

Overview of Bhutan Power Sector

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Outline of Presentation

- * Power Sector reforms
- * Role of Hydropower in the Bhutan Economy
- * Current Scenario (existing hydropower plants)
- * Future Scenario (Projects under construction)
- * Generation and Power Demand scenario in 2016
- * Demand Forecast 2017-2040
- * Expectations from this workshop

Power Sector Reforms

- * Electricity Act passed by the 79th Session of the National Assembly of Bhutan in July 2001
- * Power Sector was restructured in 2002
 - i. DoE - responsible for developing the long term policies and plans for the energy and power sector
 - ii. BPC - transmission and distribution of electricity & supply functions and also acting as a National System Operator
 - iii. DGPC- responsible for managing all hydropower plants fully owned by RGoB and also tasked with the responsibility of developing projects on its own or through JV on behalf of RGoB.
 - iv. BEA- an autonomous regulator for the energy sector since January 2010
 - v. DoE unbundled in 2011
 - vi. DHPS -Nodal Agency for hydropower sector >25MW
 - vii. DRE & DHMS- Nodal agency for all matter related renewable energy development & Hydro-met services

Hydropower Potential



The steep and rugged Himalayan topography and swift rivers promise huge hydropower potential

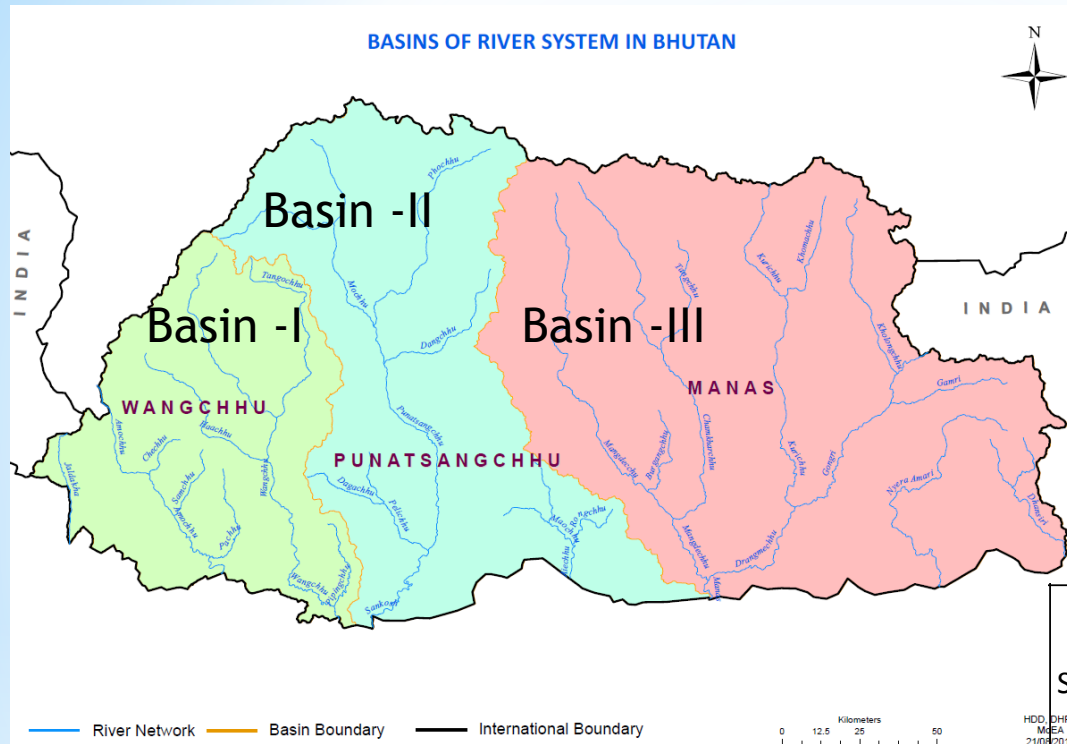
- ❑ 30,000 MW potential
- ❑ 23,325MW (64 sites of >25MW) techno-economic potential viable for development

Role of Hydropower in the Bhutan Economy

Hydropower is a Strategic National Resource and main driver of economic growth.

- i. By providing safe, reliable, affordable and abundant electricity to improve the lives of all Bhutanese and drive industrial growth
- ii. Surplus power shall be exported to enhance government revenue.

River Basins & Hydropower Potentials



Sl. No.	River-Basin	No. of Projects	Potential (MW)
1	Basin I (Amochhu & Wangchhu)	14.00	4,392.00
2	Basin II (Punatsangchhu)	14.00	7,209.00
3	Basin III (Mangdechhu, Chamkharchhu, Manas Drangmechhu)	32.00	11,143.00
4	Others (Jomori, NY-I & II & Aiechhu)	4.00	581.00
Total		64.00	23,325.00

Hydropower Plants Under Operation

Sl. No.	Power Plant	Installed Capacity (MW)	COD
1	Chukha HPP	336.00	1986-88
2	Kurichhu HPP	60.00	2001-02
3	Basochhu HPP (Upper Stage)	24.00	2001
4	Basochhu HPP (Lower Stage)	40.00	2005
5	Tala HPP	1,020.00	2006-07
6	Dagachhu HPP	126.00	2015
7	Micro/Mini (20 Nos.)	8.00	
	Total	1,614.00	~7%

Project Under Construction

Sl. No.	Power Plant	Installed Capacity (MW)	Generation (MU)
1	Punatsangchhu-I	1,200.00	15,700.00
2	Punatsangchhu-II	1,020.00	14,000.00
3	Mangdechhu	1,172.00	12,900.00
4	Kholongchhu	1,160.00	12,599.00
5	Nikachhu	118.00	1,492.00
	Total	5,658.00	56,691.00

Power Generation & Domestic Demand in 2016

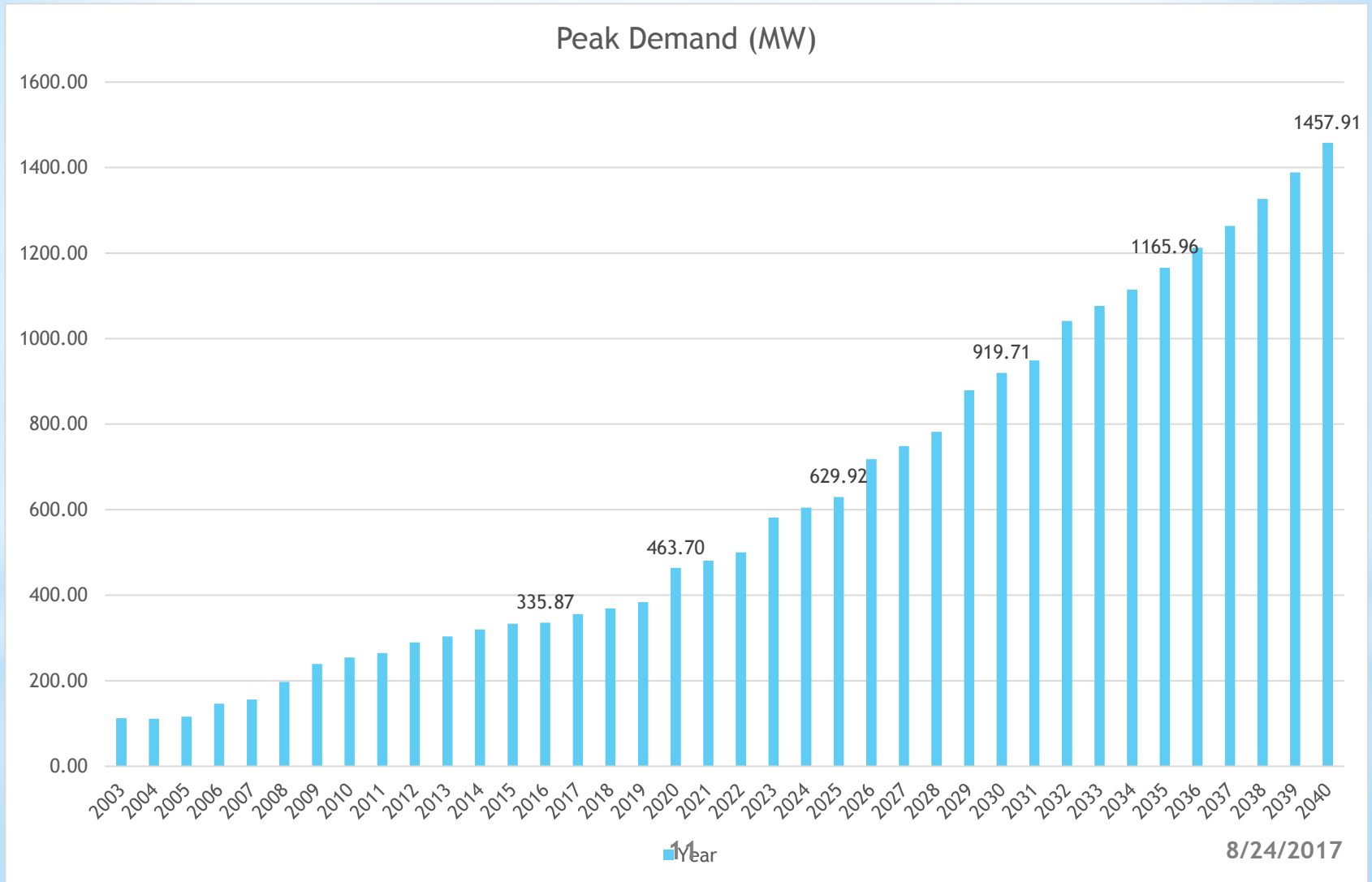
- * Annual Generation - 7,948MU
- * Domestic Load - 2,084.69MU
- * Total number of customers -177,151
- * Rural Electrification coverage ratio -99.95%
- * National Coincidental load - 335.87MW
- * ~70% of generation exported
- * Transmission route length - 1,102.074km
- * Total transformation capacity - 1,065.5MVA
- * Global System loss (Including Wheeling)- 1.14%
- * Transmission Losses including wheeling -0.56%

Source: BPC Power Data Book 2016

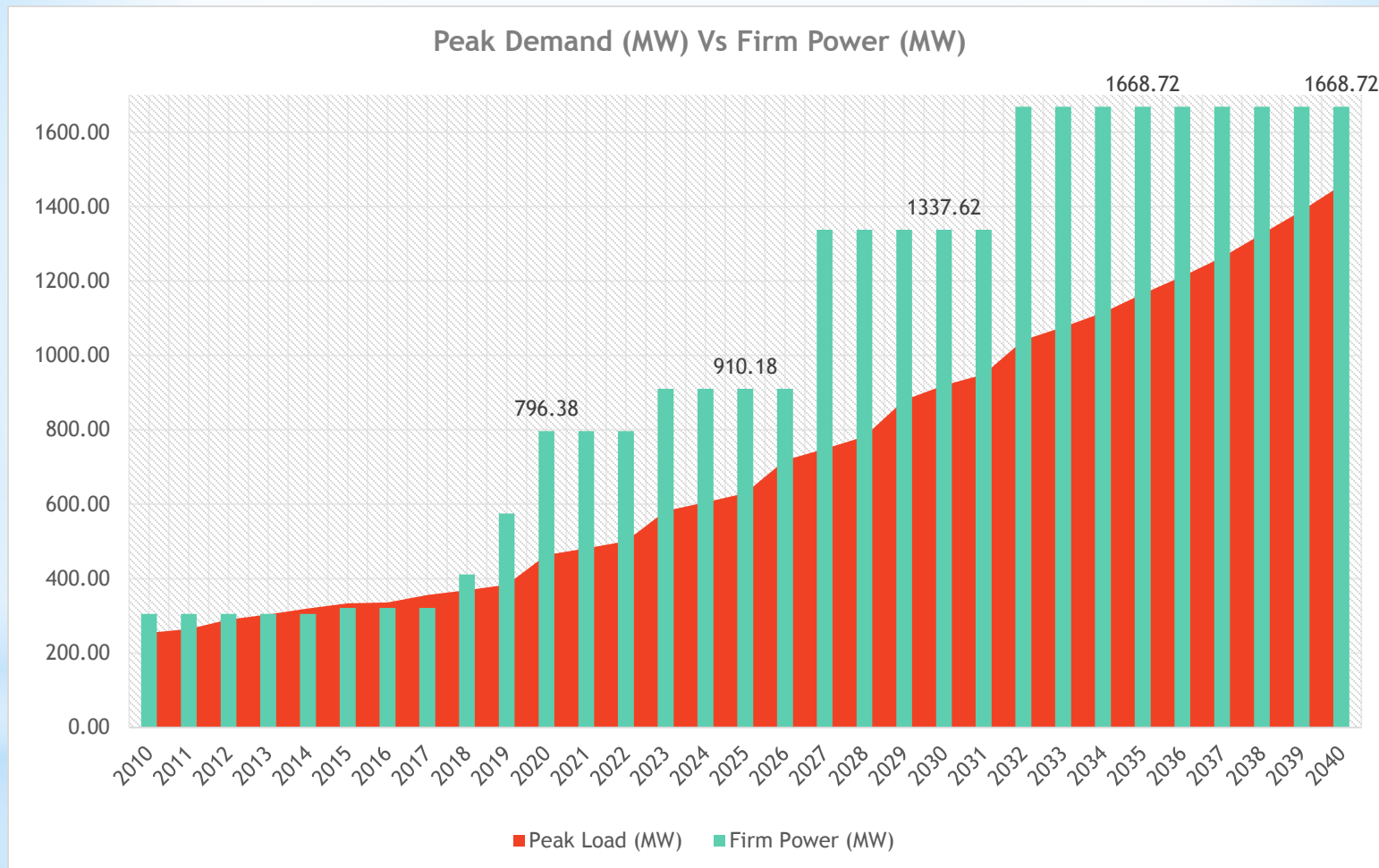
Demand Forecast

- * 9.64% average demand growth (past 14 years)
- * Maximum peak demand observed was 336.52MW in 2015
- * Demand forecast based on three categories (HV, MV, LV)
- * HV demand forecast based on load factor of past two years
- * MV & LV demand forecast based on trend analysis using 13 years historical data
- * By 2040, Bhutan's demand is expected to be ~1500MW

Demand Forecast 2017-40



Contd.



Expectations from the Workshop

- * Idea on Short-term, medium term and long term forecasting
- * Data analyses and validation
- * Different techniques of Load Forecasting methods (generation as well as demand forecast)
- * Demand forecast considering different consumer categories
- * Hands-on training

Thank you
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