Nepal Power Investment Summit 2016

Transmission Line Projects

Presented By:

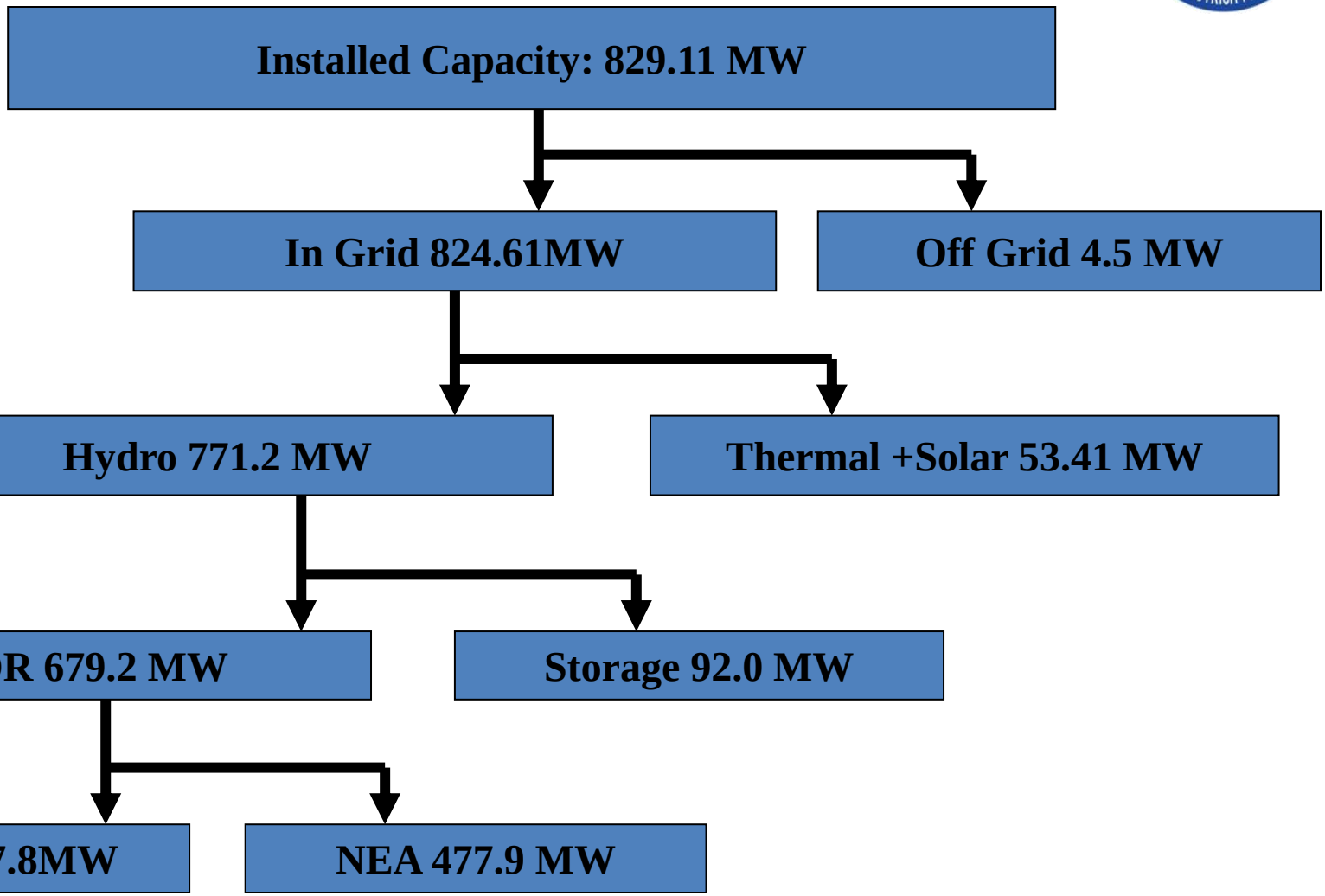
Mr. Kanhaiya Kumar Manandhar

Deputy Managing Director
Transmission Directorate
Nepal Electricity Authority

SYSTEM AT A GLANCE

- Annual Demand Growth Rate
  - peak demand :10%
  - energy growth : 9%
- Peak Load (FY 2014/15 till date): 1291.8 MW
- Shortages during Dry Season
  - Capacity shortage: 600 MW approx.
  - Energy shortage (daily): 6500 MWh
  - Implied Load shedding: 12 hrs per day
  - Shortage expected to continue for few more years
- NEA System Loss: 25%

SYSTEM AT A GLANCE



Transmission Line Projects

Total Transmission Line Projects	**66**
Projects Under Construction	**47**
•GoN Funded Project	19
•Projects for Cement Industries	4
•ADB Funded Projects	7
•World Bank Funded Project	5
•Government of India & GoN Funded Project	4
•German Development Bank, European Investment Bank	2
•Project Management Directorate	6
Projects in different Development Phase	**19**

High Voltge Transmission Lines, Substations

Transmission Lines	Existing (Circuit km)	Under Construction (Circuit km)	Planned (Circuit km)
66kV Voltage Level	511.16	-	
132kV Voltage Level	2337.7	1010.0	1320.0
220kV Voltage Level	-	659.0	949.8
400kV Voltage Level	-	648.0	6495.6
Total	2848.86	2317.0	8765.4

Substations	Existing (Numbers/Capacity)	Under Construction (Numbers/Capacity)	Planned (Numbers/Capacity)
66kV Voltage Level	13/509.15MVA	-	
132/66kV Voltage Level	28/1622.4MVA	10/506.5MVA	21/917MVA
220kV Voltage Level	-	-	18/3876MVA
400kV Voltage Level	-	-	5/2025MVA

Transmission System Master Plan (TSMP)

A decade of conflict has adversely affected the power infrastructure of the country, leading to the present power demand-supply gap.

•Electricity demand in Nepal grew at an average annual rate of 10% during last decade. Nepal Electricity Authority (NEA), the only public utility in Nepal responsible for generation, transmission, and distribution of electricity is finding difficulty to cope with the increasing demand due to poor investment in generation and transmission.

•To meet the growing electricity demand of the country, Government of Nepal (GoN) has focused on promoting private power through changes in existing electricity rules and regulation. To evacuate the power generated from the hydro power plants under development, an adequate transmission system has become essential.

•The main purpose and primary objective is to provide a Transmission System Master Plan (TSMP) covering 2015 to 2035 that optimizes projected load flows within Nepal and between Nepal and India in a manner that is safe, respects agreed reliability criteria, is technically efficient and least cost to Nepal.

Transmission System Master Plan (TSMP) Implementation

Implemented in two main phases:

Phase I Methodology, data and results of demand and supply projections covering the study period.

Phase II Aims to improve the Transmission Grid for the period 2015 to 2035 regarding the flows for Nepal consumption and India export.

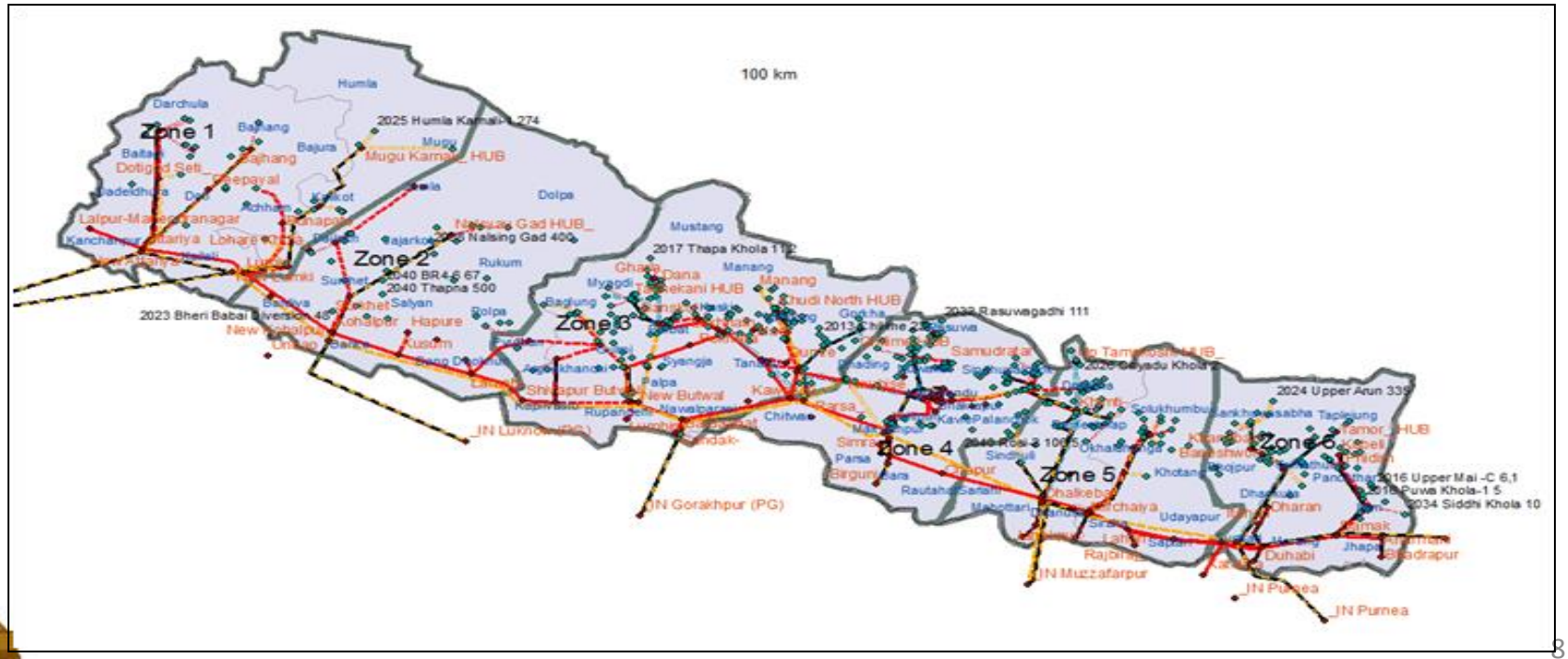
Transmission Master Plan

Transmission Network Development

Nepal is divided into 6 zones, in order to focus on regional problems and thus treat at the second stage global issues such as inter-areas or interconnections flows

For each zone, the design of the network was based on the following information:

- The location and the nominal power of future hydro power plant
- The existing network or committed network where any in the zone
- The criteria for selecting line types from the power transfer



Investment on Transmission

The core of the transmission network is to be commissioned during the next 10 years. The total investment cost planned for the whole 2015-2035 period amounts to 5.15 billion USD and is mainly concentrated in first ten years, i.e. between 2015 and 2025:

Label		**2015**	**2020**	**2025**	**2030**	**2035**	
All Zones	Commissioning from	2015	2020	2025	2030	2035	Total
	to year	2019	2024	2029	2034		
		MUSD	MUSD	MUSD	MUSD	MUSD	MUSD
Lines	Comm.	412.8	621.1	214.2	0.0	0.0	1248.1
Lines	Planned	138.1	332.6	181.7	0.0	0.0	652.3
Lines	All	550.9	953.7	395.9	0.0	0.0	1900.5
S/S	Existing	123.0	60.2	13.2	34.5	26.1	257.1
S/S	Comm.	410.0	231.3	82.7	81.5	0.0	805.4
S/S	Planned	47.4	358.0	215.2	67.1	5.3	693.1
S/S	All	580.5	649.5	311.1	183.0	31.4	1755.6
Total	Existing	123.0	60.2	13.2	34.5	26.1	257.1
Total	Comm.	822.8	852.4	296.9	81.5	0.0	2053.6
Total	Planned	185.5	690.6	396.9	67.1	5.3	1345.4
Total	All	1131.4	1603.2	707.0	183.0	31.4	3656.0
Connection	Lines	142.6	584.2	420.4	76.8	4.1	1228.1
Connection	Bays	38.5	83.6	118.4	25.4	6.5	272.4
Grand	**Total**	1312.5	2270.9	1245.9	285.2	42.0	5156.5

Future Transmission Line Projects
Year 2015 to 2035 (MUS$)

Zone	Major TL	TL Investment	SS Investment	Total Investment
Zone-1	➢ 400kV Western West Seti-Karnali Corridor *(West Seti, Chainpur Projects, Upper Karnali Projects)* ➢ 400kV Eastern Corridor *(Mugu Karnali-Phulkot Projects)* ➢ 132kV West Corridors *(Chameliya, Bajhang, Deepayel , Budhiganga Projects)*	233.7	144.6	378.3
Zone-2	➢ 400kV Nalsyaugad Corridor ➢ Central 132kV Corridor *(Dailekh, SurkhetProjects)*	366.8	124.5	491.3
Zone-3	➢ 400kV Kaligandaki-New Butwal Corridor ➢ 400kV Kusma-New Butwal Corridor *(Dana,Tadikuna, Beni, Upper Modi, Kusma Projects)* ➢ 400kV Khudi North HUB *(Manang,Khudi North, Kirtipur, Udipur, Khudi North Projects)* ➢ 220kV Upper Budhigandaki-N Marsyangdi Corridor *(Upper Daraudi,Bhdhigandaki Projects)* ➢ *220kV Tanahu Project* ➢ 132kV Western Basin (Lamahi,Jhimruk, Gulmi, Butwal Loop ➢ 132kV Lekhnath	466.2	453.2	919.4

Future Transmission Line Projects Year 2015 to 2035 (MUS$)

Zone	Major TL	TL Investment	SS Investment	Total Investment
Zone-4	➢ 220kV Trishuli 3B-Chilime HUB *(Chilime HUB,Tamakoshi-Sunkoshi, Samundratar HUB Projects)* ➢ 400kV Barhabise Northern Section *(Lamosangu, Bhotekoshi, Balefi, Barhabise HUBProjects)* ➢ 132kV West Corridors *(Chameliya, Bajhang, Deepayel , Budhiganga Projects)*	328.5	397.4	725.9
Zone-5	➢ 400kV Dhalkebar Corridor *(Dudhkoshi,Tamakoshi-SunkoshiProjects)* ➢ 400kV Likhu, New Khimti, Barhabise Corridor *(Likhu, New Khimti Projects)* ➢ 220kV Upper Tamakoshi ➢ *132kV Corridors* *(Singati, TinglaProjects)*	244.2	309.8	554.0
Zone-6	➢ 400kV Arun Corridor *(Arun-3, Tamor Storage Projects)* ➢ 220kV Koshi Corridor *(Arunn-Khandbari, Hangpang, BasantapurProjects)* ➢ 132kV Kabeli Corridor	261.1	326.1	587.2

Future Cross Boarder Transmission Line

- Attariya-Bareli 400kV Transmission Line
- Lamki-Bareli 400kV Transmission Line
- Kohalpur-Lucknow 400kV Transmission Line
- New Butwal-Gorakhpur 400kV Transmission Line
- Dhalkebar-Muzzaffarpur 400kV Transmission Line (Second)
- Inaruwa (Duhabi)-Purniya 400kV Transmission Line

Thank You