel crisis since September 2015. The government allowed people, for a while, to drive their cars only on alternate days, and asked them to use charcoal and firewood for cooking. This energy crisis has seriously constrained economic and social development. In addition, many households, defying restrictions switch to electricity for cooking, causing some distribution transformers to burn because of overloading.

### 2. High Dependence on Import for Fossil Fuel Supply, and Inadequate Storage Capacity

32. In the absence of proven fossil fuel reserves, except for an insignificant amount of lignite deposits, and the extremely limited transportation options available, nearly all fossil fuel demand in Nepal is met by imports from India. For the past 4 decades, the Indian Oil Corporation has been supplying petroleum products (gasoline, diesel, and kerosene) to the country at Indian market rates under a long-term contract. However, the blockade has paralyzed this agreement. Nepal's oil storage capacity is also just enough for 20 days of national sales, compared with 270 days in Israel, 240 days in the Republic of Korea, and 137 days in the United States. Nepal must address this storage capacity problem soon by increasing it in a phased manner from 20 days to 160–180 days to improve the country's energy security, while import sources are diversified.

### 3. Inadequate Power Supply Systems

33. Despite its abundant hydropower resources and significant potential to export electricity, Nepal is a net importer of electricity, and the amount of imports has doubled, from 694 GWh in FY2011 to 1,758 GWh in FY2016, for an average annual growth rate of 20.4%, compared with a 0.3% annual increase in NEA generation. On the other hand, storage-type hydropower plants represent only 13% of the total hydropower capacity.<sup>15</sup> The dominance of run-of-the-river hydropower plants has led to acute capacity shortages especially during the dry season (winter), when demand rises sharply but water flow decreases, adversely affecting power generation. The existing plan envisages the installation of over 2,000 MW of new capacity by 2022, but funding constraints suggest that this target may not be achieved. Country diagnostic studies identify this as a major hindrance to Nepal's inclusive economic growth. The government's approach to addressing this issue is to prioritize reservoir-based projects over run-of-the-river projects. Sustainable development of hydropower potential can provide Nepal with the following key benefits:

- (i) higher potential for improving electricity access;
- (ii) reliable supply to narrow the current acute energy deficit;

<sup>14</sup> As of FY2016, the total power generation capacity in Nepal including other energy resources is 856 MW.

<sup>15</sup> ADB. 2013. *Report and Recommendation of the President to the Board of Directors: Proposed Loans and Administration of Technical Assistance Grant for Tanahu Hydropower Project*. Manila.

- (iii) electricity exports to generate much-needed foreign exchange through sales of electricity to India and other neighboring countries; and
- (iv) reduced reliance on carbon-intensive fossil fuels and other conventional fuel sources.

34. The timely commissioning of transmission lines will be critical to evacuating power from new hydropower generation plants. Several IPPs have been unable to undertake new hydropower development initiatives because of difficulties in evacuating power from remote sites (footnote 15). Except for border areas and parts of the Far-Western region of Nepal, transmission connectivity with India is also limited. Poor connectivity has hampered large-scale, export-focused hydropower development in Nepal. The distribution network of substandard reliability, coupled with inadequate power generation and transmission facilities, has likewise kept the electrification ratio low. In response to the ongoing power crisis, a cross-border transmission line (400 kV) to the national grid is being constructed, to allow additional power imports from India.

#### 4. Poor Operational and Financial Performance of Nepal Electricity Authority

35. As a government corporation, the NEA has dominated Nepal's power sector since its establishment in 1985. Its operational and financial performance has been below par. By the end of FY2015, its accumulated losses had reached NRs26.8 billion (\$251 million). In FY2015 alone, the NEA incurred losses of NRs6.5 billion (\$60.9 million).<sup>16</sup> The further deterioration in the agency's financial position is due to a number of factors, including (i) the absence of a tariff adjustment since August 2012 till September 2016;<sup>17</sup> (ii) the high cost of service, on account of the higher internal purchase price at generation point, annual escalation in the cost of power purchased from IPPs, the operation of thermal plants, the import of high-cost seasonal energy, and increased operation and maintenance costs; (iii) high system losses of over 24%; and (iv) increased arrears, largely due from the public sector, including municipalities. Table 10 shows the trend in system losses, collection to bill, outstanding arrears, and annual billing amount from FY2011 to FY2015.

**Table 10: Nepal Electricity Authority Operational Performance, Fiscal Year 2011–Fiscal Year 2015**

Item	FY2011	FY2012	FY2013	FY2014	FY2015	
System losses (%)	28.55	26.37	25.11	24.64	24.44	
Collection to bill (%)	91.92	96.08	96.67	95.79	96.76	
Outstanding arrears	NRs million	7,282	6,672	7,950	7,813	9,475
	Equivalent months of billing	4.83	3.90	3.69	3.26	3.73
Annual billing amount (NRs million)	18,068	20,518	25,875	28,787	30,483	

Source: Nepal Electricity Authority.

<sup>16</sup> Nepal Electricity Authority. 2016. *A Year in Review: Fiscal Year 2015/2016*. Kathmandu.

<sup>17</sup> The last tariff adjustment was in September 2016, and the earlier adjustment was in August 2012.

## II Strategy

### A. Government Sector Strategy, Policy, and Plans<sup>18</sup>

36. The government's policy initiatives in the energy sector include the Electricity Act of 1992, which was adopted to develop and manage the hydropower regime in Nepal and to standardize and safeguard electricity services. This was followed by the Hydropower Development Policy of 2001, which listed objectives and laid down governing rules for the hydropower sector. It specified the generation, transmission, and distribution functions for the creation of an independent power systems operation. To address sector needs resulting from demand growth and the responsiveness required from the NEA, ADB assisted the government in drafting the Nepal Electricity Act and the Nepal Electricity Regulatory Commission Act. These were approved by the cabinet and submitted to the Parliament, but have been stalled at the legislature since May 2012. The former piece of legislation is aimed at restructuring the NEA by unbundling its operations; the latter, at setting up an independent regulatory regime for the power sector, long needed to attract investment into the sector.

37. The Water Resources Strategy of 2002 requires a commercially viable NEA through corporatization, improved management, and separation of its rural electrification operations. It also calls for generation to become the responsibility of a separate corporation. Moreover, the country's 3-year plans have dealt with such issues as (i) effectively regulating electricity generation, transmission, and distribution; (ii) adopting a one-window approach to hydropower development to encourage investments; and (iii) making consistent efforts to expand electricity generation and transmission.

38. In 2008, the government approved the National Electricity Crisis Resolution Action Plan with immediate and long-term strategies for dealing with the worsening power situation. These strategies included increasing power imports from India, building thermal power plants, expanding transmission capacity, and addressing electricity theft. In December 2008, the government also formed a task force to prepare a road map for developing an additional 10,000 MW of hydropower generation capacity within 10 years. The task force recommended that the production of hydropower to meet domestic demand be given priority over production for export.

39. Other government initiatives to mitigate the power crisis included the Rural Energy Policy of 2006, which was targeted at the installation of improved biomass technologies, off-grid microhydro systems for rural electrification (capable of being connected to the national grid when it is extended), and light-emitting-diode (LED) and PV-based solar lights to replace kerosene lamps. The policy provided for special programs to enhance the benefits of rural energy for women and other marginalized groups, and increase their representation in community-based organizations through social mobilization.

40. In view of its major financing responsibilities in many other sectors, the government is aware that it will be unable to make sufficient investments on its own to fully develop Nepal's hydropower potential. To leverage investments it can make, share the risks, and use the efficiencies and innovations of private enterprise, it is

<sup>18</sup> ADB. 2013. *Country Partnership Strategy, Nepal 2013–2017*. Manila.

considering public–private partnerships (PPPs) as a preferred model of hydropower generation. It is setting up a facility to implement large–scale PPP hydropower projects and to provide related transaction advice. PPPs already exist in power distribution through the community electrification initiatives of the NEA.

41. In February 2016, a cabinet meeting endorsed an action plan for ending the energy crisis within 2 years. The cabinet meeting also directed the Ministry of Energy to prepare a concrete action plan for reducing the power shortage within a year and achieving zero power shortage within 2 years. In addition, the cabinet meeting declared National Energy Crisis Reduction and Electricity Development Decades. The action plan consists of 99 specific activities covering (i) legal reform provisions, (ii) policy decisions, (iii) administrative decisions and procedural reforms, and (iv) structural provisions and reforms. Key programs under the action plan, which is presented in full in Appendix 4, are summarized below.

(i) Legal Reform Provisions

- (a) Formulate a new Electricity Act and submit it to the Parliament together with the National Electricity Regulatory Commission Bill.
- (b) Approve and implement the Energy Crisis Bill.
- (c) Simplify the licensing of projects and make the procedures more systematic to ensure their affiliation with the electricity transmission and distribution system.
- (d) Provide for the development of electricity projects of at least 500 MW.
- (e) Provide for income tax exemptions under the Electricity Act of 1992.
- (f) Amend the Electricity Theft Control Act of 2002.

(ii) Policy Decisions

- (a) Formulate and implement a National Energy Security Policy.
- (b) Fund hydroelectric projects by mobilizing internal resources.
- (c) Restructure the Ministry of Energy and its Department of Electricity Development.
- (d) Complete the construction of high–priority hydroelectricity projects as follows: 200 MW within 1 year, an additional 850 MW within 2 years, and 400 MW more within 3 years.
- (e) Construct reservoir–based projects as a priority.
- (f) Determine and adjust electricity tariff rates, power purchase rates, and wheeling charges in accordance with the weather and the time.
- (g) Ensure payment in return for purchase of power.
- (h) Follow take–or–pay instead of take–and–pay provisions.
- (i) Construct transmission lines and substations under the build–transfer model through a consortium of promoters.
- (j) Make electricity generation, transmission, and distribution projects national priority projects.
- (k) Make special provisions for the acquisition of land for electricity projects, transmission lines, and substations.
- (l) Review land compensation.
- (m) Provide a community support program.
- (n) Gradually install time–of–day meters to be able to charge all consumers peak and off–peak tariff rates.
- (o) Ensure that electricity services reach all the people of Nepal within the next 10 years.
- (p) Gradually implement the smart meter and smart grid concepts.
- (q) Develop and implement an electricity distribution master plan.
- (r) Develop an action plan for controlling electricity distribution system leakage and implement the plan.

- (s) Activate the National Transmission Grid Company.
- (t) Connect solar or wind power to the national grid.
- (u) Invite competitive bids for photovoltaic solar and wind electricity projects.
- (v) Negotiate and finalize purchase agreements for solar electricity and wind electricity based on the take-or-pay principle.
- (w) Conduct an electricity conservation program to control technical and nontechnical leakage.
- (x) Carry out technical audits of large electricity consumers.

(iii) Administrative Decisions and Procedural Reforms

- (a) Simplify exchange facilities for paying consultants and contractors in foreign currency.
- (b) Simplify the granting of work visas and labor permits.
- (c) Develop hydroelectric projects in the government basket.
- (d) Conclude power purchase agreements in convertible currency.
- (e) Provide inflation benefits to hydroelectric projects with a capacity of 25 MW equal to the benefits for projects with a capacity of over 25 MW and up to 100 MW.
- (f) Simplify the provisions relating to environmental impact assessment (EIA) or initial environmental examination (IEE) for applications to the NEA for a power sale or purchase agreement.
- (g) Assign high priority to the completion of transmission lines under construction.
- (h) Complete the new 220 kV Marsyangdi–Matatirtha transmission line as quickly as possible, as a matter of high priority.
- (i) Complete the construction of the new 132 kV Kataiya–Kushaha and Raxaul–Parwanipur transmission lines and substations to enable the country to import an additional 100 MW of electricity.
- (j) Strengthen and extend the national electricity system.
- (k) Give high priority to the construction of 400 kV substations.
- (l) Make suitable arrangements for any required access to forest areas for EIAs or IEEs.
- (m) Simplify EIA or IEE studies of hydroelectric and transmission lines and their approval.
- (n) Simplify the process of obtaining approval for the felling of trees and the taking of a lease of land for the development of hydroelectric and transmission projects.
- (o) Provide for a 10% equity share in projects for affected communities and individuals in the project districts.
- (p) Forecast load demand on the basis of actual electricity demand.
- (q) Expand and strengthen the NEA in an organized way.
- (r) Develop an underground distribution system and modern distribution kiosk technology.
- (s) Remove obstructions to the construction and extension of 11 kV and 33 kV lines.

(iv) Structural Provisions and Reforms

- (a) Form a Central Energy Crisis Prevention Coordination Committee and a District Level Energy Crisis Prevention Coordination Committee for the effective implementation of the Energy Crisis Prevention Decade.
- (b) Make the necessary arrangements for interagency coordination at the Joint Secretary level for the development of electricity projects.
- (c) Form a Facilitation Committee chaired by the chief secretary and with the secretaries of the related ministries as members.
- (d) Provide for a mechanism for the development and construction of reservoir-based projects.
- (e) Restructure and revitalize the Water and Energy Commission.

- (f) Carry out a rural electrification campaign.
- (g) Establish a National Electricity Generation Company.
- (h) Create an empowered and resourceful consulting company at the appropriate government level.
- (i) Carry out the financial and institutional restructuring of the National Transmission Grid Company.
- (j) Establish a National Power Trade Company.
- (k) Form power generation companies as holding companies of the NEA.

42. Besides issuing the Energy Crisis Prevention Decade action plan, the government issued “People Investment in Nepal Hydropower” in September 2016, outlining 37 specific medium- to long-term actions for electricity sector development, including the following:

- (i) Bring visible progress to the electricity supply situation through improvements in aging distribution assets, leakage control, efficient operation of the No-light unit of the NEA, timely provision of meters for new connections, and effective implementation of the load-shedding schedule.
- (ii) Transform the NEA from a loss-making entity to a profitable and efficient institution through (a) financial and institutional restructuring, (b) revenue-generating activities, (c) sustained recovery of arrears and control of power leakage, (d) adoption of the right-man-in-the-right position principle with performance contracting and availability of the required human resources, (e) implementation of hydropower development through NEA subsidiaries, and (f) efficient use of available NEA resources.
- (iii) Eliminate load shedding within 2 years through the effective implementation of the action plan for the National Energy Crisis Prevention and Electricity Development Decade, 2016.
- (iv) Develop 10,000 MW by 2025 through an appropriate combination of storage, run-of-the-river, peaking run-of-the-river, and pump storage plants.
- (v) Promote the participation of citizens in hydropower investments by mobilizing available resources from financial institutions.
- (vi) Model hydropower development with the active participation of the security sector including the Nepalese Army.
- (vii) Undertake a Government with Poor Program by providing shares in state-owned hydropower projects to poor, marginalized, and conflict-affected families.
- (viii) Implement attractive projects by mobilizing the participation of more than 10,000 youths.
- (ix) Carry out a self-employment and income program providing loans amounting to NRs1 lakh to poor, Dalit (members of the lowest caste), and marginalized people.
- (x) Implement a biomass energy generation program to create jobs for people in the Terai region.
- (xi) Develop a program linking hydropower with agriculture, tourism, industry, education, science and technology, and health.
- (xii) Create a conducive environment for the mobilization of foreign investment in the development of large-scale hydropower projects and high-voltage transmission lines.
- (xiii) Establish a currency hedge fund to minimize the foreign exchange risk in power purchase agreements denominated in a foreign currency.
- (xiv) Establish an Electricity Generation Company with the government and government-owned financial and commercial institutions as shareholders. Also establish a Power Trading Company and an Engineering Company.
- (xv) Prepare and implement a distribution master plan along with the upgrading of distribution assets.

- (xvi) Initiate the implementation of an underground distribution system in cities.
- (xvii) Promote the use of solar-powered streetlights.
- (xviii) Develop separate institutional arrangements for rural electrification.
- (xix) Develop an action plan for controlling electricity theft and organize a national campaign to implement the plan.
- (xx) Forecast electricity demand over the next 20 years.
- (xxi) Develop and implement a scientific and automatic tariff mechanism. Set wheeling charges for the use of the electricity transmission system.
- (xxii) Establish different electricity purchase rates for run-of-the-river, peaking run-of-the-river, and reservoir hydropower plants.
- (xxiii) Simplify licensing procedures.
- (xxiv) Shorten the EIA procedure for electricity projects. Simplify forest clearance and land acquisition procedures for projects that have undergone EIA.
- (xxv) Update the river basin master plan.
- (xxvi) Restructure the institutional setup of the Water and Energy Commission Secretariat and the Ministry of Energy.
- (xxvii) Take appropriate action to implement the power trade agreement between India and Nepal, and the South Asian Association for Regional Cooperation (SAARC) framework agreement. Also establish appropriate mechanisms for power trading between Nepal and India.
- (xxviii) Initiate the establishment of open access to the retail and wholesale transmission markets.
- (xxix) Submit the Nepal Electricity Regulatory Commission Act to the Parliament within 2 months to ensure the effective regulation of the electricity sector. Develop a National Energy Security Policy focusing on the development of hydro resources. Prepare an Integrated National Water Resource Policy in consultation with all stakeholders.
- (xxx) Require industries that employ more than 5,000 people to provide 24 hours of electricity supply at a specified rate.

43. To address the oil crisis, the Government of Nepal is set to diversify its import sources, which now include the PRC and Saudi Arabia, and to increase storage capacity from the current 20 days of national total sales to 30 days.

44. Recognizing the urgency and importance of reducing the impact of climate change and implementing climate adaptation action, the Government of Nepal submitted its Intended Nationally Determined Contributions (INDC) to the United Nations Framework Convention on Climate Change (UNFCCC) Secretariat in February 2016, indicating its full commitment to making efforts to implementing its INDC and thereby contribute to the global efforts of reducing greenhouse gas emissions. The INDC has the following salient features:

- (i) Nepal places climate change adaptation at the center of its development plans and policies. It aims to strengthen implementation of Environment-Friendly Local Government (EFLG) Framework in Village Development Committee and municipalities, and water conservation and green development.
- (ii) Nepal plans to formulate the Low Carbon Economic Development Strategy that will envision country's future plan to promote economic development through low carbon emission with particular focus on (a) energy, (b) agriculture and livestock, (c) forests, (d) industry, (e) human settlements and wastes; (f) transport, (g) commercial sectors.

- (iii) By 2050, Nepal will achieve 80% electrification through renewable energy sources having appropriate energy mix. Nepal will also reduce its dependency on fossil fuels by 50%.
- (iv) Nepal aims to achieve the following targets under the Nepal Rural Renewable Energy Programme, reducing its dependency on biomass and making it more efficient.

**Table 11: Nepal Rural Renewable Energy Programme Targets**

Technologies	Targets
Mini and Micro Hydropower	25 MW
Solar Home System	600,000 systems
Institutional Solar Power System (solar photovoltaic and solar pump systems)	1,500 systems
Improved Water Mill	4,000 numbers
Improved Cooking Stoves	475,000 stoves
Biogas	130,000 household systems, 1,000 institutional and 200 community biogas plants

Source: Ministry of Population and Environment. 2016. *Intended Nationally Determined Contributions*. Kathmandu.

- (v) Nepal will develop its electrical (hydropowered) rail network by 2040 to support mass transportation of goods and public commuting.
- (vi) Nepal will maintain 40% of the total area of the country under forest cover and forest productivity and products will be increased through sustainable management of forest. Emphasis will equally be given to enhance carbon sequestration and forest carbon storage and improve forest governance.
- (vii) By 2025, Nepal will strive to decrease the rate of air pollution through proper monitoring of sources of air pollutants like wastes, oil and unmaintained vehicles, and industries.

## B. Development Partners' Sector Experience and Assistance Program

45. The main development partners in Nepal's energy sector are ADB, the governments of Denmark and Norway, the European Commission, the European Investment Bank, the Japan International Cooperation Agency (JICA), KfW, the Netherlands Development Organization, the United Nations Development Programme, and the World Bank, all of which are focusing on the power subsector.

46. Among these, ADB, JICA, KfW, the Government of Norway, and the World Bank have been the most active in the on-grid subsector. Nepal's other development partners are more involved in off-grid development. The country's development partners regularly coordinate with one another on sector investments and support for establishing an enabling institutional and regulatory framework.

47. ADB has been the leading partner in Nepal's power sector, focusing in particular on on-grid support for the NEA's expansion of generation, transmission, and distribution capacity, with six loan projects and one grant amounting to \$521 million and 21 technical assistance projects amounting to \$13.7 million since 1999, as detailed in Appendix 5.<sup>19</sup> Among other projects, ADB and JICA cofinanced the Kali Gandaki "A" Hydroelectric Project,

<sup>19</sup> ADB's interventions in the Nepal energy sector have been only in the power subsector. No other subsectors have been supported.

a 144 MW power plant commission in 2002 to increase generation capacity.<sup>20</sup> ADB also supported the expansion of the NEA's transmission capacity through assistance projects in 2009–2011, cofinanced by Norway, to strengthen transmission infrastructure from the western border to the central region of Nepal and for the evacuation of electricity from generation sites to the load center in Kathmandu Valley. In distribution, ADB assistance has focused on increasing access, rehabilitating small hydropower plants, and supporting other clean-energy interventions, such as solar street lighting and energy-efficient lighting. ADB has also assisted several rural electrification projects with the participation of local communities (footnote 18).

48. ADB approved the 140 MW Tanahu Hydropower Project in 2013 to address the issue of limited generation of electricity from storage-type hydropower plants in Nepal (footnote 15). The project was cofinanced by JICA, the European Investment Bank, and the Abu Dhabi Fund for Development. The project included pilot programs to expand access by women and other marginalized groups to energy resources and energy-based livelihoods, in partnership with the NEA, the AEPC, and nongovernment agencies.

49. In July 2014, ADB approved the South Asia Subregional Economic Cooperation Power System Expansion Project, cofinanced by the European Investment Bank and the Government of Norway, to assist Nepal's energy sector development by facilitating (i) expansion of domestic power transmission capacity, (ii) power exchange with India, (iii) augmentation and expansion of distribution networks, and (iv) mini-grid-based renewable energy access in rural areas.<sup>21</sup>

50. In 2016, ADB approved a \$20 million solar project under a Public Private Partnership model, using grant funding from the Scaling up Renewable Energy Programs in Low Income Countries (SREP) for Nepal. The project will engage the private sector to develop, install, and operate a minimum of 25 MW aggregated, grid-connected, utility-scale solar plants (defined as 4 MW or larger for each individual site) for a 25 year period. These would become the first utility scale solar systems in the country, and as such, are being fast tracked to be constructed and commissioned, with a target of 2018, to address the chronic power and fuel supply deficits.

51. Since 2009, ADB operations in Nepal's energy sector have been instrumental in supporting the reform process, including the preparation of the NEA's financial restructuring and a tariff increase in 2012 after 12 years of no adjustment. However, the implementation of projects, including the procurement of consultants and contractors, has been slow. The NEA's decision making has also been slow. Land acquisition has been a major problem, mainly because of changes in the alignment of transmission lines. Project readiness has been low.

52. As illustrated in Chapter 3 of this paper, ADB's main focus in the country partnership strategy 2013–2017 will be to make Nepal's energy sector a key driver of inclusive economic growth. This will be achieved through investments in both on-grid and off-grid solutions. ADB's on-grid investments will include support for the development of large-scale hydropower projects and related transmission infrastructure. ADB will provide transaction advisory services to the government to explore suitable PPP modalities and catalyze private sector investment in large-scale hydropower development. Its investments in transmission will include support for strengthening the in-country network for evacuating electricity from generation sites to domestic load centers, as well as for cross-border lines for power exchange with India (footnote 18).

53. To improve access to modern energy resources in remote areas, ADB will help the government develop off-grid power through the use of renewable energy sources. It will also support initiatives that increase energy efficiency. ADB's interventions in the energy sector will comply with stringent social and environmental safeguard

<sup>20</sup> ADB. 1996. *Report and Recommendation of the President to the Board of Directors: Proposed Loan and Technical Assistance Grants for Kali Gandaki "A" Hydroelectric Project*. Manila.

<sup>21</sup> ADB. 2014. *Report and Recommendation of the President to the Board of Directors: Proposed Loan, Technical Assistance Grant, and Administration of Grants for South Asia Subregional Economic Cooperation Power System Expansion Project*. Manila.

requirements, and will further enhance inclusive economic and environmentally sustainable growth. ADB will support the development of the institutional capacity of sector agencies to address such concerns as the need to enhance inclusiveness in access to energy. It will conduct a policy dialogue with the government to (i) improve the governance and efficiency of the energy sector; (ii) create an independent regulatory authority for energy and water; and (iii) introduce appropriate structural reforms, including the passage of the relevant legislation, full implementation of the NEA's financial restructuring plan, and regular tariff revisions. Support for sector planning frameworks, such as a regional transmission master plan and basin-level planning, will also be considered, in coordination with other development partners (footnote 18).

54. ADB will likewise provide support in implementing the Action Plan on National Energy Crisis Prevention and Electricity Development Decade, 2016, its 37 specific medium- and long-term actions for electricity sector development, and the initiatives stipulated in INDC.

# III Plans and Supporting Analysis

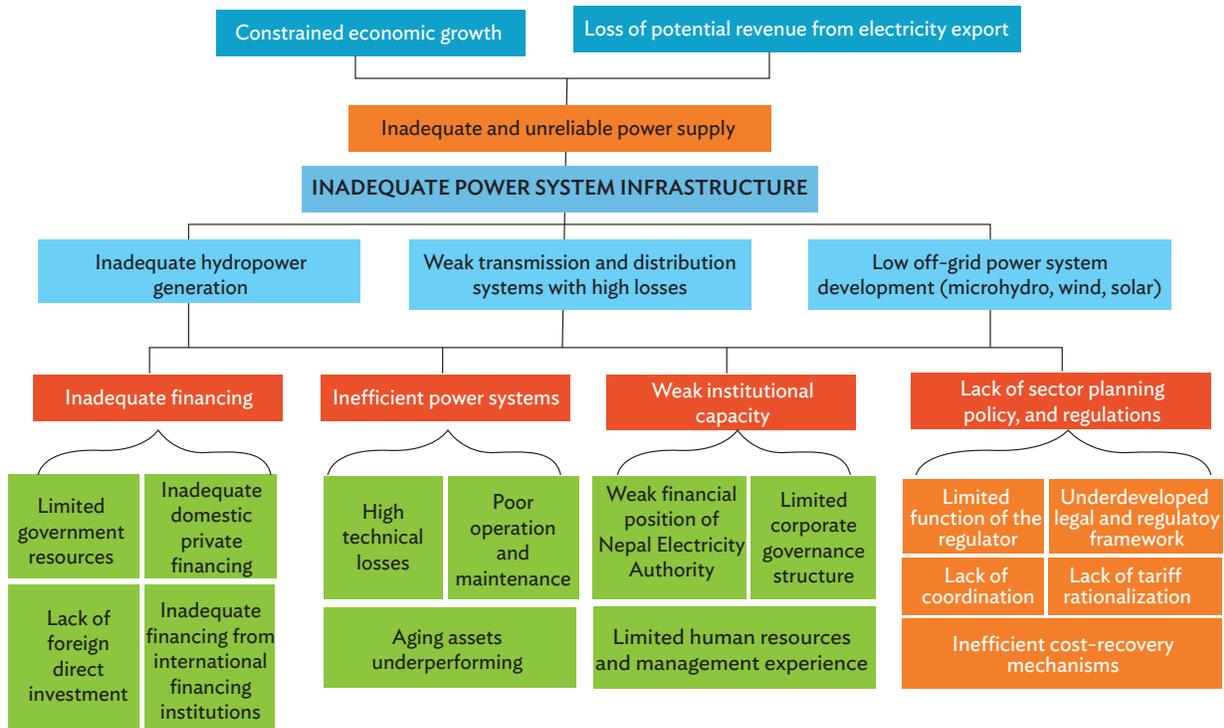
55. Table 12 presents ADB's results framework for the energy sector for 2013–2017, and Figure 6, a problem tree analysis of the sector.

**Table 12: Energy Sector Results Framework, 2013–2017**

Country Sector Outcomes		Country Sector Output		ADB Sector Operations	
Outcomes with ADB Contribution	Indicators with Targets and Baselines	Output with ADB Contribution	Indicators with Incremental Targets	Planned and Ongoing ADB Interventions	Main Output Expected from ADB Interventions
Increased use of commercial energy by households Increased cross-border energy trade	Households using electricity <i>Target (2017): 70% (on-grid)</i> <i>Baseline (2012): 56% (on-grid)</i>  Per capita electricity consumption <i>Target (2017): 180 kWh</i> <i>Baseline (2012): 102 kWh</i>  Level of power trade <i>Target (2017): 400 MW</i> <i>Baseline (2012): 150 MW</i>	Energy infrastructure and system expanded and improved Regulatory environment in energy sector improved	Installed electricity generation capacity <i>Target (2017): 1,590 MW</i> <i>Baseline (2012): 705 MW</i>  Installed off-grid renewable energy generation capacity <i>Target (2017): 50 MW</i> <i>Baseline (2012): 35 MW</i>  New transmission lines installed <i>Target (2017): 2,000 km</i> <i>Baseline (2012): 0 km</i>  New distribution line installed <i>Target (2017): 1,000 km</i> <i>Baseline (2012): 0 km</i>  Cost-reflective electricity tariff <i>Target (2017): Tariff reflects 100% of costs</i> <i>Baseline (2012): 75%</i>	<b>(i) Planned key activity areas</b> <ul style="list-style-type: none"> <li>Large hydropower (large dams) (62% of funds)</li> <li>Renewable (solar, small hydro, wind) (4% of funds)</li> <li>Electricity transmission and distribution (electrical power transmission) (30% of funds)</li> <li>Energy sector development (policy and regulation, tariffs and pricing, PPP) (4% of funds)</li> </ul> <b>(ii) Projects in the pipeline</b> <ul style="list-style-type: none"> <li>Project Preparatory Facility (\$21 million)</li> <li>Rural Electrification through Renewable Energy (\$19 million)</li> <li>SASEC Power System Expansion (\$145 million)</li> <li>Hydropower Development through PPP (\$110 million)</li> </ul> <b>(iii) Ongoing projects</b> <ul style="list-style-type: none"> <li>Tanahu Hydropower (\$150 million)</li> <li>Energy Access and Efficiency Improvement (\$63.2 million)</li> <li>Electricity Transmission Expansion and Supply Improvement (\$75 million)</li> <li>Detailed Engineering Study for Upper Seti Hydropower (\$2.5 million)</li> </ul>	<b>(i) Planned key activity areas and projects in the pipeline</b> <ul style="list-style-type: none"> <li>Hydropower projects with up to 740 MW capacity begun</li> <li>5.5 MW renewable energy generation (excluding large hydropower) established</li> <li>400 km transmission line and 200 km distribution line installed</li> </ul> <b>(ii) Ongoing projects</b> <ul style="list-style-type: none"> <li>150 MW hydropower plant constructed</li> <li>550 km transmission line and 600 km distribution line installed</li> <li>29,000 households electrified</li> <li>At least 1 distribution center set up under PPP modality</li> <li>1 million energy-efficient lighting and 1,500 solar and solar-wind street lighting set up</li> <li>4 hydropower plants rehabilitated</li> <li>Poor households headed by women and disadvantaged households covered under distribution strengthening and expansion</li> <li>Sector GESI framework adopted</li> </ul>

ADB = Asian Development Bank, GESI = gender equality and social inclusion, km = kilometer, kWh = kilowatt-hour, MW = megawatt, PPP = public-private partnership, SASEC = South Asia Subregional Economic Cooperation.  
Source: ADB and government estimates.

Figure 6: Problem Tree Analysis of the Energy Sector



Source: ADB. 2013. *Country Partnership Strategy, Nepal 2013-2017*. Manila

## APPENDIX 1

# Existing Power Plants and Installed Capacity, Fiscal Year 2016

Table A1.1: Summary of Installed Capacity

Generation Source		Capacity (MW)	% of Total
Hydro	NEA Grid Connected	473.4	55.4
	NEA Small Hydro	4.5	0.5
	IPP	324.5	37.9
	<b>Subtotal</b>	<b>802.4</b>	<b>93.8</b>
Thermal	NEA	53.4	6.2
Solar	NEA	0.1	0.0
<b>Total Installed Capacity</b>		<b>855.9</b>	<b>100.0</b>

MW = megawatt.

Source: Nepal Electricity Authority. 2016. *A Year in Review: Fiscal Year 2015/2016*. Kathmandu.

Table A1.2: Grid-Connected Power Plants Owned by Nepal Electricity Authority

Power Plant	Installed Capacity (MW)
<b>Major Hydropower Station</b>	
Devighat	14.10
Gandak	15.00
Kaligandaki A	144.00
Kulekhani I	60.00
Kulekhani II	32.00
Marsyangdi	69.00
Middle Marsyangdi	70.00
Modi Khola	14.80
Puwa Khola	6.20
Sunkoshi	10.05
Trishuli	24.00

continued on next page

Table A1.2 continued

Power Plant	Installed Capacity (MW)
<b>Small Hydropower Plants</b>	
Baglung**	0.20
Chatara	3.20
Doti**	0.20
Fewa	1.00
Jomsom*	0.24
Khandban*	0.25
Panauti	2.40
Pharping**	0.50
Phidim*	0.24
Ramechhap	0.15
Seti (Pokhara)	1.50
Sundarjal	0.64
Surnalyagad	0.20
Tatopani	2.00
Terhathum*	0.10
Tinau	1.02
<b>Total</b>	<b>473.39</b>

MW = megawatt.

\* Leased to private sector

\*\* Not in normal operation

Source: Nepal Electricity Authority, 2016. A Year in Review: Fiscal Year 2015/2016. Kathmandu.

**Table A1.3: Isolated Small Hydropower Plants Owned by Nepal Electricity Authority**

Power Plant	Installed Capacity (MW)
Achham	0.40
Arughat (Gorkha)	0.15
Bajhang	0.20
Bajura*	0.20
Bhojpur*	0.25
Chame*	0.05
Chaurjhari (Rukum)*	0.15
Darchula*	0.30
Dhanding**	0.03
Dhankula**	0.24
Dolpa	0.20
Gorkhe (Ilam)**	0.06
Helambu	0.05

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Table A1.3 continued

Power Plant	Installed Capacity (MW)
Heldung (Humla)	0.50
Jhupra (Surkhet)**	0.35
Jumla*	0.20
Kalokot	0.50
Manang*	0.08
Okhaldhunga	0.13
Rupalgad (Dadeldhura)	0.10
Syangia**	0.08
Syaprudaha (Rukum)*	0.20
Taplejung*	0.13
<b>Total</b>	<b>4.54</b>

MW = megawatt.

\* Leased to private sector \*\*Not in normal operation

Source: Nepal Electricity Authority, 2016. *A Year in Review: Fiscal Year 2015/2016*. Kathmandu.

Table A1.4: Non-Hydro Power Plants Owned by Nepal Electricity Authority

Power Plant	Installed Capacity (MW)
Duhabi Multifuel	39.00
Hetauda Diesel	14.41
Subtotal	53.41
Gamgadhi	0.05
Simikot Solar	0.05
Subtotal	0.10
<b>Total</b>	<b>53.51</b>

MW = megawatt.

Source: Nepal Electricity Authority, 2016. *A Year in Review: Fiscal Year 2015/2016*. Kathmandu.

Table A1.5: Existing Power Plants Owned by Independent Power Producers

Power Plant	Installed Capacity (MW)
Andhi Khola	9.40
Ankhu Khola-1	8.40
Baramchi Khola	4.20
Belkhu	0.52
Bhairab Kunda	3.00
Bhotekoshi Khola	45.00
Bijayapur-1	4.41
Chaku Khola	3.00
Charanawati Khola	3.52
Chhandi	2.00
Chhote Khola	0.99

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Table A1.5 continued

Power Plant	Installed Capacity (MW)
Chilime	22.10
Daram Khola-A	2.50
Hewa Khola	4.46
Indrawati III	7.50
Jhimruk Khola	12.00
Jiri Khola Small	2.20
Khimti Khola	60.00
Khudi Khola	4.00
Lower Chaku Khola	1.80
Lower Modi 1	10.00
Lower Piluwa Small	0.99
Mai Cascade	7.00
Mai Khola	4.50
Mai Khola	22.00
Mailung Khola	5.00
Mardi Khola	4.80
Middle Chaku	1.80
Naudadh Gad Khola	8.50
Pati Khola Small	1.00
Pheme Khola	1.00
Piluwa Khola Small	3.00
Radhi Khola	4.40
Rairang Khola	0.50
Ridi Khola	2.40
Sali Nadi	0.25
Seti II	0.98
Sipring Khola	9.66
Sisne Khola Small	0.75
Siuri Khola	4.95
Solar	0.68
Sunkoshi Small	2.50
Suspa Bukhari	1.00
Syange Khola	0.18
Tadi Khola (Thaprek)	5.00
Thopal Khola	1.65
Upper Hadi Khola	0.99
Upper Hugdi Khola	5.00
Upper Mai Khola	9.98
Upper Puwa-1	3.00
<b>Total</b>	<b>324.45</b>

MW = megawatt.

Source: Nepal Electricity Authority, 2016. *A Year in Review: Fiscal Year 2015/2016*. Kathmandu.

## APPENDIX 2

# Planned Installed Generation Capacity Until Fiscal Year 2022

**Table A2.1: Summary of Planned Installed Generation Capacity**

Ownership	No. of Plants	Planned Installed Capacity (MW)	% of Total
Nepal Electricity Authority–Owned Power Plants	4	244.00	11.7
Independent Power Producer–Owned Power Plants	108	1,847.02	88.3
<b>Total</b>	<b>112</b>	<b>2,091.02</b>	<b>100.0</b>

MW = megawatt.

Source: ADB. 2014. *Technical Assistance for South Asia Economic Integration Partnership - Power Trading in Bangladesh and Nepal (Subproject 1)*. Manila.

**Table A2.2: Power Plants Owned by the Nepal Electricity Authority**

Power Plant	Expected Commissioning (FY)	Installed Capacity (MW)
Chamailiya	2017	30.00
KL-3	2017	14.00
Trishuli 3A	2017	60.00
Tanahu	2021	140.00
<b>Total</b>		<b>244.00</b>

FY = fiscal year, MW = megawatt.

Source: ADB. 2014. *Technical Assistance for South Asia Economic Integration Partnership - Power Trading in Bangladesh and Nepal (Subproject 1)*. Manila.

**Table A2.3: Power Plants Owned by Independent Power Producers**

Power Plant	Expected Commissioning (FY)	Installed Capacity (MW)
Upper Mai Khola	2016	3.10
Phawa Khola	2016	4.95
Belkhu Khola-1	2016	0.52
Jumdi Khola	2016	1.75
Jhyadi Khola	2016	1.00
Gelun	2016	3.20
Suspa Bukhari	2016	1.00

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Table A2.3 continued

Power Plant	Expected Commissioning (FY)	Installed Capacity (MW)
Upper Marsyangdi A	2017	50.00
Upper Puwa Khola-1	2017	1.00
Upper Chaku A	2017	22.20
Upper Tamakoshi Hydropower Plant	2017	456.00
Mai Cascade	2017	7.00
Upper Madi Khola	2017	19.01
Sardi Khola	2017	4.00
Upper Mai C	2017	5.10
Mai Sana Cascade	2017	8.00
Tinau Khola	2017	0.99
Pikhuwa Khola	2017	2.48
Madkyu Khola	2017	9.97
Theule Khola	2017	1.50
Tadi Khola	2017	5.00
Dhansi Khola	2017	0.96
Thapa Khola	2017	11.20
Hewa Khola A	2017	14.90
Upper Belkhu	2017	1.00
Middle Tadi	2017	5.33
Salankhu Khola	2017	2.50
Jogmai	2017	7.60
Upper Parajuli Khola	2017	2.15
Lohore Khola	2017	4.20
Rawa Khola	2017	6.50
Lower Khare	2017	8.26
Middle Midim	2017	3.10
Teliya Khola	2017	1.00
Midim Karapu	2017	3.00
Rudi A	2017	6.80
Molung Khola	2017	7.00
Kapadigad	2017	3.00
Junbesi Khola	2017	5.20
Ghalemdi Khola	2017	4.00
Dwari Khola	2017	3.75
Lower Midim	2017	1.00
Buku Khola	2017	6.00

continued on next page

Table A2.3 continued

Power Plant	Expected Commissioning (FY)	Installed Capacity (MW)
Midim Khola	2017	0.10
Midim Khola	2017	3.40
Ghatte Khola	2017	5.00
Idi Khola	2017	0.98
Puwa Khola 1	2017	4.00
Lower Tadi	2017	4.99
Khani Khola-1	2018	25.00
Sanjen	2018	42.50
Upper Sanjen	2018	14.80
Middle Bhotekoshi	2018	102.00
Rasuwa Gadi	2018	111.00
Chake Khola	2018	0.99
Upper Mailung A	2018	5.00
Naugad Gad Khola	2018	8.50
Balefi	2018	24.00
Upper Khimti	2018	12.00
Upper Ingua Khola	2018	9.70
Lower Modi	2018	20.00
Upper Mailung	2018	14.30
Tame Khola	2018	1.25
Badi Gad	2018	6.60
Dhunge-Jiri	2018	0.60
Upper Tadi	2018	11.00
Chhandi	2018	1.70
Dordi Khola	2018	27.00
Khani Khola (Dolakha)	2018	30.00
Salang Khola	2018	0.99
Tungun-Thosne	2018	4.36
Khani Khola	2018	2.00
Upper Dordi A	2018	22.00
Tinekhu Khola	2018	0.99
Balefi A	2018	10.60
Miya Khola	2018	1.00
Madhya Modi	2018	15.10
Khorunga Khola	2018	4.80
Upper Solu	2018	18.00

continued on next page

Table A2.3 continued

Power Plant	Expected Commissioning (FY)	Installed Capacity (MW)
Bagmati Khola	2018	20.00
Phalankhu Khola	2018	13.70
Upper Khimti II	2018	7.00
Iwa Khola	2018	9.90
Tangchahara	2018	2.20
Khare Khola	2018	24.10
Singati Khola	2018	16.00
Tallo Hewa Khola	2018	21.60
Rudi Khola B	2018	6.60
Ludi Khola	2018	0.75
Sunkoshi (Tocardo Technology)	2018	0.40
Tauthali Khola	2018	0.95
Dordi Khola	2018	10.30
Phalanku Khola	2018	5.00
Lower Indrawati Khola	2019	4.50
Namarjun Madi	2019	11.88
Mistri Khola	2019	42.00
Daraudi Khola A	2019	6.00
Saba Khola	2019	4.00
Kabeli B-1	2019	25.00
Upper Khadam	2019	0.99
Lower Solu	2019	82.00
Maya Khola	2019	14.90
Solu Khola	2020	23.50
Likhu-IV	2021	52.40
Likhu 2 Hydroelectric Project	2021	33.40
Likhu 1 Hydroelectric Project	2021	51.40
Likhu A Hydroelectric Project	2021	24.20
Super Dordi Kha	2021	49.60
<b>Total</b>		<b>1,847.02</b>

FY = fiscal year, MW = megawatt.

Source: ADB. 2014. *Technical Assistance for South Asia Economic Integration Partnership - Power Trading in Bangladesh and Nepal (Subproject 1)*. Manila.

## APPENDIX 3

# Electricity Tariff Rates (Billing Effective September 2016)

### Notes:

1. Low voltage refers to an electricity supply of 230/400 Volt (V). Medium voltage refers to 11 Kilovolt (kV) and 33 kV and high voltage refers to 66kV or above.
2. If the consumer's demand meter is a kilowatt (kW) reading, then kilovolt-ampere (kVA) = kW/0.8. Consumers having kW demand meters must install capacitors within the prescribed time. Otherwise, their kVA demand will be calculated as kVA = kW/0.7.
3. A 10% rebate off the total bill amount is given to the government-approved industrial districts if the bill is paid within 21 days of the billing date.
4. If the crematory house, governmental hospital, or health center (but not a residential complex or a part thereof) under the Government of Nepal pays the bill within 21 days, a 20% rebate off the total bill amount is given.
5. Consumers supplied at medium (33 kV and 11kV) or high voltage (66kV or above) should compulsorily install time-of-day meters.
6. If new additional consumers applying for 11 kV supply are to be supplied at 33kV, they will be charged according to the 11 kV tariff structure.

## Domestic Consumers

Table A3.1: Service and Energy Charges (Single Phase)

kWh (Monthly)	5 Amperes		15 Amperes		30 Amperes		60 Amperes	
	Service Charge	Energy Charge						
0–20	30.00	3.00	50.00	4.00	75.00	5.00	125.00	6.00
21–30	50.00	7.00	75.00	7.00	100.00	7.00	150.00	7.00
31–50	75.00	8.50	100.00	8.50	125.00	8.50	175.00	8.50
51–150	100.00	10.00	125.00	10.00	150.00	10.00	200.00	10.00
151–250	125.00	11.00	150.00	11.00	175.00	11.00	225.00	11.00
251–400	150.00	12.00	175.00	12.00	200.00	12.00	250.00	12.00
Above 400	175.00	13.00	200.00	13.00	225.00	13.00	275.00	13.00

kWh = kilowatt-hour.

Source: Nepal Electricity Authority, 2016. *A Year in Review: Fiscal Year 2015/2016*. Kathmandu.

**Table A3.2: Service and Energy Charges (Three Phase), Low Voltage (230/400 V)**

kWh	Up to 10 KVA		Above 10 KVA	
	Service Charge	Energy Charge	Service Charge	Energy Charge
Up to 400	1,100.00	12.50	1,800.00	12.50
Above 400		13.50		13.50

kVA = kilovolt-ampere, kWh = kilowatt-hour, V = volt.

Source: Nepal Electricity Authority. 2016. *A Year in Review: Fiscal Year 2015/2016*. Kathmandu.

**Table A3.3: Service and Energy Charges (Three Phase), Medium Voltage (33/11kV)**

kWh	Up to 10 KVA	
	Service Charge	Energy Charge
Up to 1,000	1,100.00	11.00
1,001–2,000		12.00
Above 2,001		13.00

kVA = kilovolt-ampere, kWh = kilowatt-hour, V = volt.

Source: Nepal Electricity Authority. 2016. *A Year in Review: Fiscal Year 2015/2016*. Kathmandu.

**Table A3.4: Billing Method (For 5 Amperes)**

Electricity Consumption Block	Rate (NRs per unit)	Billing Method
Up to 20 units	3.00	Minimum monthly service charge of NRs30.00 for up to 20 units, and energy charge of NRs3.00 per unit.
21–30 units	7.00	Minimum monthly service charge of NRs50.00, and energy charge of NRs3.00 per unit up to 20 units and NRs7.00 per unit for 21–30 units.
31–50 units	8.50	Minimum monthly service charge of NRs75.00, and energy charge of NRs3.00 per unit up to 20 units, NRs7.00 per unit for 21–30 units, and NRs8.50 per unit for 31–50 units.
51–150 units	10.00	Minimum monthly service charge of NRs100.00, and energy charge of NRs3.00 per unit for up to 20 units, NRs7.00 per unit for 21–30 units, NRs8.50 per unit for 31–50 units, and NRs10.00 per unit for 51–150 units.
151 to 250 units	11.00	Minimum monthly service charge of NRs125.00, and energy charge of NRs3.00 per unit up to 20 units, NRs7.00 per unit for 21–30 units, NRs8.50 per unit for 31–50 units, NRs10.00 per unit for 51–150 units, and NRs11.00 per unit for 151–250 units.
251 to 400 units	12.00	Minimum monthly service charge of NRs150.00, and energy charge of NRs3.00 per unit up to 20 units, NRs7.00 per unit for 21–30 units, NRs8.50 per unit for 31–50 units, NRs10.00 per unit for 51–150 units, NRs11.00 per unit for 151–250 units, and NRs12.00 per unit for 251–400 units.
Above 400	13.00	Minimum monthly service charge NRs175.00 and energy charge per unit NRs3.00 up to 20 units and NRs7.00 per unit for 21–30 units, NRs8.50 per unit for 31–50 units, NRs10.00 per unit for 51–150 units, NRs11.00 per unit for 151–250 units, and NRs12.00 per unit for 251–400 units and NR13.00 per unit for units above 400.

Note: Similar billing will be made for 15, 30, and 60 amperes.

Source: Nepal Electricity Authority. 2016. *A Year in Review: Fiscal Year 2015/2016*. Kathmandu.

## Other Consumers

**Table A3.5: Demand and Energy Charges, Low Voltage (230/400V)**

Consumer Category	Demand Charge (NRs/KVA/month)	Energy Charge (NRs/unit)
<b>Industrial</b>		
Rural and domestic	60.00	7.80
Small industry	110.00	9.60
Commercial	325.00	11.20
Noncommercial	215.00	12.00
Irrigation		4.30
Water supply		
Community water supply	155.00	5.20
Other water supply	230.00	7.20
Temple		6.10
Streetlight		
Metered		7.30
Nonmetered	2,475.00	
Temporary supply		19.80
Nondomestic	350.00	13.00
Entertainment business	350.00	14.00

KVA = kilovolt-ampere

Source: Nepal Electricity Authority, 2016. *A Year in Review: Fiscal Year 2015/2016*. Kathmandu.

**Table A3.6: Demand and Energy Charges, Medium and High Voltage**

Consumer Category	Demand Charge (NRs/KVA/month)	Energy Charge (NRs/unit)
<b>Medium voltage (11 KV)</b>		
Industrial	255.00	8.60
Commercial	315.00	11.10
Noncommercial	240.00	11.50
Irrigation	55.00	4.90
Water supply		
Community water supply	220.00	6.20
Other water supply	220.00	6.80
Transportation		
Trolley bus	230.00	5.60
Other transportation	255.00	8.80
Temple	220.00	9.90

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A3.6 continued

Consumer Category	Demand Charge (NRs/KVA/month)	Energy Charge (NRs/unit)
Temporary supply	330.00	12.00
Nondomestic	350.00	12.90
Entertainment business	350.00	13.90
<b>Medium voltage (33 kV)</b>		
Industrial	255.00	8.40
Commercial	315.00	10.80
Noncommercial	240.00	11.40
Irrigation	55.00	4.80
Water supply		
Community water supply	220.00	6.00
Other water supply	220.00	6.60
Transportation		
Trolley bus	230.00	5.60
Other transportation	255.00	8.60
Nondomestic	350.00	12.55
Entertainment business	350.00	13.50
<b>High voltage (66 KV and above)</b>		
Industrial	240.00	7.50

KVA = kilovolt-ampere

Source: Nepal Electricity Authority, 2016. *A Year in Review: Fiscal Year 2015/2016*. Kathmandu.

Table A3.7: Time of Day Tariff Rate, Baishakh to Mangsir

Consumer Category	Demand Charge (NRs/KVA/month)	Peak Time (17:00–23:00)	Off-Peak Time (23:00–05:00)	Normal Time (05:00–17:00)
<b>Medium voltage (11k KV)</b>				
Industrial	250.00	10.50	5.40	8.55
Commercial	315.00	12.60	6.90	11.10
Noncommercial	240.00	13.50	7.15	12.25
Irrigation	55.00	6.40	3.50	4.75
Water supply				
Community water supply	220.00	7.45	4.40	6.10
Other water supply	220.00	10.50	5.40	8.50
Transportation				
Trolley bus	230.00	7.15	4.20	5.60
Other transportation	255.00	9.65	4.20	8.50
Streetlight	80.00	8.80	3.75	4.40
Temple	220.00	11.30	5.15	9.10

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A3.7 continued

Consumer Category	Demand Charge (NRs/KVA/month)	Peak Time (17:00–23:00)	Off-Peak Time (23:00–05:00)	Normal Time (05:00–17:00)
Temporary supply	330.00	14.40	6.60	11.75
<b>Medium Voltage (33 kV)</b>				
Industrial	250.00	10.20	5.25	8.40
Commercial	315.00	12.30	6.75	10.80
Noncommercial	240.00	13.20	7.00	12.00
Irrigation	55.00	6.30	3.15	4.70
Water supply				
Community water supply	220.00	7.30	3.60	5.90
Other water supply	220.00	10.20	5.25	8.40
Transportation				
Trolley bus	230.00	7.00	3.70	5.50
Other transportation	255.00	9.35	3.70	8.40
Streetlight	80.00	8.40	3.50	4.20
<b>High voltage (66kV and above)</b>				
Industrial	240.00	9.30	4.15	7.50

kV = kilovolt, KVA = kilovolt-ampere

Source: Nepal Electricity Authority, 2016. *A Year in Review: Fiscal Year 2015/2016*. Kathmandu.

Table A3.8: Time of Day Tariff Rate, Paush to Chaitra

Consumer Category	Demand Charge (NRs/KVA/month)	Peak Time (17:00–23:00)	Normal Time (23:00–05:00)
<b>Medium Voltage (11 KV)</b>			
Industrial	250.00	10.50	8.55
Commercial	315.00	12.60	11.10
Noncommercial	240.00	13.50	12.25
Irrigation	55.00	6.40	4.75
Water supply			
Community water supply	220.00	7.45	6.10
Other water supply	220.00	10.50	8.50
Transportation			
Trolley bus	230.00	7.15	5.60
Other transportation	255.00	9.65	8.50
Streetlight	80.00	8.80	4.40
Temple	220.00	11.30	9.10
Temporary supply	330.00	14.40	11.75

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A3.8 continued

Consumer Category	Demand Charge (NRs/KVA/month)	Peak Time (17:00–23:00)	Normal Time (23:00–05:00)
<b>Medium voltage (33 kV)</b>			
Industrial	250.00	10.20	8.40
Commercial	315.00	12.30	10.80
Noncommercial	240.00	13.20	12.00
Irrigation	55.00	6.30	4.70
Water Supply			
Community water supply	220.00	7.30	5.90
Other water supply	220.00	10.20	8.40
Transportation			
Trolley bus	230.00	7.00	5.90
Other transportation	255.00	9.35	8.40
Streetlight	80.00	8.40	4.20
<b>High voltage (66 kV and above)</b>			
Industrial	240.00	9.30	7.50

KVA = kilovolt-ampere

Source: Nepal Electricity Authority, 2016. *A Year in Review: Fiscal Year 2015/2016*. Kathmandu.

## Community Wholesale Consumer

**Table A3.9: Energy Charge, Low and Medium Voltage**

Voltage Level	Energy Charge (NRs/unit)
Low voltage (230/400 V)	
Up to (N x 30) units	4.25
Above (N x 30) units	6.25
Medium voltage (11 kV/33 kV)	
Up to (N x 30) units	4.25
Above (N x 30) units	6.00

N = total number of consumers in a community group

Source: Nepal Electricity Authority, 2016. *A Year in Review: Fiscal Year 2015/2016*. Kathmandu.

## APPENDIX 4

# Action Plan on National Energy Crisis Prevention and Electricity Development Decade, 2016

S.N.	Programs	Activities	Duration	Main Responsible Agency	Supporting Agency/ Agencies	Expected Liabilities Likely to Fall on Government	Remarks
<b>Provisions of Legal Reform</b>							
1	To provide for new Electricity Act and National Electricity Regulatory Commission Act.	To formulate and submit new Electricity Act to replace the Electricity Act, 1992 and the Bill Relating to National Electricity Regulatory Commission to the Legislature-Parliament.	6 months	Ministry of Energy	MoLJPA, Secretariat of WEC/DOED/ NEA		
2	To approve and implement Energy Crisis Bill.	To get Energy Crisis Bill approved from the Legislature-Parliament by bearing in mind including the reformative steps of long-term in nature to be taken to remove the legal hurdles and develop the overall energy sector for the reduction of the present energy crisis.	3 months	Government of Nepal, Council of Ministers	MoF, MoLJPA, Ministry of Energy		

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Table continued

S.N.	Programs	Activities	Duration	Main Responsible Agency	Supporting Agency/ Agencies	Expected Liabilities Likely to Fall on Government	Remarks
3	To make necessary arrangements for interagency coordination in electricity related projects.	To form Electricity Energy Crisis Prevention Committee Chaired by Rt. Hon. Prime Minister consisting of Hon. Energy, Forest and Soil Conservation, Home, Finance and Population and Environment Ministers as members and Energy Secretary as Member Secretary to remove hurdles and difficulties to be encountered in the study and construction phase of project works, as work could not have been completed in a prompt and easy manner due to the lack of inter-agency coordination in electricity related project.	Immediately	Government of Nepal, Council of Ministers	Ministry of Energy		
4	To simplify and make more systematic the provision of issuing license of projects in such a way as to ensure affiliation with electricity transmission/ distribution.	<ul style="list-style-type: none"> <li>To provide for a provision in Energy Crisis Prevention Bill to issue license in such a way as to be consistent with transmission master plan in order to obviate the problem of not being able to discharge the electricity energy generated by some projects to the existing electricity system.</li> <li>To make a provision in such a way as to issue survey and transmission license of projects with capacity of up to 25 megawatts, and survey and transmission license of up to 132 kV voltage level by Director General of the Department of Electricity Development.</li> </ul>	3 months	Ministry of Energy	DOED/NEA		

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Table continued

S.N.	Programs	Activities	Duration	Main Responsible Agency	Supporting Agency/ Agencies	Expected Liabilities Likely to Fall on Government	Remarks
5	Provisions relating to development of electricity projects of 500 megawatts or above.	The role of Investment Board and Ministry of Energy with respect to the subjects of the development and monitoring of electricity projects of 500 megawatts and above will be reviewed on the basis of the aspects of investment management and implementation effectiveness.	3 months	Ministry of Energy	Investment Board, DOED, NEA		
6	To provide for concession in consideration of VAT refund.	To provide for the facility of VAT refund of NRs5 million per megawatt in the case of projects to be constructed for domestic consumption within the country will be made effective till the period of Energy Crisis Prevention Decade or the FY2025–2026. Such facility will be accorded even to industries and organizations that generate electricity in a minimum 1 megawatt installed capacity from renewable energy within the next 2 years and operate it as a captive plant.	6 months	Ministry of Finance	Ministry of Energy		To be incorporated in Financial Act.
7	To provide for income tax exemption granted by Electricity Act, 1992.	Since the income tax exemption granted by Electricity Act, 1992 was slashed at different times, a provision will be made to provide such facility till the Energy Crisis Prevention Decade.	6 months	Ministry of Finance	Ministry of Energy		To be incorporated in Financial Act.
8	To remove ceiling on land of electricity and transmission line project.	To provide for a provision in such a way that there will be no imposition of ceiling on the land of up to the area mentioned in the EIA or IEE in the name of electricity and transmission line project.	3 months	Ministry of Land Reform and Management	MoE, District Survey Off/ District Land Revenue Off.		

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Table continued

S.N.	Programs	Activities	Duration	Main Responsible Agency	Supporting Agency/ Agencies	Expected Liabilities Likely to Fall on Government	Remarks
9	To remove hindrances or obstacles to the study, development and construction process of electricity project.	<ul style="list-style-type: none"> <li>To make a provision of initiating legal action against any person or organization that creates hindrances or obstacles in the study, development and construction process of electricity project by considering such offences equal to public crimes.</li> </ul>	3 months	Ministry of Home Affairs	MoE, related DAO		
		<ul style="list-style-type: none"> <li>To provide a provision for declaring electricity project site a prohibited zone as necessary.</li> </ul>	3 months	Ministry of Energy	MoE, related DAO		
10	To make additional provisions in procurement process relating to electricity project.	To make a provision as to be permitted to procure goods and construction works by adopting the method of 'Single Stage Two Envelopes' for the projects of electricity generation, transmission and distribution system.		Ministry of Energy	MoF, MoLJPA, Public Pro. Monitoring Office		
11	To make an amendment to Electricity Theft Control Act, 2002.	To make timely and contemporary change in Electricity Theft Control Act, 2002.	3 months	Ministry of Energy	MoLJPA, NEA		
<b>Policy Decisions</b>							
12	To implement "National Energy Security Policy."	To formulate and implement "National Energy Security Policy."	6 months	Ministry of Energy	NPC, Secretariat of WEC, DOED, NEA		

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Table continued

S.N.	Programs	Activities	Duration	Main Responsible Agency	Supporting Agency/ Agencies	Expected Liabilities Likely to Fall on Government	Remarks
13	To provide for investment in hydroelectricity projects by mobilizing internal resources.	<ul style="list-style-type: none"> <li>To make an arrangement in such a way as to permit the banks and financial institutions established under the existing Banks and Financial Institutions Act to make investment of up to 15% of their loan investment in electricity projects during the Electricity Energy Crisis Prevention period.</li> </ul>	3 months	NRB	MoF, Ministry of Energy		
		<ul style="list-style-type: none"> <li>Internal resources will be mobilized by formulating a procedure in such a way as to provide for investment in equity with 51% of the Government of Nepal and government financial institutions and 49% from foreign employment remittance that enters the country, all Nepalese people in an organized way, cooperative organizations etc. to ensure the arrangement of in large and attractive hydroelectricity projects. For this, 3-4 projects will be selected and operated.</li> </ul>	6 months	Ministry of Energy	MoF, NRB including related agencies		
14	To revise Financial Administrative Bylaw of Nepal Electricity Authority.	Necessary changes will be made in Financial Administration Bylaw of Nepal Electricity Authority as to be in consistent with Public Procurement Act and Rules.	3 months	NEA Board of Directors	Ministry of Energy		
15	To carry out restructuring of Ministry of Energy and Department of Electricity Department.	To carry out restructuring of Ministry of Energy and Department of Electricity Department with necessary additional human resources.	6 months	Ministry of Energy	MoF, MoGA, DOED		

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Table continued

S.N.	Programs	Activities	Duration	Main Responsible Agency	Supporting Agency/ Agencies	Expected Liabilities Likely to Fall on Government	Remarks
16	To fix generation mix of project according to the type of hydroelectricity project.	<ul style="list-style-type: none"> <li>To develop electricity as to be 40%-50% from reservoir-based and pump storage, 15%-20% Peaking Run of River, 23%-30% Run of River and 5%-10 % other alternative sources to end load-shedding from the power generated within the country in the long term.</li> <li>(Regional balance, low resettlement, high head, multidimensional utility etc. will also be made the basis while selecting the projects. Furthermore, to make arrangements as to ensure justifiable sharing of benefits [electricity energy, irrigation, flood control, water transportation, fishery and tourism etc.] to be enjoyed by understream project/areas.)</li> </ul>	10 years	Ministry of Energy	NPC, DOED, NEA		
17	To complete under construction hydroelectricity projects with high priority.	<ul style="list-style-type: none"> <li>200 megawatt</li> <li>Additional 850 megawatts</li> <li>Additional 400 megawatts</li> </ul>	1 year 2 years 3 years	Private sector NEA and subsidiary company, Private sector NEA and subsidiary company, Private sector	MoE, DOED, NEA MoE, DOED, NEA MoE, DOED, NEA		

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S.N.	Programs	Activities	Duration	Main Responsible Agency	Supporting Agency/ Agencies	Expected Liabilities Likely to Fall on Government	Remarks
18	To construct reservoir-based projects with priority.	To make necessary procedures to develop them by entering into contract under the provisions referred to in Section 35 of Electricity Act, 1992 in order to address the issues including the resource management for the construction of reservoir-based projects and construct such projects on the basis of Engineering Procurement Construction Finance (EPCF) as well. To accord special priority to lead reservoir-based projects like Karnali Chisapani of multipurpose importance to the construction phase by updating the study.	3 months	Ministry of Energy	MoE, DOED, NEA		
19	To reimburse loss amount in operation of existing thermal plants and electricity import.	To reimburse Nepal Electricity Authority the loss amount incurred to while importing electricity from India and in the case of operation of the existing thermal power plants.	As may be required	Ministry of Finance	Ministry of Energy	Approximately NRs 4 billion per year	Estimated NRs 6.69 billion to be reimbursed in respect of import for FY2014–2015 and FY2015–2016 and estimated NRs 180 million to be reimbursed in respect of thermal for FY2015–2016.
20	To determine/ adjust electricity tariff rate consistent with weather and time.	To determine electricity tariff consistent with weather and time to increase investment in the development of hydroelectricity projects and bring about improvement in financial condition of Nepal Electricity Authority as well as to manage the demand side.	6 months	Electricity Tariff Fixation Commission	NEA, Butwal Power Company		

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Table continued

S.N.	Programs	Activities	Duration	Main Responsible Agency	Supporting Agency/ Agencies	Expected Liabilities Likely to Fall on Government	Remarks
21	To determine power purchase rate and wheeling charge according to weather and time.	<ul style="list-style-type: none"> <li>To determine power purchase rate according to weather and time to create enabling environment for the construction of Peaking Run of River and reservoir-based projects.</li> </ul>	1 year	NEA	Ministry of Energy		To be determined after establishment of Electricity Regulatory Commission and activation of National Transmission Grid Company as well.
		<ul style="list-style-type: none"> <li>To make a provision that requires determination of Wheeling Charge to be paid in respect of the use of electricity transmission line.</li> </ul>	1 year	Ministry of Energy	National Transmission Grid Company		
22	Not to affect the reservoir-based electricity projects that have been confirmed and are under River Basin Master Plan.	<ul style="list-style-type: none"> <li>To initiate long-term infrastructure and settlement development program by the Government of Nepal in such a way that reservoir-based electricity projects whose construction has become certain and that are included in River Basin Master Plan will not affect the reservoir area of the projects.</li> </ul>	Immediately	NPC	All related ministries and subordinate agencies		
		<ul style="list-style-type: none"> <li>To provide information to related agencies about the reservoir-based electricity projects which have been confirmed and are under River Basin Master Plan.</li> </ul>	1 month	Ministry of Energy	DOED/NEA		
23	To initiate hydroelectricity projects with investment of people.	Hydroelectricity projects to be constructed with the investment of people will be carried forward with high priority as to ensure the share of the hydroelectricity projects to the maximum number of people.	Continuous	Ministry of Energy	MoF/DOED/NEA		

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S.N.	Programs	Activities	Duration	Main Responsible Agency	Supporting Agency/ Agencies	Expected Liabilities Likely to Fall on Government	Remarks
24	To provide transmission facilities to hydroelectricity up to 3 megawatts generated at local level.	If hydroelectricity up to 3 megawatts is generated with the investment of local level community, cooperative organizations etc. in the initiative and leadership of local body in a manner to distribute mainly at the local level itself and sell only the surplus to the grid, the Government of Nepal will make the arrangements for the construction of transmission line on the basis of feasibility.	As may be required		MoF/MoE/NEA		
25	To ensure payment in consideration of purchase of power purchase.	For the purpose of attracting foreign investment, an arrangement will be made in such a way that the Government of Nepal may guarantee the payment in consideration of power purchase in the projects to be developed through the Project Development Agreement for domestic consumption.	1 month	Government of Nepal	MoF/MoE/NEA		

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S.N.	Programs	Activities	Duration	Main Responsible Agency	Supporting Agency/ Agencies	Expected Liabilities Likely to Fall on Government	Remarks
26	To follow provisions of Take or Pay instead of Take and Pay.	<ul style="list-style-type: none"> <li>In the case of private sector hydroelectricity projects that have already concluded or are in the process of concluding Power Purchase Agreement with the Take and Pay provision after completion of Grid Impact Study by Nepal Electricity Authority, to make arrangement of purchase of power generated by the Run-of-River (RoR) based hydroelectricity projects will be made until the period of the prevention of electricity crisis or the FY2025-2026 on the basis of Take or Pay, subject to the proposed generation mix.</li> </ul>	6 months	NEA Board of Directors	NEA Power Trade Department		If domestic energy can be caused to be consumed by developing adequate transmission and distribution capacity, there will be no such condition to bear the liabilities of such amount.
		<ul style="list-style-type: none"> <li>To provide reimbursement thereof by the Government of Nepal if Nepal Electricity Authority incurs any loss due to this provision.</li> </ul>	As may be required	Government of Nepal, Council of Ministers	MoF/MoE/ NEA	Per year risk of approximately NRs 8 billion (Based on 25% in respect of 1,100 MW capacity Dispatchable GIS).	
27	Nepal Electricity Authority to purchase electricity to be available as cogeneration from sugarcane bagasse of sugar factories after entering into contract by the Ministry of Energy.	To develop a model (pilot) contract to connect the surplus electricity to the national grid through the Power Purchase Agreement after the internal consumption of the electricity to be available as cogeneration from sugarcane bagasse of sugar factories.	2 months	Ministry of Energy	DOED		
		<ul style="list-style-type: none"> <li>To enter into contract agreement with sugar factories.</li> </ul>	3 months	Ministry of Energy	DOED, Sugar Factories		

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S.N.	Programs	Activities	Duration	Main Responsible Agency	Supporting Agency/ Agencies	Expected Liabilities Likely to Fall on Government	Remarks
		<ul style="list-style-type: none"> <li>To purchase electricity at the existing posted rate to connect the surplus to be available as cogeneration from bagasse after the internal consumption of the factory to connect it to the national grid.</li> <li>Transmission line from the national grid to the industry to be constructed at the expense of the factory itself.</li> </ul>	4 months	NEA	Ministry of Energy		
			On demand basis	NEA	Sugar Factories		
28	<ul style="list-style-type: none"> <li>To provide necessary facilities by considering the devastating earthquakes and floods, landslides of the FY2014-2015 as <i>force majeure</i>.</li> <li>To provide necessary facilities by considering the devastating earthquakes and floods, landslides of the FY2014-2015 as <i>force majeure</i>.</li> </ul>	<ul style="list-style-type: none"> <li>Provisions relating to <i>force majeure</i> to be activated under the contract agreement for projects damaged by the earthquakes of April 2015.</li> <li>To extend Required Commercial Operation Date (RCOD) for a period not exceeding one year for under construction projects affected/damaged by the earthquakes and even in the case of damage of operating projects damaged by the earthquakes, the term of the Power Purchase Agreement will be extended for a period of maximum one year as necessary.</li> <li>To extend validity period of electricity generation license as well in consistent with the extension of RCOD and Power Purchase Agreement.</li> </ul>	Immediately	Government of Nepal	NEA		
			2 months	NEA			
			After period is extended in PPA	Ministry of Energy	DOED		

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S.N.	Programs	Activities	Duration	Main Responsible Agency	Supporting Agency/ Agencies	Expected Liabilities Likely to Fall on Government	Remarks
		<ul style="list-style-type: none"> <li>To provide for appropriate concessions by formulating a procedure for projects that came or will come into operation again within the FY2015–2016 followed by disruption in power house due to damage caused by floods and landslides.</li> </ul>	6 months	Ministry of Energy	NEA		
29	To construct transmission line and substation under Build-Transfer Model through a consortium of promoters.	Projects relating to transmission line will be operated with high priority and for this purpose, Transmission Line Master Plan, including that of River Basin Corridor Transmission Line, East West Transmission Highway and Transnational Import-Export Transmission line, will be approved and implemented. To develop and implement a procedure in such a way as to allow the transmission line and substation to be constructed under the Build-Transfer Model by forming a consortium of related promoters to carry out Power Evacuation by initiating the construction of transmission line in a speedy manner.	3 months	Ministry of Energy	NEA, DOED		

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S.N.	Programs	Activities	Duration	Main Responsible Agency	Supporting Agency/ Agencies	Expected Liabilities Likely to Fall on Government	Remarks
30	To provide additional compensation amount on an annual basis for the lands falling on RoW.	As the utility of the lands falling on Right-of-Way (RoW) in the course of construction of electricity transmission line diminishes and the existing provision of only 10% of the fixed value of such lands seems to be causing difficulty in land acquisition, to provide additional compensation for the lands falling on RoW as an annual rent by preparing a procedure in addition to the existing provision to facilitate this. To delegate its managerial responsibility to the related VDCs/Municipalities.	4 months	Government of Nepal Council of Ministers	MoF, MoE, MoFALD, NEA, related VDC/ Municipality	Approximately NRs 1 billion per year	
31	Electricity generation, transmission and distribution projects to become national priority projects.	Provisions to be made in such a way that all projects pertaining to electricity generation, transmission and distribution and infrastructure and resettlement related projects associated with thereof will be projects of national priority.	Immediately	Government of Nepal, Council of Ministers	NPC		
32	To make special arrangements for the study and construction of reservoir-based projects situated within the protected areas.	To make special arrangements for the study and construction of reservoir-based projects like Uttar Ganga and Langtang that are situated within the protected area but do not seem to be attractive for power generation during the dry season.	6 months	Government of Nepal, Council of Ministers	MoE, MoFSC, MoPE		

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S.N.	Programs	Activities	Duration	Main Responsible Agency	Supporting Agency/ Agencies	Expected Liabilities Likely to Fall on Government	Remarks
33	To scrap the provision of providing additional land as compensation in consideration of forestland taking on lease.	Where the existing provision requires it to reimburse the equal of forestland in consideration of taking on lease, to provide for provision in such a way that the related promoter provides minimum amount valued by the government or land as prescribed by the Ministry of Forest and Soil Conservation at his/ her convenience for forest development instead thereof.	Continuous	Government of Nepal, Council of Ministers	NPC, MoE, MoFSC		
34	<ul style="list-style-type: none"> <li>Payment for Ecosystem Services (PES) to be scrapped.</li> </ul>	<ul style="list-style-type: none"> <li>To withdraw the provision of Payment for Ecosystem Service (PES) imposed by Ministry of Forest and Soil Conservation, except otherwise clearly provisioned in Project Development Agreement. To provide a certain percentage of royalty to be received from electricity projects for the protection and conservation of forest affected by electricity project by developing a procedure.</li> </ul>	3 months	Government of Nepal Council of Ministers	NPC, MoE, MoFSC		
35	To provide for special provisions for acquisition of land of electricity projects, transmission lines and substations.	To classify (commercial-urban, urban, peri-urban, rural etc.) such lands by developing a procedure for acquisition of lands located in electricity projects, transmission lines and substations.	6 months	NEA	MoLRM		

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S.N.	Programs	Activities	Duration	Main Responsible Agency	Supporting Agency/ Agencies	Expected Liabilities Likely to Fall on Government	Remarks
		<ul style="list-style-type: none"> <li>To make an arrangement to determine the price/rate of the land on the basis of land revenue rate, prevailing general market rate, commerciality of the lands and other appropriate criteria while carrying out valuation of such lands.</li> </ul>	6 months	NEA	MoLRM		
		<ul style="list-style-type: none"> <li>In proceeding over acquisition of lands this way, to make an arrangement of acquisition of all lands by providing full compensation or of providing compensation in consideration of the lands by distributing partial compensation on the basis of the classification of lands under the procedure.</li> </ul>	6 months	NEA	MoLRM		
		<ul style="list-style-type: none"> <li>To carry out study, development and construction of priority transmission line with capacity of 132 kV or above in such a way to minimize the use of private lands as far as possible or to revise the provisions relating to the use of government or forestlands that are inconsistent with this.</li> </ul>	6 months	Ministry of Energy	MoPE, MoFSC		

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S.N.	Programs	Activities	Duration	Main Responsible Agency	Supporting Agency/ Agencies	Expected Liabilities Likely to Fall on Government	Remarks
36	To provide for review of land compensation.	<ul style="list-style-type: none"> <li>A provision of Land Compensation Review Committee will be made at the district level for the review of land compensation rate fixed by Land Compensation Determination Committee. A provision to be made in such a way that the related party, if not satisfied with the decision of the Land Compensation Determination Committee, may make an application to the Committee for review within 35 days of the decision and the Committee will give decision within 35 days.</li> </ul>	3 months	Government of Nepal	MoE, MoLRM		
37	To make arrangements for the construction of transmission line.	To engage Nepali Army as necessary to carry out the construction of transmission line at a high speed.	Immediately	Government of Nepal Council of Ministers	Ministry of Defense, MoE		
38	To provide for Community Support Program.	In addition to the amount to be spent in compulsory action plan like environmental management and resettlement, to fix a ceiling requiring to set aside 0.75% of total investment for the projects with capacity of up to 100 megawatts and 0.5% for the projects with capacity of more than 100 megawatts under the Community Support Program in IEE/EIA for various activities to be carried out for the social development of the project area.	Immediately	Government of Nepal Council of Ministers	MoE, MoPE		

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S.N.	Programs	Activities	Duration	Main Responsible Agency	Supporting Agency/ Agencies	Expected Liabilities Likely to Fall on Government	Remarks
39	To conduct a feasibility study on the concept of installing private transformer in apartment buildings and of single metering.	<ul style="list-style-type: none"> <li>To install private transformer in large apartment buildings to be constructed in urban area.</li> </ul>	Continuous	NEA	MoE, MoUD		
		<ul style="list-style-type: none"> <li>To carry out feasibility study of single metering.</li> </ul>	6 months	NEA	ETRC, MoE		
40	To install Time-of-Day (TOD) meter by making policy provisions of charging domestic tariff rate on the basis of peak/off peak tariff.	To gradually install TOD meter to charge peak/off peak tariff rates on all consumers who consume electricity in high voltage in off peak time as well as even on domestic tariff to reduce the peak load of the present electricity system and displace the load during the off peak time.	1 year	Electricity T.D.C.	MoE, NEA		
41	To extend electricity service to all Nepalese people within the next 10 years.	To carry forward the Rural Electrification Program in an organized way with an aim to extend electricity service to all Nepalese people within the next 10 years.	10 years by starting immediately	Ministry of Energy	NPC, MoF, MoE		
42	To gradually implement the concept of Smart Meter and Smart Grid.	<ul style="list-style-type: none"> <li>To adopt a program for making electricity distribution system consumer friendly by modernizing it.</li> </ul>	Immediately	NEA	NPC, MoF, MoE		
		<ul style="list-style-type: none"> <li>To introduce the concept of Smart Meter and Smart Grid to control electricity leakage in such a way as to gradually implement them.</li> </ul>	6 months	NEA	NPC, MoF, MoE		
		<ul style="list-style-type: none"> <li>To implement a pilot project/program within the Kathmandu Valley under the concept of Smart Meter and Smart Grid.</li> </ul>	2 months	NEA	NPC, MoF, MoE		

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S.N.	Programs	Activities	Duration	Main Responsible Agency	Supporting Agency/ Agencies	Expected Liabilities Likely to Fall on Government	Remarks
43	To implement electricity distribution master plan and distribution system leakage control action plan.	• To develop and implement electricity distribution master plan.	1 year	NEA	NPC, MoF, MoE		
		• To develop and implement electricity distribution system leakage control action plan.	1 month	NEA	MoHA, MoFALD, MoE		
44	To extend distribution substations with capacity of equal to around 12,000 MVA.	To extend additional distribution substations with capacity of equal to around 12,000 MVA to strengthen the distribution system management.	10 years	NEA	NPC, MoF, MoE		
45	To activate National Transmission Grid Company	To cause National Transmission Grid Company Ltd. to carry out all functions pertaining to extension, and operation and control of national grid.	1 year	Ministry of Energy	MoF, DOED, NEA		
46	High-voltage consumers to be permitted to purchase power directly.	To make arrangement in such a way that high-voltage consumers could purchase power from power producers or trade licensees directly by obtaining affiliation with the system of National Transmission Grid Company	3 years	Ministry of Energy	ETRC, DOED, NEA		
47	To operate Unscheduled Interchange (UI) market.	Arrangements to be made for the operation of Unscheduled Interchange (UI) market to maintain daily energy balance between the power producers and purchasers.	3 years	Ministry of Energy	ETRC, DOED, NEA		
48	To fix “benchmark” electricity purchase rate for photovoltaic solar or wind energy to be connected to National Grid.	Displaced cost of NRs9.61 per unit price to be fixed as “benchmark” electricity purchase rate for photovoltaic solar or wind energy to be connected to National Grid.	3 months	Ministry of Energy	MoF, NEA		

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Table continued

S.N.	Programs	Activities	Duration	Main Responsible Agency	Supporting Agency/ Agencies	Expected Liabilities Likely to Fall on Government	Remarks
49	To connect solar or wind electricity energy to national grid.	<ul style="list-style-type: none"> <li>To adopt a policy of connecting the solar or wind electricity energy to the national grid by maintaining 10% of total installed capacity of electricity to be allied to the national grid as its ceiling.</li> </ul>	Immediately	Council of Ministers	NPC, MoE, MoF		
		<ul style="list-style-type: none"> <li>To connect solar or wind electricity energy to the national grid by maintaining around 100 megawatts of the amount to be calculated at the rate of 10% thereof as its ceiling, considering around 1,000 megawatts the total installed capacity of electricity to be connected to the national grid. Of them, to accelerate the work of connecting 25 megawatt solar energy already initiated by Nepal Electricity.</li> </ul>	1 year	NEA	MoE, MoF, DOED	NRs 560 million	(Liabilities could be plus/minus based on competitive price)
		<ul style="list-style-type: none"> <li>To connect to the solar or wind electricity energy to the national grid to the national grid by maintaining around 200 megawatts of the amount to be calculated at the rate of 10% thereof as its ceiling, considering around 2,000 megawatts the total installed capacity of electricity to be connected to the national grid.</li> </ul>	2 years	NEA	MoE, MoF, DOED	NRs 1.12 billion per year	

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Table continued

S.N.	Programs	Activities	Duration	Main Responsible Agency	Supporting Agency/ Agencies	Expected Liabilities Likely to Fall on Government	Remarks
50	To invite competitive bid for photovoltaic solar and wind electricity.	To invite competitive through Nepal Electricity Authority for related promoter companies that wish to connect solar or wind electricity to the prescribed point of the national grid in the prescribed amount in such a way to fulfill the prescribed standards in the “benchmark” electricity purchase rates fixed separately for photovoltaic solar electricity and wind electricity.	6 months	NEA	MoE, DOED		
51	To conclude solar electricity and wind electricity purchase agreement based on the principle of Take or Pay.	To conclude solar electricity and wind electricity purchase agreement as to be based on the principle of “Take or Pay” for 25 years.	6 months	NEA	MoE, DOED		
52	To encourage industries, educational and other institutions and interested consumers to install off-grid solar energy.	<ul style="list-style-type: none"> <li>Since the load of national grid System can be reduced significantly especially in the urban areas through the installation and use of the off-grid solar, industries, educational and other institutions and interested consumers will be encouraged for this by framing specific rules/ procedures.</li> </ul>	3 months	Government of Nepal	Ministry of Energy		
		<ul style="list-style-type: none"> <li>To gradually provide for net metering for the places where there is access to the national grid as far as possible in relation to the utilization of surplus electricity generated from the photovoltaic solar system with installed capacity of 500 megawatts or above.</li> </ul>	3 months	NEA	MoE, MoF, ETRC, DOED		

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S.N.	Programs	Activities	Duration	Main Responsible Agency	Supporting Agency/ Agencies	Expected Liabilities Likely to Fall on Government	Remarks
		<ul style="list-style-type: none"> <li>A subsidy of NRs20,000 and simple loan facility as provisioned will be provided to household and commercial consumers who install solar system with capacity of 200 watt or above.</li> </ul>	Continuous	AEPC	MoPE, MoE		
53	To take necessary steps towards appropriate exploitation of other sources of alternative energy as well.	<ul style="list-style-type: none"> <li>To take necessary steps towards appropriate exploitation of other sources of alternative energy as well to make the concept of sustainable and dependable energy development more effective.</li> </ul>	3 months	Ministry of Energy	MoF, DOED, NEA		As projects have yet to be identified, liabilities to be borne by the Government of Nepal could not be established.
		<ul style="list-style-type: none"> <li>At a time when attention of private entrepreneurs has already been drawn to electricity generation from organic waste management, to provide for provision in such a way as to be able to provide additional up to 20% at the prevailing power purchase rate to encourage such acts.</li> </ul>	3 months	Ministry of Energy	MoF, NEA		
		<ul style="list-style-type: none"> <li>To identify the potentiality of electricity generation even from geothermal technology and move it into the implementation phase if found feasible.</li> </ul>	3 months	Ministry of Energy	DOED, NEA		
54	To conduct Electricity Preservation Program to control technical/nontechnical leakage.	To conduct Electricity Preservation Program to reduce the supply cost, minimize unnecessary consumption, and control technical/nontechnical leakage of electricity.	Immediately	NEA	MoE, MoHA		

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S.N.	Programs	Activities	Duration	Main Responsible Agency	Supporting Agency/ Agencies	Expected Liabilities Likely to Fall on Government	Remarks
		<ul style="list-style-type: none"> <li>To conduct programs that encourage the consumers to use the lamps and equipment which consume less energy and minimize the consumption of electricity in peak hours.</li> </ul>	3 months	NEA	Ministry of Energy		
55	To carry out technical audit of large electricity consumers.	Technical audit of large electricity consumers to be initiated for effective management of electricity.	6 months	Ministry of Energy	Secretariat of WEC, DOED, NEA		
56	To grant permission to generate electricity from diesel plant for industrial activities.	If the related industrialist wishes to install diesel power plant to carry on the industrial activity till the end of load-shedding, to grant permission to install such plant but the government itself will not make investment in the diesel plant nor will it purchase the electricity generated from such plant.	As many be required	Ministry of Energy	DOED, NEA		
57	Commercial farming to be initiated for biodiesel and biofuel.	To encourage commercial farming of biodiesel and biofuel (such as jatropha, maize) and the government to buy such products for the purpose of generating biofuel.	As may be required	Ministry of Population and Env.	DOED, AEPC		
<b>Administrative Decisions and Procedural Reforms</b>							
58.	To make arrangement of providing the amount of Industry Revitalization Fund to hydroelectricity sector as well.	To make arrangement of providing the amount of Industry Revitalization Fund established by the Government of Nepal to hydroelectricity sector as well.	Immediately	Ministry of Industry	MoF, MoE		

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S.N.	Programs	Activities	Duration	Main Responsible Agency	Supporting Agency/ Agencies	Expected Liabilities Likely to Fall on Government	Remarks
59.	To simplify the exchange facility for payment to be made to consultants and contractors in foreign currency.	To make lump sum recommendation for the amount as referred to in the agreement instead of the requirement to secure recommendation of exchange facility for each invoice time and again for the payment to be made to the consultants and contractors in foreign currencies under the provisions provided in the contract provision and to make a provision in such a way that does not require recommendation for each payment of the amount thereunder.	3 months	NRB	MoE, DOED		
60.	To simplify the provision of granting working visa and labor permit.	To simplify the provisions relating to granting working visa and labor permit to the technicians and laborers of foreign consultants and contractors.	Continuous	MoHA, MoLE	MoE, DOED, NEA		
61.	To develop hydroelectricity projects that are in government's basket.	To develop hydroelectricity projects in government's basket through the state-owned organizations or public corporations and through private companies based on competition on necessity and priority basis.	Continuous	Ministry of Energy	DOED		
62.	To provide for security of projects.	If any project demands security in a manner to bear the cost to be incurred as prescribed while deploying the security, the Government of Nepal to deploy Nepali Army or Armed Police Force for the security of such project.	Continuous	MoHA, Ministry of Defense	Ministry of Energy		

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S.N.	Programs	Activities	Duration	Main Responsible Agency	Supporting Agency/ Agencies	Expected Liabilities Likely to Fall on Government	Remarks
63.	To conclude Power Purchase Agreement (PPA) in convertible currency.	<ul style="list-style-type: none"> <li>To conclude Power Purchase Agreement in foreign currency up to the limit of liability of foreign loan in ratio of the foreign loan investment for a period not extending 10 year until the repatriation of the investor's foreign loan investment.</li> </ul>	Immediately	Government of Nepal Council of Ministers	MoF		
		<ul style="list-style-type: none"> <li>To develop a standard with provisions including the Basis and Mode of Payment, Hedging Fund to implement the aforesaid provision.</li> </ul>	3 months	Ministry of Energy	MoF, NRB, NEA		
64.	To provide inflation benefits to hydroelectricity projects with capacity of up to 25 megawatts as well.	Where the annual growth rate number to be provided at the posted rate for the projects funded in Nepali currency is 5 in the existing rate power purchase rate while purchasing power generated from private sector projects with installed capacity of up to 25 megawatts and 8 growth rate number in the same posted rate for the projects with installed capacity of above 25 megawatts to 100 megawatts, to provide inflation benefits even to the hydroelectricity projects with installed capacity of up to 25 megawatts to be investment in Nepal currency which commence commercial operation within the RCOD equal to the projects with installed capacity of above 25 megawatts to 100 megawatts as incentives till the Electricity Development Decade (Fiscal Year 2025/26) keeping in mind the dearth of electricity.	Continuous after COD	NEA	MoF, MoE	NRs700 million per year to be borne by NEA itself.	

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S.N.	Programs	Activities	Duration	Main Responsible Agency	Supporting Agency/ Agencies	Expected Liabilities Likely to Fall on Government	Remarks
65.	To provide for necessary provisions in Power Purchase Agreement in such a way as not to claim the compensation to be paid by promoters due to decline in discharge of water of hydroelectricity projects.	<ul style="list-style-type: none"> <li>To conclude Power Purchase Agreement in such a way that Nepal Electricity Authority will not recover any compensation from the related promoters if any hydroelectricity project with installed capacity of up to 10 megawatts fails to supply the amount of power referred to in the Power Purchase Agreement due to decline in discharge of water from rivers and rivulets in any month of the year and to apply this provision even in the case of projects which have already entered into the PPA.</li> </ul>	Continuous	NEA			
		<ul style="list-style-type: none"> <li>To develop an appropriate procedure of verification for this.</li> </ul>	2 months	NEA			
66.	To simplify the provisions relating to EIA/ IEE necessary while making application to Nepal Electricity Authority for power sale/ purchase agreement.	To make a provision in such a way as to not require the ToR/Scoping and ToR of Environmental Impact Assessment/Initial Environmental Examination to be approved and the submission of recommendation of VDC hitherto.	Continuous	NEA	Ministry of Energy		
67.	To complete under construction transmission lines with high priority to supply electricity to Kathmandu.	<ul style="list-style-type: none"> <li>To complete Trishuli (Pahire Besi) – Matatirtha 220 kV Transmission Line with high priority in a speedy manner.</li> </ul>	1 year	NEA	Ministry of Energy		
		<ul style="list-style-type: none"> <li>To complete New Marsyangdi-Matatirtha 220 kV Transmission Line with high priority in a speedy manner.</li> </ul>	2 years	NEA	Ministry of Energy		

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S.N.	Programs	Activities	Duration	Main Responsible Agency	Supporting Agency/ Agencies	Expected Liabilities Likely to Fall on Government	Remarks
68.	To import additional 100 megawatt electricity from import/export links of 132 kV.	• To complete the construction of New Kataiya-Kushaha 132 kV Transmission Line and substation.	1 year	NEA	Ministry of Energy		
		• To complete the construction of New Raxaul-Parwanipur of 132 kV Transmission Line and substation.	1 year	NEA	Ministry of Energy		
69.	To complete the construction of transmission with high priority for the import of electricity through Dhalkebar-Muzaffar Transnational Transmission Line to reduce load-shedding.	<b>First Phase</b> – To import 80 megawatt electricity at 132 kV voltage level.	15 days	NEA	Ministry of Energy		

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S.N.	Programs	Activities	Duration	Main Responsible Agency	Supporting Agency/ Agencies	Expected Liabilities Likely to Fall on Government	Remarks
		<p><b>Second Phase –</b></p> <p>(i) To import minimum 200 megawatt electricity in 220 kV voltage level. For this:</p> <ul style="list-style-type: none"> <li>To complete the substation extension work of 220/132 kV 2x160 MVA capacity.</li> <li>To connect New Hetauda and Old Hetauda substations by constructing a link of 132 kV.</li> </ul> <p>(ii) To import additional electricity to Kathmandu in 220 kV voltage level. For this:</p> <ul style="list-style-type: none"> <li>To complete the construction of Khimti-Dhalkebar 220 kV Transmission Line (obstructed 5 towers) promptly.</li> <li>To complete the construction of Bhaktapur-Harisiddhi-Matatirtha 132 kV Transmission Line and substation promptly.</li> <li>To complete the construction of Bharatpur-Hetauda 220 kV Transmission Line.</li> <li>To complete the construction of Hetauda-Dhalkebar-Inaruwa 400 kV Transmission Line and charge in 220 kV.</li> <li>To upgrade (HTLS) the conductor of Hetauda-Kulekhani-Matatirtha-Syuchatar 132 kV Double Circuit Transmission Line.</li> <li>To upgrade (HTLS) the conductor of Khimti-Lamosanghu transmission Line.</li> <li>To strengthen the grid of Kathmandu Valley.</li> </ul>	<p>9 months</p> <p>1 year</p> <p>18 months</p>	<p>NEA</p> <p>NEA</p> <p>NEA</p>	<p>NPC, MoF, MoE, DOED</p>		

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S.N.	Programs	Activities	Duration	Main Responsible Agency	Supporting Agency/ Agencies	Expected Liabilities Likely to Fall on Government	Remarks
		<p><b>(i) Third Phase</b> – To import 600 megawatt or above electricity in 400 kV voltage level. For this:</p> <ul style="list-style-type: none"> <li>• To expand 400/200 kV Dhalkebar Transmission Line.</li> <li>• To complete the construction of New Khimti-Kathmandu 400/220 kV Transmission Line promptly.</li> <li>• To construct Hetauda-Naubise 400 kV Electricity Transmission Line (including substation).</li> <li>• To improve the transmission and distribution system in various places.</li> </ul>	<p>2 years</p> <p>3.5 years</p> <p>4 years</p> <p>3 years</p>	NEA	NPC, MoF, MoE, DOED		
70.	To make arrangement for completion of transnational transmission lines by causing to carry out their study/survey.	In addition to Dhalkebar-Muzaffar 400 kV Transnational Transmission Line that is in the process of completion of construction works, an arrangement will be immediately made to complete the construction works of additional 400 kV transnational transmission lines as necessary by conducting study/survey consistent with the transmission line master plan for the purpose of import/export of electricity energy depending on the need of the country. For this, to initiate the construction of high-voltage transnational transmission lines like New Butwal/Bardghat-Gorakhpur, Duhabi/ Inaruwa-Purniya, Second Dhalkebar-Muzaffar, Kohalpur-Lucknow, Lamki-Bareilly, Atariya-Bareilly as well as Chilime Hub-Kerung.	6-10 years	NEA	NPC, MoF, MoE, DOED		

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S.N.	Programs	Activities	Duration	Main Responsible Agency	Supporting Agency/ Agencies	Expected Liabilities Likely to Fall on Government	Remarks
71.	To extend and strengthen national electricity system.	To carry out the construction and extension of high-voltage level transmission line with high priority according to master plan.	Continuous, starting within 2 years		NPC, MoF, MoE, DOED		
72.	To initiate the construction of substations of 400 kV voltage level with high priority.	To initiate the construction of substations of 400 kV level in places including Hetauda and Inaruwa with high priority and to simplify the procurement process as well by managing necessary resources for this.	Immediately		MoF, MoE, DOED		
73.	To make necessary arrangements if it is required to have access to forest areas (national parks, wildlife reserves, protected areas and buffer zones) to conduct IEE/ EIA.	To make arrangements in such a way as to be able to carry out study by providing information to the related District Forest Office in writing with necessary details if it is necessary to get access to forest area to conduct study as part of IEE/EIA. In case of any need to have access to national park, wildlife reserve and buffer zone, to make arrangement to obtain approval for study from local level office of such organization within 15 days.	Immediately	MoFSC	Department of Forests, DoNPWC, DOED		

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S.N.	Programs	Activities	Duration	Main Responsible Agency	Supporting Agency/ Agencies	Expected Liabilities Likely to Fall on Government	Remarks
74.	To simplify study and approval process of IEE/EIA of hydroelectricity and transmission lines.	To make an arrangement to cause to carry out the preparation and approval process of Initial Environmental Examination report of hydroelectricity and transmission line projects with capacity of up to 10 megawatts through Standard Checklist to simplify it. Such study works to be caused to be done by accredited consultancy organization. For this, Ministry of Population and Environment to an arrangement to develop a list of necessary consultants and standard checklist. To provide for post audit in the project by preparing a procedure by Ministry of Population and Environment. For this, to provide for necessary legal provisions.	6 months	Government of Nepal	MoPE, MoE, DOED		
75.	To simplify the process of obtaining approval for felling of trees and taking land on lease necessary for the development of hydroelectricity and transmission projects.	<ul style="list-style-type: none"> <li>To make an arrangement to conclude the decision on felling of trees and taking land on lease from the ministerial-level decision of Ministry Forest and Soil Conservation itself after the approval of EIA/IEE.</li> </ul>	1 month	Government of Nepal	MoFSC, MoE, DoF, DOED		

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S.N.	Programs	Activities	Duration	Main Responsible Agency	Supporting Agency/ Agencies	Expected Liabilities Likely to Fall on Government	Remarks
		<ul style="list-style-type: none"> <li>To make an arrangement in such a way as to conclude the process to be initiated to fell trees and take a lease on the land necessary for the development of project within 1 month from the date of submission of the application, accompanied by the approved EIA/IEE and necessary particulars. For this work, to initiate the approval process from the related District Forest Office itself by registering an application with it.</li> </ul>	Immediately	MoFSC	MoE, DoF, DOED		
76.	To simplify the process relating to IEE/EIA.	<ul style="list-style-type: none"> <li>Department of Electricity Development to communicate to the promoter within 7 days of the receipt of the reports if any document is found incomplete after the receipt of reports pertaining to Initial Environmental Examination. To make legal provisions of proceeding with approval from Department of Electricity Development within 21 working days from the date of receipt of necessary documents in a complete manner according to the recommendation of a committee consisting of representatives from Department of Electricity Development, Ministry of Energy and experts in related fields.</li> </ul>	Immediately	Ministry of Energy	DOED		

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S.N.	Programs	Activities	Duration	Main Responsible Agency	Supporting Agency/ Agencies	Expected Liabilities Likely to Fall on Government	Remarks
		<ul style="list-style-type: none"> <li>To make an arrangement to submit the reports (Scoping, ToR, and EIA), accompanied by the recommendation, pertaining to Environmental Impact Assessment to Ministry of Energy within 21 working days from the date of receipt of the necessary documents in a complete manner for approval and Ministry of Energy will send the reports, accompanied by the recommendation, to Ministry of Population and Environment within 15 working days of the receipt of the reports for approval.</li> </ul>	Immediately	Ministry of Energy	DOED		
		To make arrangements in such a way as not requiring recommendation from community forest for the approval of IEE/EIA.	Immediately	MoPE	MoFSC, MoE, DoF, DOED		
77.	To provide for provisions relating to supplementary EIA or supplementary IEE.	<ul style="list-style-type: none"> <li>To make an arrangement as not requiring carrying out supplementary IEE or supplementary EIA where ordinary changes in the structure of the project do not cause significant effects on the environment or result in alteration (plus/minus) up to 10% in the area of forestland.</li> </ul>	3 months	MoPE	MoFSC, MoE, DoF, DOED		

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S.N.	Programs	Activities	Duration	Main Responsible Agency	Supporting Agency/ Agencies	Expected Liabilities Likely to Fall on Government	Remarks
		<ul style="list-style-type: none"> <li>If any change in the structure of the project causes significant effects on the environment or results in alteration (plus/ minus) of more than 10% in the area of forestland or the number of trees to be felled increases by more than 10%, due to such change, to make necessary revisions in Supplementary Environmental Impact Assessment Directives, 2014 to simplify in such a way as to require publication of a public notice in a daily newspaper of national circulation instead of conducting a public hearing.</li> </ul>	3 months	MoPE	MoFSC, MoE, DoF, DOED		
78.	To make a provision for 10% share of equity of the project to the project affected communities and persons in the district.	To make a provision for 10% share of equity of the project to the project affected communities and persons in the district. Furthermore, if the persons who are going to be rehabilitated or resettled or whose land has been acquired by the project wish to invest share in the project, to make an arrangement to give priority to convert them into share.	Continuous	Related promoters	MoE, DOED, Office of the Company Registrar		
79.	To forecast load demand on the basis of actual electricity demand.	As the present load forecast is based on the suppressed demand, to make load forecast on the basis of actual load demand, bearing in mind the potential industrialization, use of electric vehicles, use of different electronic equipment and displacement of cooking gas as well as the time when the country becomes self-reliant in electricity in the future.	6 months	NPC, Secretariat of WEC	MoE/DOED/ NEA		

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S.N.	Programs	Activities	Duration	Main Responsible Agency	Supporting Agency/ Agencies	Expected Liabilities Likely to Fall on Government	Remarks
80.	To extend and strengthen Nepal Electricity Authority in an organized way.	To gradually increase the number and capacity of the distribution substations that make existing supply by selecting their appropriate locations to extend and strengthen the electricity distribution system in an organized way by giving it high priority in the Kathmandu Valley including other big cities.	To give continuity after initiating immediately	NEA	MoF, MoE, Secretariat of NPC		
81.	To develop Underground Distribution System and Modern Distribution Kiosk Technologies.	To construct and extend Underground Distribution Line and Indoor/GIS Substation to other cities by introducing it on trunk roads of Kathmandu and Pokhara by making policy and construction standards for the development of Underground Distribution System and Modern Distribution Kiosk Technologies.	To give continuity after initiating immediately	NEA	MoF, MoE, Secretariat of NPC		
82.	To make arrangement of electricity supply in industrial areas (estates) of the Government of Nepal.	As per the policy of the Government of Nepal to gradually extend the concept of the establishment of industrial area (estate), to connect electricity line up to that area.	Continuous	NEA	MoF, MoE, Secretariat of NPC		
83.	To make arrangements for supplying electricity from 132 kV line to urban and industrial areas that have high electricity demand.	To make arrangements for supplying electricity from 132 kV line to urban and industrial areas like Kathmandu, Pokhara, Biratnagar, Birgunj, Nepalgunj, Bhairahawa, Janakpur, Hetauda etc. that have high electricity demand.	As may be required	NEA	MoF, MoE, Secretariat of NPC		

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S.N.	Programs	Activities	Duration	Main Responsible Agency	Supporting Agency/ Agencies	Expected Liabilities Likely to Fall on Government	Remarks
84.	To carry out construction works of road and transmission line in an integrated way in urban areas.	To formulate and implement the integrated plan in such a way as to construct transmission line of appropriate voltage level while carrying out construction works of roads in other urban areas including Kathmandu.	As necessary	NPC, Ministry of Energy, MoPIT	Dept. of Roads, NEA		
85.	To remove obstruction to the construction and extension of 11 kV and 33 kV lines.	While carrying out the construction of structures including electricity pole in the course of construction/ extension of 11 kV and 33 kV lines and installation of distribution transformer in public land, to make arrangements to complete such works without obstruction of any kind.	Continuous	District Level Energy Crisis Prevention Coordination Committee	MoHA, MoE, NEA		
<b>Structural Provisions and Reforms</b>							
86.	To form Central Energy Crisis Prevention Coordination Committee and District Level Energy Crisis Prevention Coordination Committee for effective implementation of Energy Crisis Prevention Decade.	To form Central Energy Crisis Prevention Coordination Committee chaired by Minister for Energy consisting of Forest Secretary, Home Secretary, Land Reform and Management Secretary, Population and Environment Secretary, Finance Secretary, Energy Secretary and representatives from security agencies, and District Level Energy Crisis Prevention Coordination Committee chaired by Chief District Officer consisting of representatives from District Forest Office, District Land Revenue Office, District Police Office, District Survey Office, District Development Committee and District Technical Office for the effective implementation of Energy Crisis Prevention Decade.	Immediately	Government of Nepal, Council of Ministers	Related ministries and subordinate agencies		

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S.N.	Programs	Activities	Duration	Main Responsible Agency	Supporting Agency/ Agencies	Expected Liabilities Likely to Fall on Government	Remarks
87.	To make necessary arrangements for inter-agency coordination at Joint Secretary level for the development of electricity projects.	To make arrangements to facilitate and settle the problems arising in project development by maintaining coordination within the ministries and among other agencies by designating a Joint Secretary at the ministry level of each agency related to the electricity development project as Focal Person to keep up inter-agency coordination for the development of electricity projects.	Immediately	Government of Nepal Council of Ministers	Related ministries and subordinate agencies		
88.	To form a Facilitation Committee chaired by Chief Secretary consisting of Secretaries of the related ministries.	To form a committee chaired by chief secretary consisting of secretaries of the related ministries to settle the problems that could not be resolved at the Joint Secretary level.	Immediately	Government of Nepal Council of Ministers	Related ministries and subordinate agencies		
89.	To provide for necessary mechanism for the development/ construction of reservoir-based projects.	Government company will be gradually established on the basis of work progress, effectiveness and appropriateness of the development/ construction of proposed and under construction reservoir-based projects. Furthermore, West Seti Reservoir-based Project will be moved forward in a speedy manner with participation of private sector as well.	3 months/ As soon as possible	Government of Nepal Council of Ministers	MoF, MoE		

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S.N.	Programs	Activities	Duration	Main Responsible Agency	Supporting Agency/ Agencies	Expected Liabilities Likely to Fall on Government	Remarks
90.	To restructure and further activate the Water and Energy Commission.	<ul style="list-style-type: none"> <li>To restructure and further activate the Water and Energy Commission to carry out micro analysis of works including load demand forecasting, evaluation of energy consumption and formulation of resource substitution policy, update of generation/transmission/distribution master plan and techno-economic clearance of electricity projects.</li> </ul>	6 months	Government of Nepal Council of Ministers	MoE, DOED, NEA		
		<ul style="list-style-type: none"> <li>To develop an updated master plan of river basins by keeping in mind the multidimensional utility as well of the natural resources of Nepal.</li> </ul>	2 years	Water and Energy Commission	MoE, MoFSC, Ministry of Irrigation, MoPE, DOED, NEA		
91.	To carry out a rural electrification campaign.	To make institutional provisions relating to rural electrification and energy efficiency to enhance rural economy through rural electrification and to reduce the existing electricity crisis to some extent through demand management by carrying out the rural electrification campaign.	1 year	Government of Nepal Council of Ministers	MoF, MoE, MoGA		
92.	To establish National Electricity Generation Company.	To establish and operate a National Electricity Generation Company operated to immediately carry out the study and construction of medium-scale and large hydroelectricity projects in such a way as to supply the mid-term and long-term electricity demand of the country by the Government of Nepal.	3 months	Government of Nepal Council of Ministers	MoF, MoE, Ministry of Industry, NEA		

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S.N.	Programs	Activities	Duration	Main Responsible Agency	Supporting Agency/ Agencies	Expected Liabilities Likely to Fall on Government	Remarks
93.	To create an empowered and resourceful consultancy company in the government level itself.	To establish a resourceful Engineering Consultancy Service Company in such a way as to have equity of other organizations including Nepal Electricity Authority in the context of extreme necessity to create a company to carry out study/research of hydroelectricity and other infrastructure as well as to become self-reliant in consultancy service by gradually making the available human resources efficient by creating an empowered and resourceful consultancy company in the government level itself.	3 months	Government of Nepal Council of Ministers	MoF, MoE, Ministry of Industry, NEA		
94.	To carry out financial and institutional restructuring of National Transmission Grid Company established by the Government of Nepal.	To bring into operation the National Transmission Grid Company Limited established by the Government of Nepal by carrying out its financial and institutional restructuring. To adjust related human resources, structures and property of Nepal Electricity Authority in this company. To ascertain the equity of Nepal Electricity Authority on the basis of investment to be made in the future as well as by determining the existing property.	3 months	Government of Nepal Council of Ministers	MoF, MoE, Ministry of Industry, NEA		
95.	To establish National Power Trade Company.	The Government of Nepal will establish a National Power Trade Company to carry out the works relating to electricity trade in the country and abroad.	3 months	Government of Nepal Council of Ministers	MoF, MoE, Ministry of Industry, NEA		

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Table continued

S.N.	Programs	Activities	Duration	Main Responsible Agency	Supporting Agency/ Agencies	Expected Liabilities Likely to Fall on Government	Remarks
96.	To form power generation companies as holding companies of Nepal Electricity Authority.	The following companies will be formed as holding companies of Nepal Electricity Authority in such a way as to gradually adjust the existing human resources, structures and property of Nepal Electricity Authority: Power generation company/companies having under construction and operating generation structures of Nepal Electricity Authority Power generation companies in such a way as to have Nepal Electricity Authority's under construction or operating distribution structures with capacity of less than 33 kV and as to have boundary of working area according to demarcation of provinces	1 year	Government of Nepal Council of Ministers	MoF, MoE, Ministry of Industry, NEA		
97.	To provide for appellate tribunal.	To establish Nepal Electricity Regulatory Commission with provision for appellate tribunal therein.	1 year	Government of Nepal Council of Ministers	MoLJPA, MoE		
98.	To plan and prepare detailed works including that of monitoring.	To plan and prepare works including that of monitoring by the organizations designated as being the main responsible agencies to carry out implementation and monitoring of the aforesaid programs.	1 month	Agencies designated as main responsible	Agencies designated as supporting ones		
99.	To give consultation services for the formulation of legal provisions and procedures.	To appoint consultants as necessary to avoid impact on performance in formulating legal provisions and procedures due to the lack of human resources in the responsible agencies.	As necessary	Related responsible agencies	Ministry of Finance	As necessary	

AEPC = Alternative Energy Promotion Center, COD = commercial operation date, DAO = district administration office, DOED = Department of Electricity Development, DoF = Department of Forest, ETRC = Electricity Tariff Recommendation Committee, EIA = environmental impact assessment, IEE = initial environmental examination, KV = kilovolt, MoE = Ministry of Energy, MoF = Ministry of Finance, MoFALD = Ministry of Federal Affairs and Local Development, MoFSC = Ministry of Forests and Soil Conservation, MoGA = Ministry of General Administration, MoHA = Ministry of Home Affairs, MoLE = Ministry of Labour and Employment, MoLJPA = Ministry of Law, Justice and Parliamentary Affairs, MoLRM = Ministry of Land Reform and Management, MoPE = Ministry of Population and Environment, MVA = megavolt ampere, NEA = Nepal Electricity Authority, NPC = National Planning Commission, NRB = Nepal Rastra Bank, PES = payment for ecosystem service, RCOD = required commercial operation date, TOD = time-of-day, VAT = value added tax, VDC = village development committee, WEC = Water and Energy Commission

Source: Ministry of Energy. 2016. *Action Plan on National Energy Crisis Prevention and Electricity Development Decade, 2016*. Kathmandu (translated by Asian Development Bank).

## APPENDIX 5

# ADB Lending and Technical Assistance to the Nepal Energy Sector, 1999–2016

Table A5.1: ADB Loan/Grant Projects

Loan No.	Name of Project	Date of Approval	Amount (\$ million)
1732	Rural Electrification, Distribution, and Transmission Project	21 Dec 1999	50.0
2587	Energy Access and Efficiency Improvement Project	27 Nov 2009	65.0
2808	Electricity Transmission Expansion and Supply Improvement Project	15 Nov 2011	56.0
2990	Tanahu Hydropower Project (SF)	21 Feb 2013	120.0
2991	Tanahu Hydropower Project (SF)	21 Feb 2013	30.0
3139	South Asia Subregional Economic Cooperation Power System Expansion Project	04 Jul 2014	180.0
Grant No.	Name of Project	Date of Approval	Amount (\$ million)
0520	Private Sector Solar Power Investment Project	11 Nov 2016	20.0
<b>Total</b>			<b>521.0</b>

SF = Special Funds.

Source: Asian Development Bank.

Table A5.2: ADB Technical Assistance Projects

TA No.	Name of Project	Date of Approval	Amount (\$'000)
3193	Transmission Planning in Kathmandu Valley	10 May 1999	100
3552	Power Sector Reforms in Nepal	27 Nov 2000	800
4492	Restructuring of Nepal Electricity Authority	18 Dec 2004	400
4493	Preparing the Rural Electrification and Renewable Energy Project	17 Dec 2004	600
4985	Preparing the West Seti Hydroelectric Project	5 Nov 2007	300
4997	Promoting Private Sector Participation in the Power Sector	3 Dec 2007	600
7076	Transmission and Distribution Project	21 Apr 2008	150
7176	Preparing Electricity Connectivity and Energy Efficiency Project I	19 Nov 2008	150
7504	Increasing Access to Energy in Rural Nepal	5 May 2010	933
7590	Preparing Hydropower Development for Energy Crisis	2 Sep 2010	2,000
7628	Energy Sector Capacity Building	27 Oct 2010	600
7666	Energy Access and Efficiency Improvement Project II	26 Nov 2010	600
7807	Scaling Up Micro and Mini Renewable Energy Initiatives	17 May 2011	215
7816	Scaling Up Small Hydro Power Projects	13 May 2011	160
7923	Gender-Focused Capacity Development in Clean Energy	15 Nov 2011	250
8081	Scaling Up Renewable Energy Project	28 May 2012	580
8272	Subregional Electricity Transmission Capacity Expansion Project	13 Dec 2012	225
8329	Support for Sustainable Energy Management and Reforms	21 Feb 2013	1,500
8412	South Asia Subregional Economic Cooperation (SASEC) Power System Expansion Project	30 Jul 2013	1,500
8678	Supporting Rural Electrification Through Renewable Energy	4 Jul 2014	500
9144	Power Transmission and Distribution Efficiency Enhancement Project	22 Jul 2016	1,500
<b>Total</b>			<b>13,663</b>

TA = technical assistance.

Source: Asian Development Bank.

## **Nepal Energy Sector Assessment, Strategy, and Road Map**

Nepal is facing an unprecedented energy crisis caused by an acute shortage of power and fuel supply. To improve energy security and stimulate economic growth, the government is accelerating the sustainable development of Nepal's hydropower potential. This publication highlights Nepal's energy sector performance, major development constraints, and government development plans and strategy. It outlines the future support strategy of the Asian Development Bank (ADB) whose main focus is to make the country's energy sector a key driver of inclusive economic growth. Linked to ADB's country partnership strategy for Nepal 2013–2017, this publication provides guidance for future investment and technical assistance operations.

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