



Bhutan Power Corporation Limited



RESPONSIBILITIES IN OPERATION OF BHUTAN INDIA INTERCONNECTION

(New Delhi, September 26/27, 2013)

Post Box 580, Thimphu : Bhutan
Tel : 00975-2-333582; Fax : 00975-2-322046
Website : www.bpc.bt



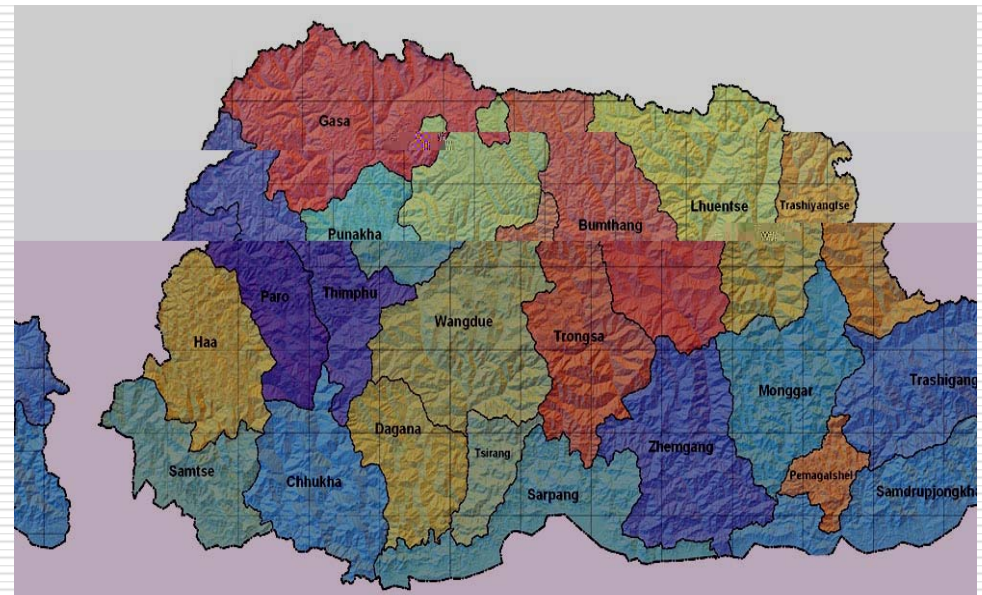
Outline

- ☐ Salient geographical features of Bhutan
- ☐ Background of power sector
- ☐ Overall power scenario
- ☐ Generation & Transmission Expansion planned
- ☐ Cross border interconnection links: Existing and planned
- ☐ Power Dispatch on existing border interconnections (for 2012)
- ☐ Method of Billing and Payment
- ☐ Metering Philosophy
- ☐ Load dispatch center



Salient geographical features of Bhutan

- ❑ Located in the Eastern Himalayas
- ❑ Area – 38,394 sq. km
- ❑ Stretch of 170 km north to south and 300 km east to west
- ❑ Forest cover – about 72.5%
- ❑ Altitude range from 200m(south)–7000M(North)
- ❑ Climate – generally 4 seasons (Spring, Summer, Autumn, and Winter)
- ❑ Population: 708265(2012)
- ❑ Religions: Buddhism, Hinduism

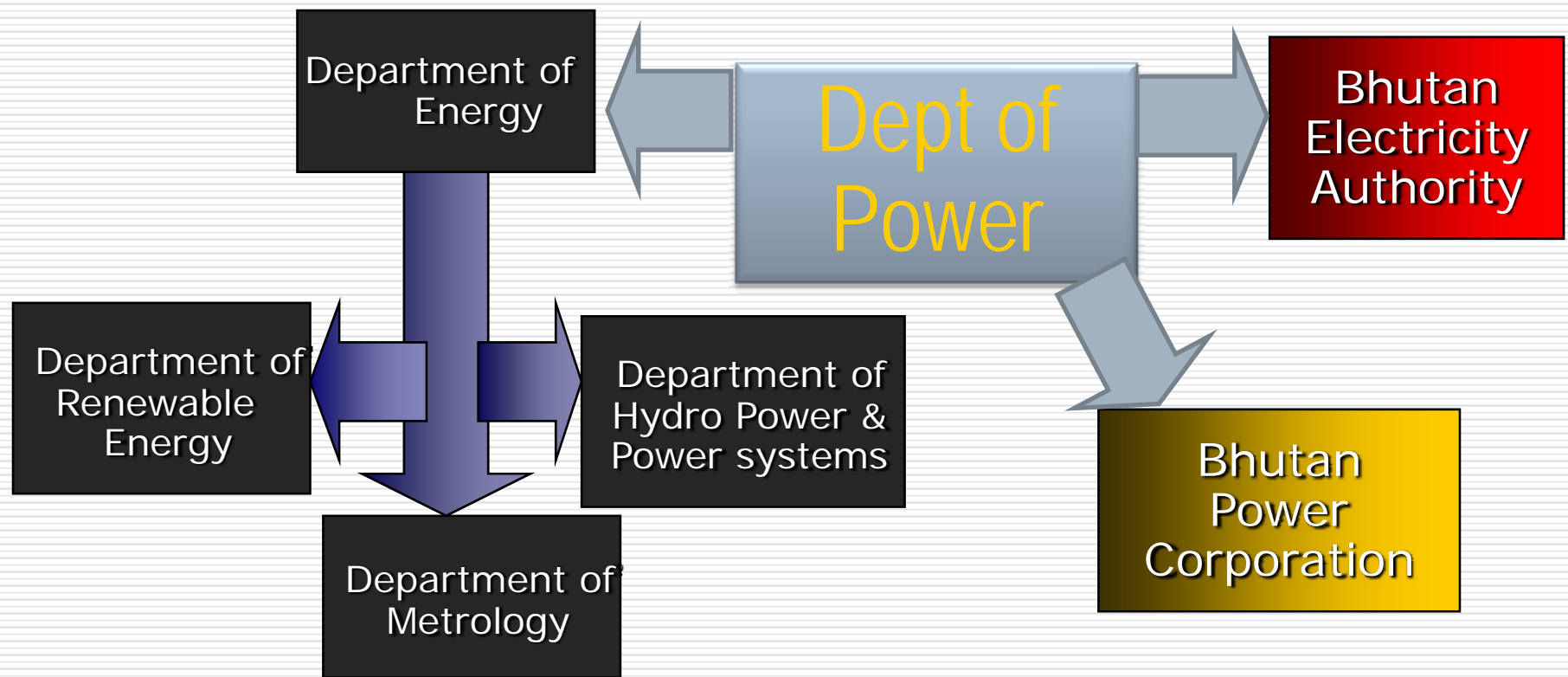




Background of Power Sector

Electricity Act 2001 provided for

- ❑ Restructuring of Electricity industry
- ❑ Erstwhile Department of Power, Ministry of Trade & Industry was unbundled to form:





Merger of Hydro Power Corporations

Kurichhu
Hydropower
Plant



Tala
Hydropower
Plant



Chukha
Hydropower
Plant

Basochhu
Hydropower
Plant





Overall Power Scenario

- ☐ The steep and rugged Himalayan mountains and fast running rivers promise huge hydropower potential
 - ✓ 30,000 MW potential
 - ✓ 26,504 MW techno-economically viable for development
- ☐ Total installed capacity: 1488 MW (5% of potential)
- ☐ Peak load demand in 2013: 291 MW (16% avg. demand growth)
- ☐ About 93.5% of the Bhutanese population have access to electricity as of June 2013
- ☐ Electricity for all by 2013



Current Generation & Transmission Scenario

Existing Hydroelectric Generating Stations

Name of Plant	Installed Capacity (No. x Unit size)	Transmission Voltage (kV)
Chhukha (CHP)	336 (4x84)	220kV, 66kV
Basochhu-I (BHP)	24 (2x12)	66kV
Basochhu-II (BHP)	40 (2x20)	220kV, 66kV
Kurichhu (KHP)	60 (4x15)	132kV
Tala (THP)	1020 (6x170)	400kV
Mini/Micro	8	
Total	1488MW	



Contd.

Existing Power Transmission Lines

Line Voltage	Line Length (ckt. Km)
400 kV	74.1
220 kV	285.1
132 kV	344.4
66 kV	311.5
Total	1,015.1

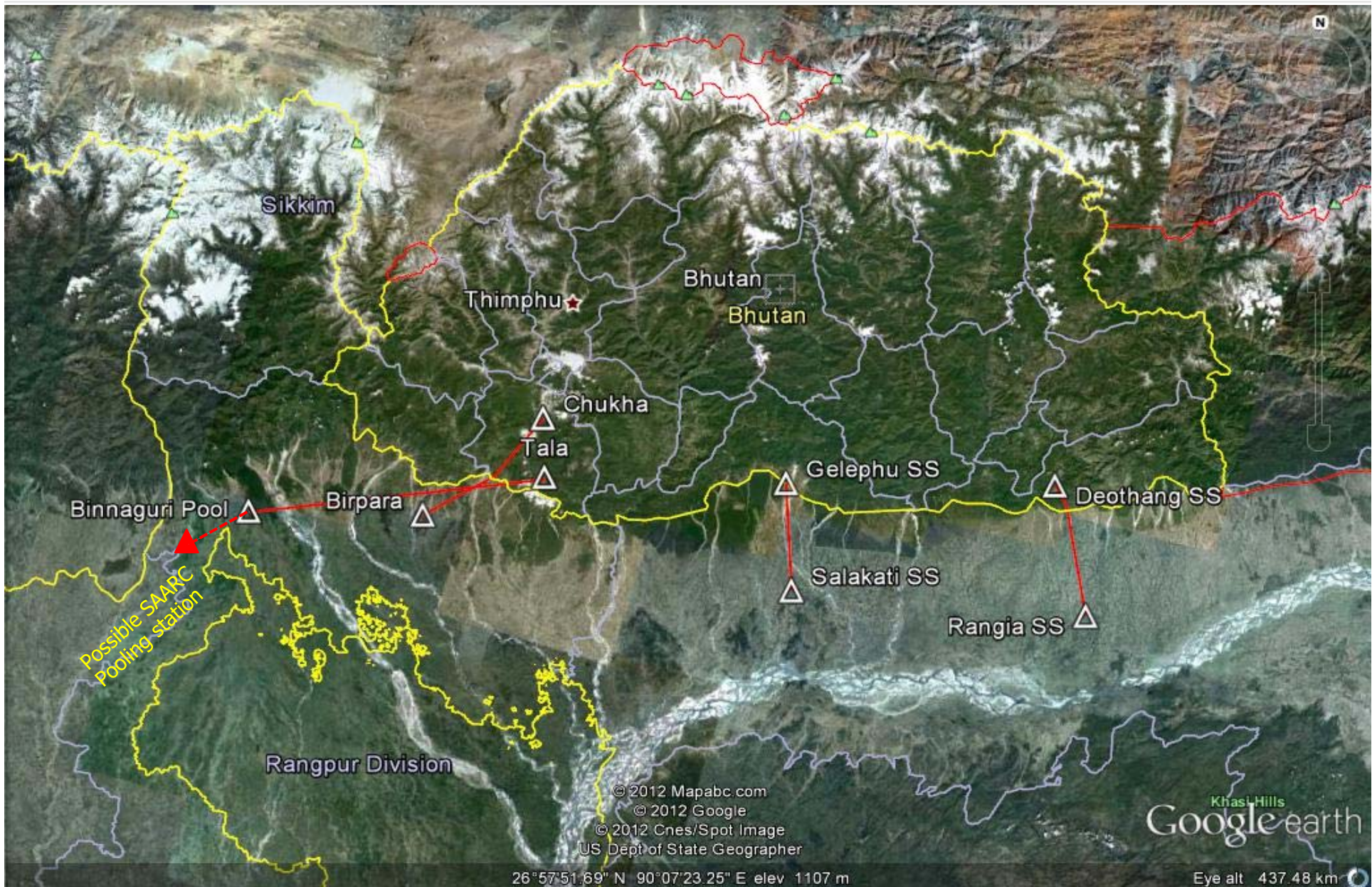


BPC's role in Power Sector!!

- ❑ BPC owns the Transmission System in the country, and is the designated “System Coordinator/System Operator”.
- ❑ Licensed to transmit, distribute, generate (embedded) and sale of electricity in the country and wheel for export
- ❑ Licensed for ICT Facilitation (Infrastructure) by Bhutan Information Communication and Media Authority
- ❑ Built the Associated Transmission System for the HEP
- ❑ Regulated Monopoly Company.
- ❑ BPC has implemented the NLDC Project for more efficient System Operation



Existing Cross border inter-connection link



Cross border interconnection links planned and existing

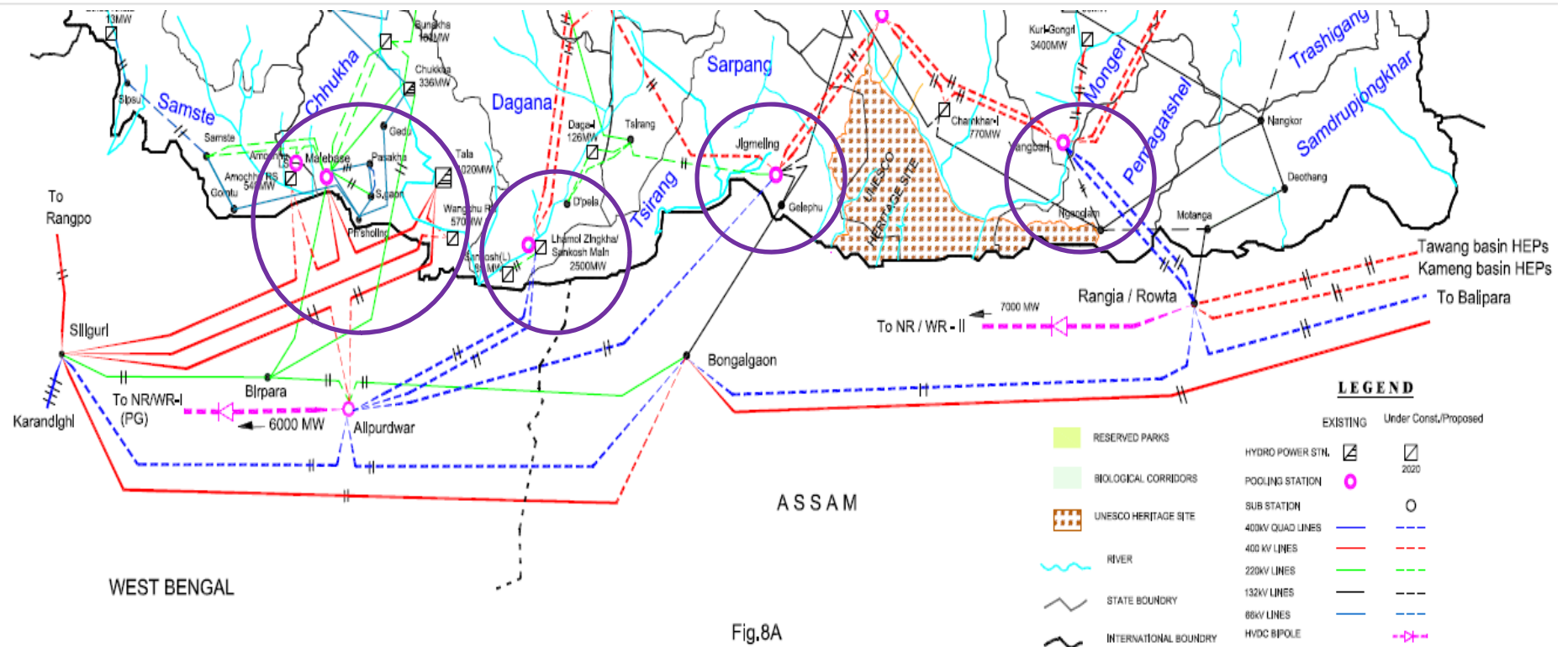
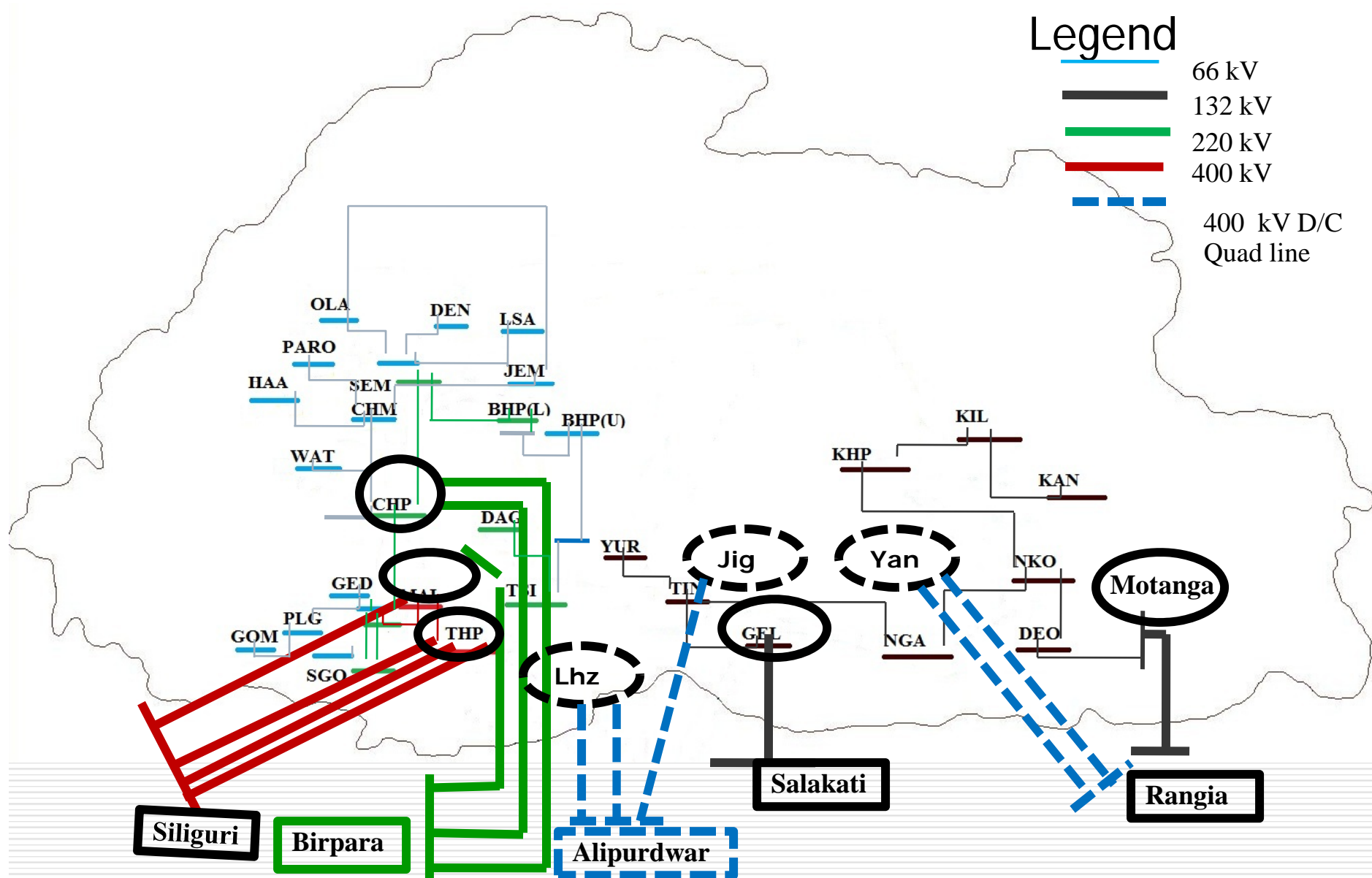


Fig.8A





Domestic Power Purchase/Sale

- ☐ Domestic consumption at the rate of Nu.0.30 per unit for royalty energy allocated (15 % of Mean Annual Generation) and;
- ☐ Nu.1.20 per unit for the additional energy drawn by BPC.



Power Purchase Agreement

Royal Government of Bhutan (RGoB) and the Government of India (GoI) have agreed that the RGoB shall sell the surplus power available from CHP, KHP and THP to the GoI, and the GoI has agreed to purchase all the surplus power as per the provisions in the Bilateral Project Implementation.



Power Dispatch on Existing Border Interconnections (for 2012)

Dispatch is as per the long term PPAs.

For 2012:

- ✓ Generation from Major HP = 6,811.27 MU
- ✓ Mini/Micro Hydel Generation= 15.21 MU
- ✓ Domestic consumption = 1,769.9 MU
- ✓ Energy export = 4,895.67 MU (about 72% of the generation)



Method of Billing and Payment (WHEELING)

- ☐ BPC raise bill for net energy wheeled to CHP,KHP,THP (DGPC) as per the agreement.
- ☐ Monthly bill raised latest by 10th day of every succeeding month.
- ☐ Incase of disagreement to the correctness of any bill(s) a written intimation is given without withholding payment. The same is rectified within 30days and any changes found is adjusted in next/future bill(s).
- ☐ Wheeling charge at Nu.0.111 per unit(kWh).



Metering Philosophy

- ☐ Virtual Metering at the International Boundary, though meters may be at the nearest interconnection point in each territory.
- ☐ Energy meters of uniform technical specification to permit accounting of the energy transactions.
- ☐ Main and Check energy meters installed.
- ☐ Joint testing/calibration is done if the reading of Main meter differ from the corresponding Check meter by 1.5% for class 0.5 accuracy meters and 0.6% for class 0.2 accuracy meters.
- ☐ Meters on 66kV and above shall be of a minimum accuracy class of 0.2.



Metering Philosophy

- ☐ Joint testing /calibration of all the main and check meters are carried annually.
- ☐ Joint meter readings at 12:30 hours (BST) on the 1st of every calendar month.
- ☐ CTs & VTs connected to the meters shall have a measurement accuracy class of 0.5 or better.



National Load Dispatch Centers

- ☐ The National Load Dispatch Center (NLDC), as a Bhutan Power System Operator (BPSO)
- ✓ Towards more efficient System Operation, NLDC has been set up.
- ☐ **As per ELECTRICITY ACT, and the GRID CODE the following are the functions of the NLDC or the System Operator:**
 - ✓ Co-ordinate the power supply system to obtain instantaneous balance between generation and consumption of electricity;
 - ✓ Be responsible for dispatching generation installations,
 - ✓ Co-ordinate the transmission outages;
 - ✓ Monitor the import and export of electricity;
 - ✓ Prepare forecasts of load and generation requirements;

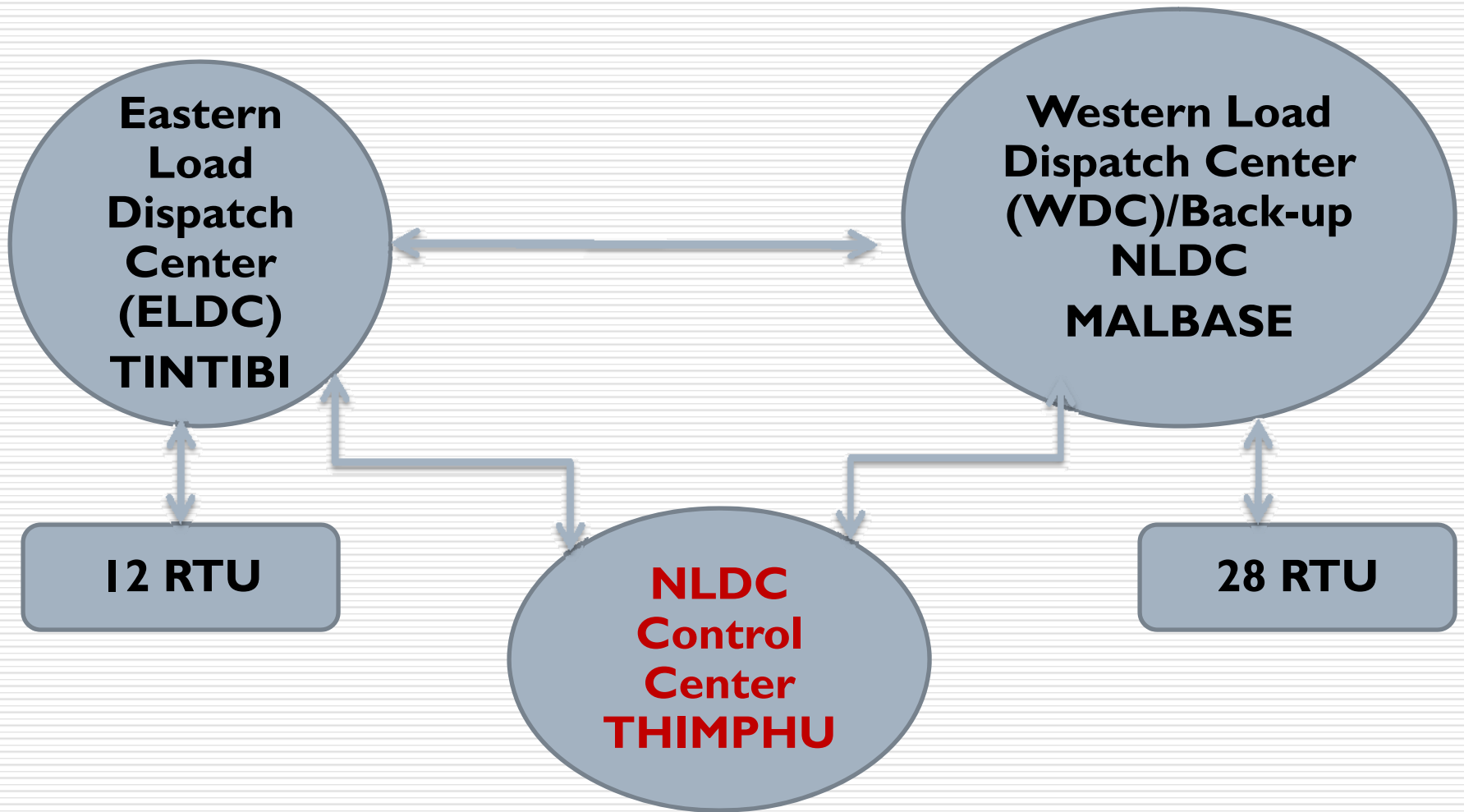


National Load Dispatch Centers

- ❑ The NLDC, Bhutan at Thimphu is connected to the Eastern Load Despatch Center (ELDC) in the east, and the Western Load dispatch Center (WLDC) located at Malbase in Pasakha, which is also the backup control center.
- ❑ Currently 40 stations report to the load dispatch center at Thimphu.



Contd.



National Load Dispatch Centers





THANK YOU

