

“Techniques on Energy Conservation and Efficiency in Buildings” – Status of Bhutan

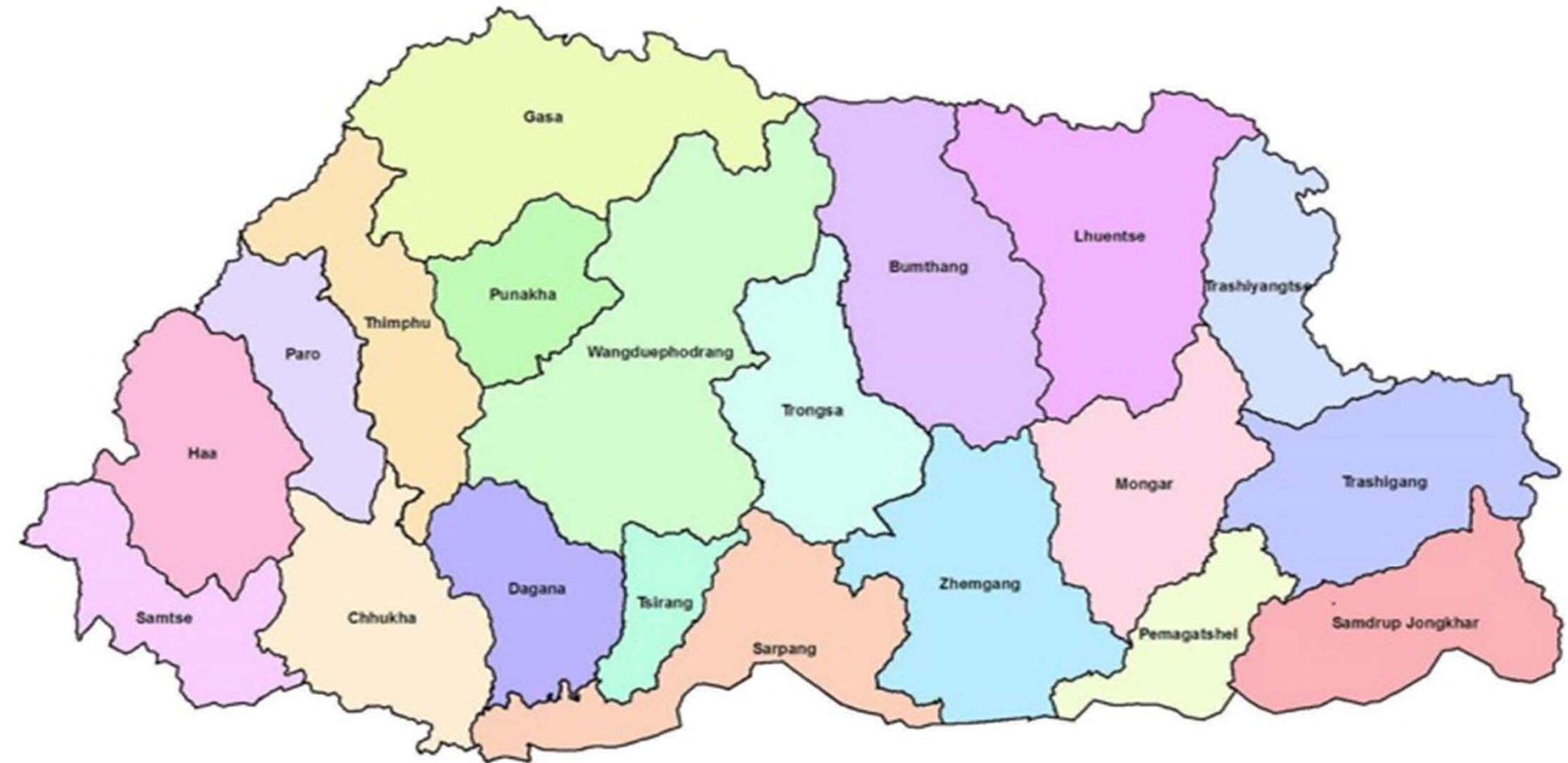
26-28 August, 2019

Dambulla, Sri Lanka

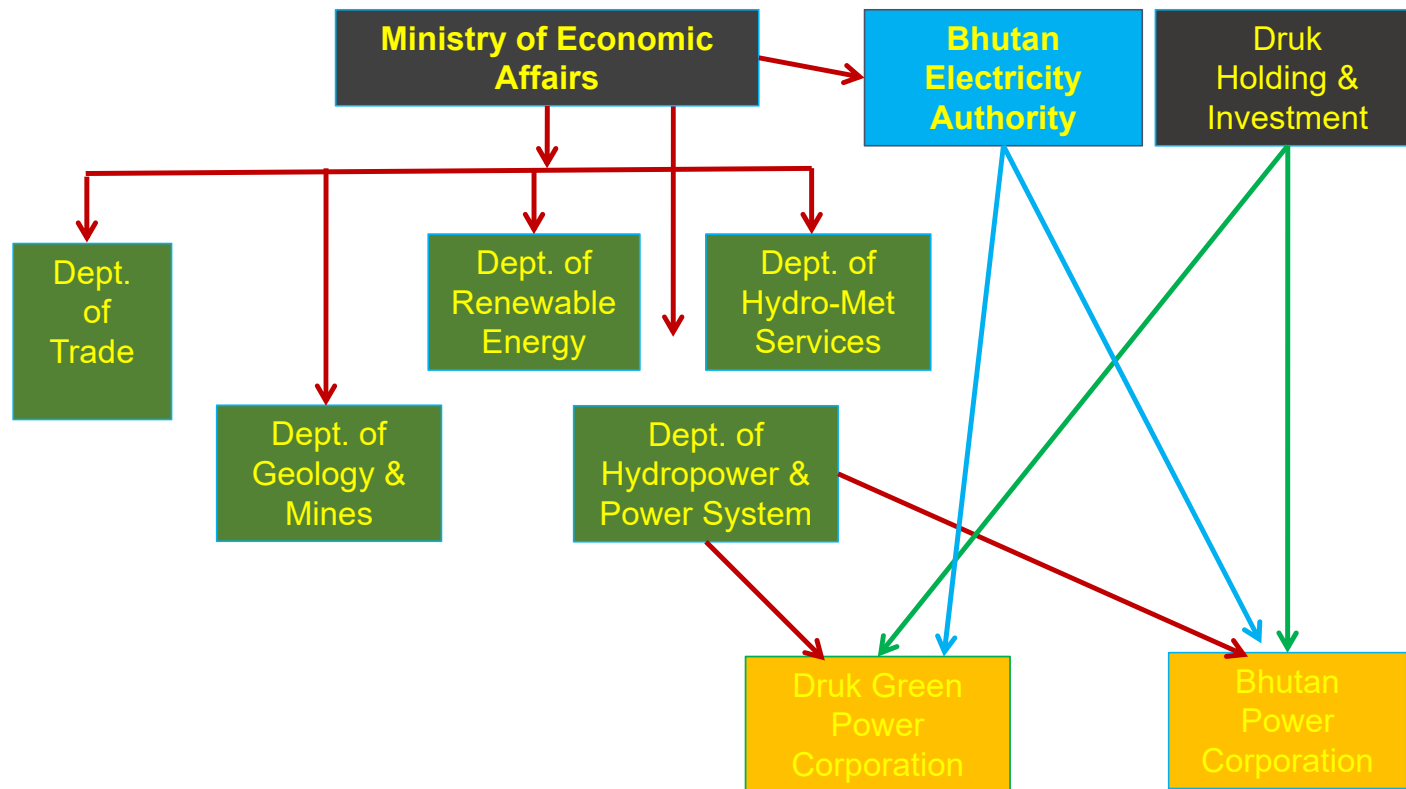
Outline

- Brief overview of Bhutan
- Overview of Energy sector in Bhutan
- Energy consumption - Bhutan
- Energy consumption – Buildings
- Building types and components
- Energy Efficiency & Conservation techniques
- Measures to promote EE&C
- Challenges

Brief Overview of Bhutan

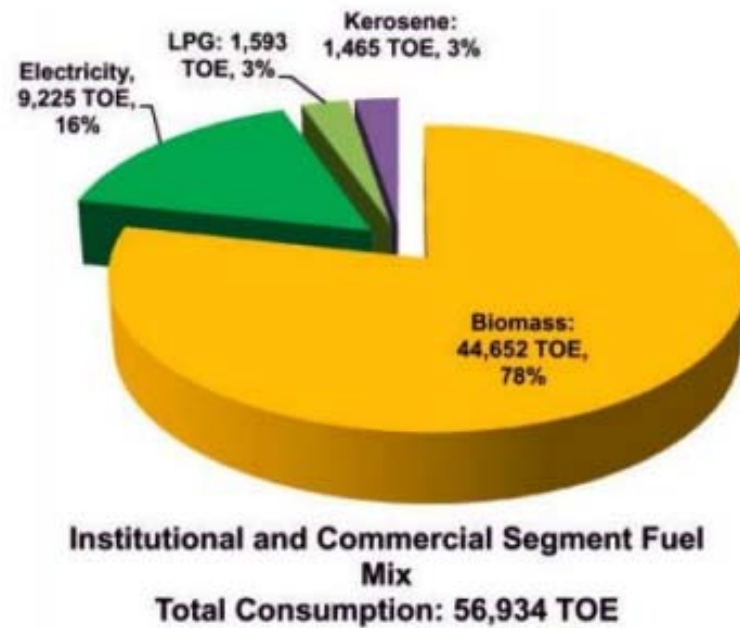
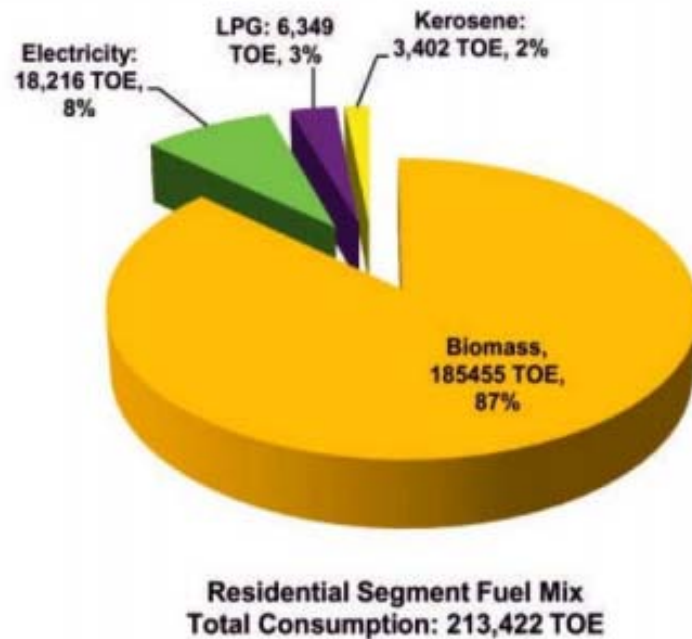


Overview of Energy Sector in Bhutan



Colour Legend: **Policy directives**, **Investment Directives**, **Regulatory Directives**

Energy Consumption - Bhutan



Source: Bhutan Energy Data Directory 2015

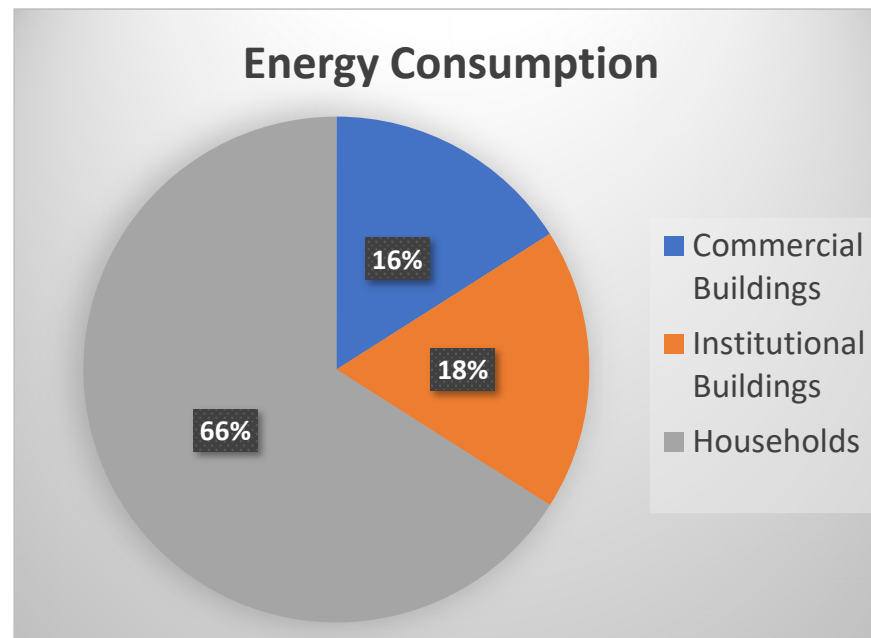
Energy Consumption - Buildings

- The Building Sector contributes to 15% of the total baseline electricity consumption
- Buildings consume energy primarily in two forms - in terms of electricity, biomass (mostly firewood) and solid/ liquid fuel (LPG, kerosene etc.).



Energy Consumption - Buildings

- The Building Sector accounts for 15% of electricity consumption in the country, and 88% of low voltage consumption in Bhutan.
- Electricity is the main energy source for lighting in 88% of households (98% in the urban areas, 83% in the rural areas.)







Tra



Energy Efficiency & Conservation techniques

	Short term	Medium term	Long term
Existing	➤ Weather strip for windows ➤ Insulated curtains ➤ AC set point optimization ➤ High Solar Reflectance (SRI) paint for roofs ➤ Positioning of Refrigerators on northern wall	➤ Reflective single glazed window ➤ Rockwool insulation ➤ LED lighting	➤ Reflective double glazed window ➤ Glass wool / EPS Insulation
New construction	➤ Weather strip for windows ➤ Insulated curtains ➤ High Solar Reflectance (SRI) paint for roofs ➤ Positioning of Refrigerators and air conditioners on northern wall	➤ Reflective single glazed window ➤ LED lighting ➤ Cavity wall ➤ Rat trap bonded Wall ➤ AAC blocks ➤ Use of appropriate shading techniques on west wall to prevent overheating	➤ Reflective double glazed window ➤ Cavity wall insulation

Measures to promote EE&C

1. Policy, Rules, Regulations and Legal Framework

- Bhutan Green Building Design Guidelines
- EEC Final Draft Policy- 2017
- Draft Building Energy Efficiency Code 2013

2. Bring behavioural changes in individuals through education/ awareness

- Advocacy and awareness programs (mass media, workshops, etc.)
- EE&C Pilot Projects:
 - Energy Efficient Heating Stoves
 - LED lighting (Residential and institutions)

Challenges

- Accessibility - difficult terrain
- Policy and regulatory framework
- Lack of awareness and social barriers
- Lack of technical capacity
- Lack of coordination

Kadrinche La
(Thank you)