

South Asia Regional Initiative for Energy Integration (SARI/EI)

**South Asia Investor's Workshop on  
"Cross-Border Electricity Trade"**

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# Outline



- Energy Situation of SAARC Region
- SAARC Energy Centre (SEC)
- Programme Activities 2013
- Programme Activities 2014
- Programme Activities 2015
- SAARC Energy Ring
- Impacts of SEC's Initiatives

# Energy Situation of South Asia

## Reserve



### Coal

- 63,036 Million tonnes, proved recoverable

### Natural Gas

- 2,308 Billion cubic meters, proved recoverable

### Oil

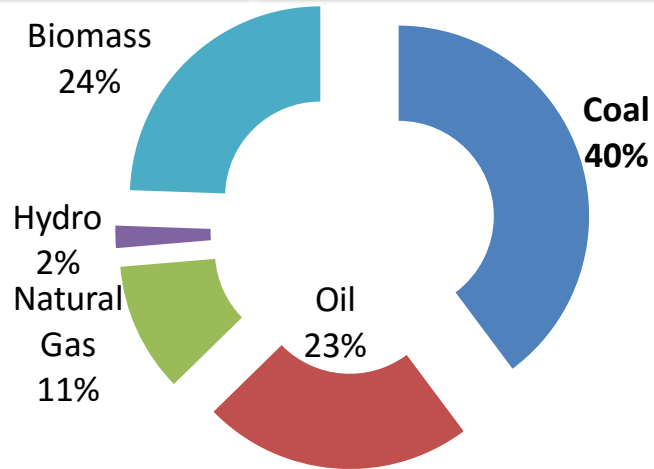
- 785 Million tonnes, proved recoverable

### Hydropower

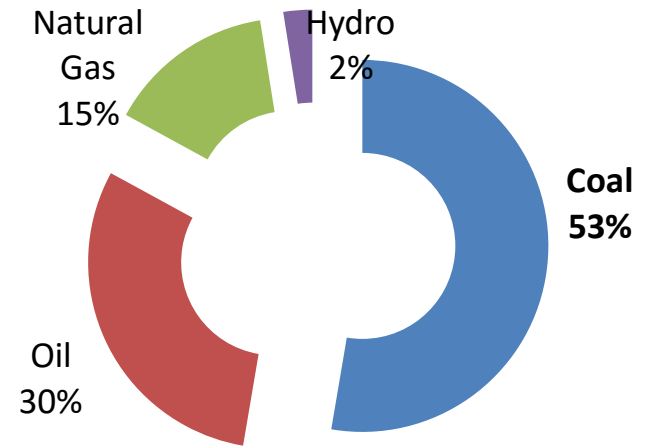
- 4,528,000 GWh/year, gross theoretical capability

# Energy Situation of South Asia

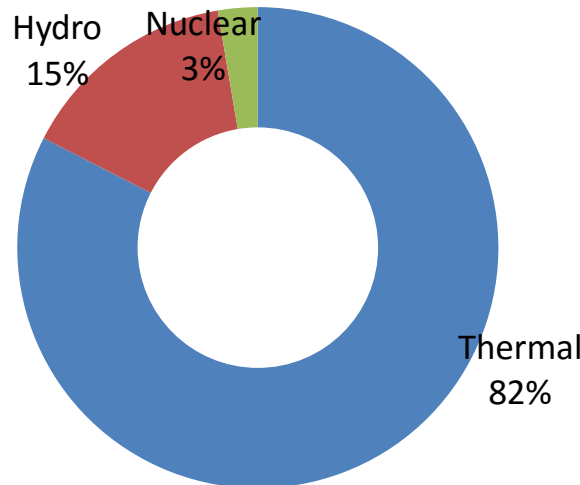
## Supply



Primary Energy: 880,122 ktoe



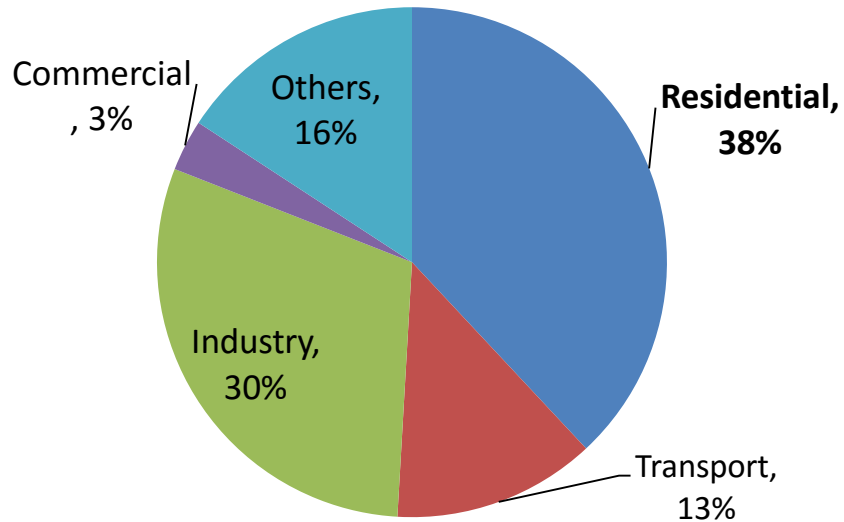
Commercial Energy: 665,001 ktoe



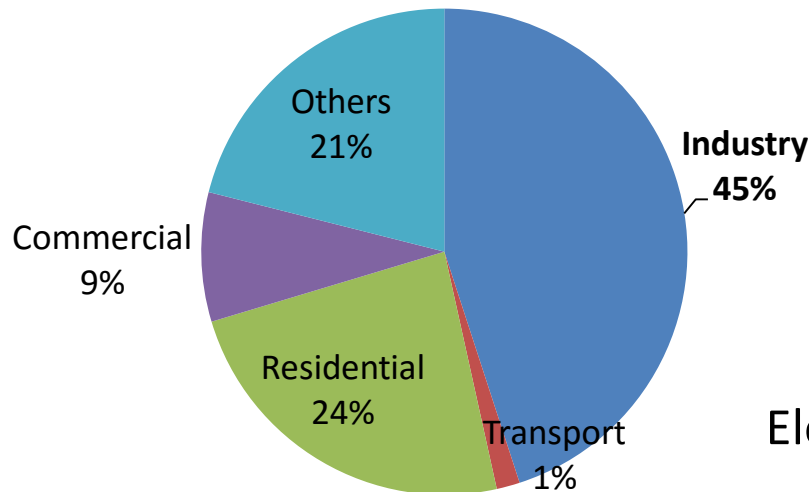
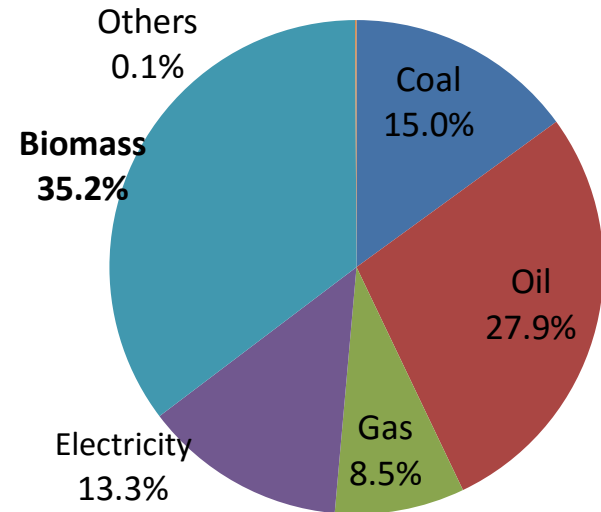
Electricity Generation: 1113,614 GWh

# Energy Situation of South Asia

## Consumption



Final Energy: 528,608 ktoe



Electricity by Sector: 822,437 GWh

# Energy Situation of South Asia

## Energy Indicators

Country/ Region	Energy Use (kgoe/capita)	ACGR Last 10 years	Electricity Use (kWh/capita)	ACGR Last 10 years
<b>SAARC</b>	<b>514</b>	<b>2.5%</b>	<b>517</b>	<b>4.1%</b>
<b>USA</b>	<b>7,051</b>	<b>-1.2%</b>	<b>12,914</b>	<b>-0.3%</b>
<b>EU</b>	<b>3,536</b>	<b>-0.4%</b>	<b>6,592</b>	<b>0.7%</b>
<b>BRAZIL</b>	<b>1,243</b>	<b>1.4%</b>	<b>2,206</b>	<b>1.9%</b>
<b>MALAYASIA</b>	<b>2,391</b>	<b>3.0%</b>	<b>3,614</b>	<b>3.3%</b>
<b>CHINA</b>	<b>1,695</b>	<b>6.9%</b>	<b>2,631</b>	<b>11.2%</b>
<b>WORLD</b>	<b>1,788</b>	<b>0.9%</b>	<b>2,803</b>	<b>2.0%</b>

# Energy Situation of South Asia

## Energy Indicators

Country	Primary Energy Intensity, 1990 (MJ/\$2005PPP)	Primary Energy Intensity, 2010 (MJ/\$2005PPP)	Improvements, 1990-2010 (% CAGR)
Afghanistan	11.8	2.9	-6.83
Bangladesh	6.8	5.9	-0.71
Bhutan	38.3	16.0	-4.26
India	12.5	7.8	-2.35
Maldives	2.7	9.3	6.39
Nepal	17.9	13.2	-1.50
Pakistan	9.9	8.5	-0.76
Sri Lanka	6.7	4.3	-2.13

# SAARC Energy Centre

## Establishment

- Year 2006 at Islamabad, Pakistan

## Objective

- Initiate, promote and facilitate cooperation in energy sector of SAARC Member States for the benefit of all

## Funding

- SAARC Member States; supervised by a Governing Board comprising all Member States

## Technical Resources

- Professional staff selected from Member States
- Expert services through outsourcing

## Networking

- ADB, WB, UNESCAP, ASEAN, Japan, US, Germany



# Principles of Programme Directions



- Summit

- Energy Ministers' Forum

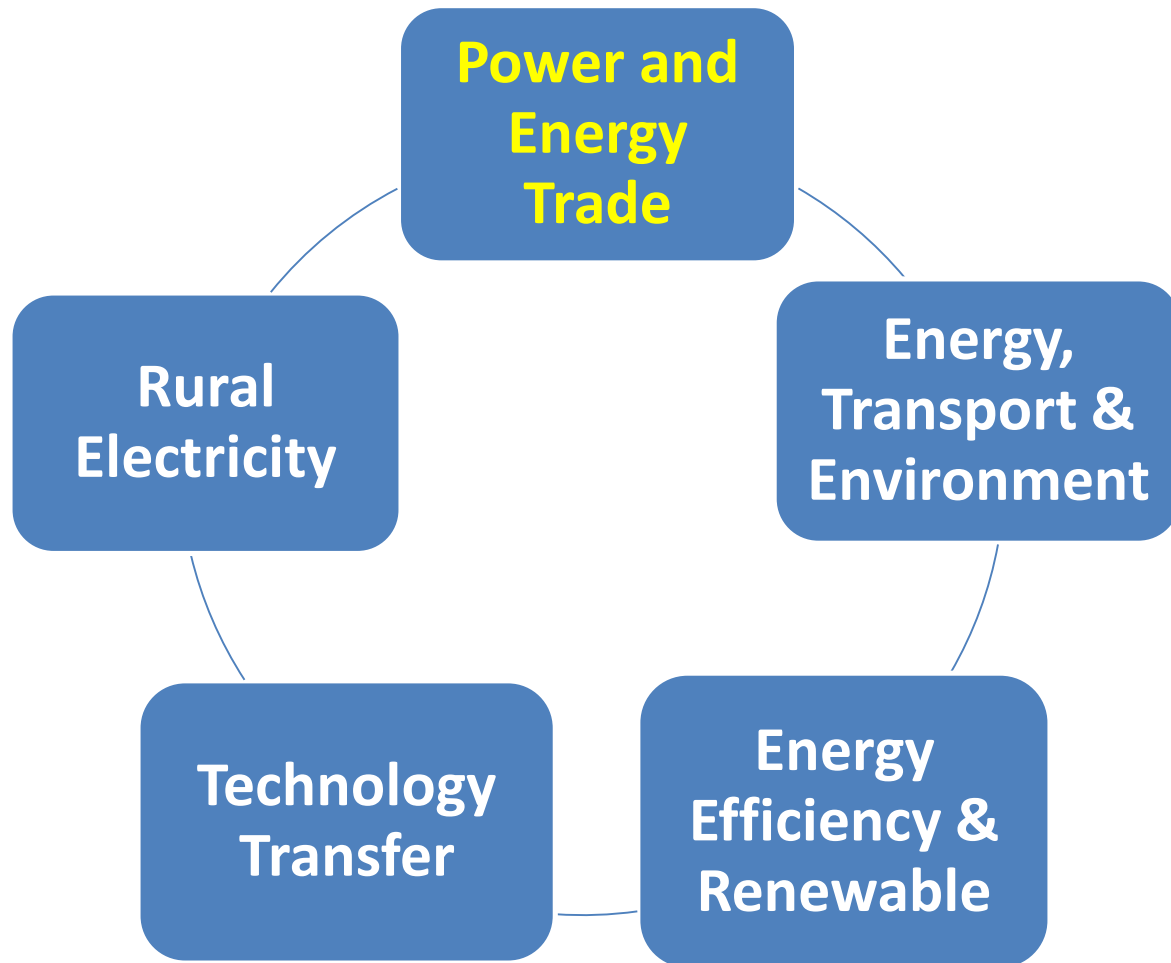
- Working Group of Energy & Governing Board

- Four Expert Groups

- Strategic & Operational Plan

- Participatory Design in collaboration with Member States

# Thematic Areas of Programme Activities



# Programme Activities



- Research Studies
- Capacity Building through Training Workshops/  
Seminars
- Pilot Projects
- Special Projects

# Programme Activities – 2013 (1/3)

## Power and Energy Trade

- Pre-feasibility study for setting up SAARC Regional / Sub-regional Coal Based Power Plant
- Study on Pricing Mechanisms of Electricity in SAARC Member States
- SAARC Energy Data Book (2001-2010)
- SAARC Dissemination Workshop on Review of Electricity Laws and Regulatory Frameworks of Member States
- SAARC Seminar on Role of Private Sector in Regional Power Trade

# Programme Activities – 2013 (2/3)

## Energy Efficiency & Renewable Energy

- Field Trials of SAARC Chullahs (ICS)
- SAARC Workshop on Household Energy Efficiency and Conservation with Women Participation
- SAARC Dissemination Workshop on Energy Conservation Potential of Brick Production in Selected SAARC Countries
- SAARC Training Workshop for Energy Audit and Efficiency in the Power Sector

# Programme Activities – 2013 (3/3)

## Technology Transfer

- Study on Cogeneration Opportunities in Sugar and Paper Industries in SAARC Member States

# Current Activities of SEC (1/4)

## Power and Energy Trade

- Study on Designing Management and Monitoring Framework for Regulatory Compliance by Power Transmission Utilities in the Region
- Study for Development of a Potential Regional Hydro Power Plant
- SAARC Energy Data Bank (2001-2011)
- SAARC Workshop on Experience Sharing of Construction, Operation and Maintenance of LNG Facilities
- SAARC Workshop on Harmonizing Regulations and Policies for Cross Border Power Trade, Risk Sharing and Financial Settlement Issues
- SAARC Inception Workshop on 20-Year Perspective Plan for the Power Sector of SAARC Region
- SAARC Webinar on Concept, Establishment and Operation of a Power Exchange for Regional Power Trading

# Current Activities of SEC (2/4)

## Energy Efficiency & Renewable Energy

- Study for Assessment of Energy Efficiency Potential through Energy Audit on Power Transmission and Distribution Grid Stations
- SAARC Workshop on Role of Independent Media for Increasing Public Awareness in Energy Conservation



# Current Activities of SEC (3/4)

## Technology Transfer

- SAARC Dissemination Workshop on Cogeneration Opportunities in Sugar and Paper Industries in SAARC Member States
- SAARC Training Workshop on Power System Studies for Synchronization of Multiple Systems

# Current Activities of SEC (4/4)

## Rural Electricity for Poverty Alleviation

- Comparative Study on Rural Electrification Policies in SAARC Member States

# Program Activities - 2015 (1/6)

## Power and Energy Trade

- Feasibility Study: Setting Up SAARC Regional/Sub-regional LNG Terminals
- SAARC Energy Data Bank (2001-2012)
- SAARC Study for the Development of 20-Year Perspective Plan for the Power Sector of the SAARC Region
- Study to Assess Renewable Energy Development in South Asia; Achievements and the Way Forward in the Perspective of Policies and Investment Opportunities
- SAARC Dissemination Workshop on Study for Designing Management and Monitoring Framework for Regulatory Compliance by Power Transmission Utilities in the SAARC Region
- SAARC Dissemination Workshop on the Study for Development of a Potential Regional Hydro Power Plant in South Asia

# Program Activities - 2015 (2/6)

## Energy Efficiency

- Study on Harmonizing Transmission Grid Codes of SAARC Member States to Combat Regulatory Challenges for Intra-region Power Trading/Interconnections
- Study on Optimum Power Generation Mix for a Sustainable Power Sector in South Asia
- Study on Energy Efficiency in Transport Sector in SAARC Region
- SAARC Workshop on Energy Based Livelihoods Contributing to Economic Empowerment of the Marginalized Sectors and Women in the SAARC Region
- Promotion of SAARC Chullahs (Improved Cooking Stoves-ICS) for their Commercialization / Scaling up in the SAARC Member States
- Impact Assessment of SEC's Initiatives and the Way Forward

# Program Activities - 2015 (3/6)

## Renewable Energy

- Comparative Study for the Prevailing Tariff of Renewable Energy in Member States and, Assessing and Recommending Options such as Net-metering, Banking and Wheeling
- SAARC Seminar on Application of on-grid Biogas Technologies

# Program Activities - 2015 (4/6)

## Technology Transfer

- SAARC Training Workshop on Experience Sharing on Coal Bed Methane, Underground Coal Gasification
- SAARC Perspective Workshop on the Past, Present and Future of High Voltage DC (HVDC) Power Transmission
- SAARC Technical Training Course for Power System Planners and Analysts Through Distance Learning

# Program Activities - 2015 (5/6)

## Rural Electricity for Poverty Alleviation

- SAARC Dissemination Workshop: Comparative Study on Rural Electrification Policies in SAARC Member States

# Program Activities - 2015 (6/6)

## Energy, Transport & Environment

- SAARC Workshop on Role of Energy in Transport Sector in SAARC Member States



# SAARC Energy Ring - SENERING

- SAARC ENERGY RING: envisioned by the SAARC Leaders at the 2004 Islamabad Summit
- Vision being translated into reality by SAARC Energy Centre
- Four Expert Groups engaged to pursue the concept:
  - Oil and Gas
  - Electricity
  - Renewable Energy
  - Technology Transfer (including Coal & Energy Efficiency)

# SAARC Energy Ring: Power Grid





# SAARC Energy Ring: Gas Grid



# Studies on SENERING



- **SAARC Regional Energy Trade Study (SRETS)** identified four regional or sub-regional trade options:
  - Power Market
  - Petroleum Refinery
  - LNG Terminal
  - Power Plant
- A recent ADB funded study on **South Asia Regional Power Exchange** has identified various opportunities in electricity trade

# Studies on SENERING

Interconnection	Capacity (MW)	Est. Cost (Million USD)	Annual Benefit (Million USD)
India-Bhutan	2,100	160	1,840
India-Nepal	1,000	186	105
India-Sri Lanka	500	600	186
India-Bangladesh	500	250	389
India-Pakistan	500	150	491
CASA 1000	1,000	970	906

- Costs provided are time dependent; also depend on specific design options.
- Data derived from planning docs; discussed with relevant agencies.

# Rationale for Regional Power Trading

- Afghanistan has extremely poor access to electricity.
- Bangladesh is reliant on gas ; rapidly drawing down its gas reserve and yet facing serious power shortages
- Pakistan is facing serious power shortages between 4,000 to 6,000 MW at peak demand. Hydro is seasonal, natural gas production is stagnant and oil is expensive.
- Sri Lankan power demand has exceeded the capacity of its viable major hydropower development options. It has embarked on imported coal based thermal power
- India has a serious balancing act to play between growth, reliable power supply and emissions. The next decade presents far greater challenges as the primary fuel supply is already posing great challenges.

# Rationale for Regional Power Trading...*(Continued)*

- Nepal and Bhutan have high quality (long term) hydropower potential and very little local demand
- Success of power exchanges in India has made a case for maximizing the potential for regional power transfers
- Current PX design is flexible to accommodate a wide range of products and a congestion management scheme
- Transmission capability within India has improved remarkably over the last decade
- **In-direct benefits**
  - Accelerated development of interconnections would encourage transmission investments in other regions, e.g. Central Asia that would immensely benefit Afghanistan
  - Large scale deployment of RE technologies would bring down their costs making case for more investments

# Next Steps for SAARC Energy Ring

- Detailed Scenario Analysis on Regional Inter-connections
- SAARC Electricity Transmission Master Plan
- SAARC Inter-Governmental Framework Agreement (IGFA) for Regional Cooperation in Energy (Electricity)
  - Unrestricted cross-border trade
  - Commercial negotiation of PPAs
  - Non-discriminatory open access
  - Private sector trading
  - Participation in power exchanges

Goal is to create SAARC Market for Electricity (SAME); which will ultimately be integrated with CASA Regional Electricity Market (CASAREM) to open up a new era of peace and prosperity in Asia



# Impact of SEC's Initiatives



SEC is engaged in mitigating Energy Poverty through creation of SAARC Market for Electricity and multilateral energy cooperation within and across South Asia for a better tomorrow

- Concept of SAARC Energy Ring has found acceptance at technical, policy and political levels
- Regional energy cooperation acknowledged as a “business opportunity” by private sector
- Improved flow of information and experiences across the SAARC Member States
- Development of cross-border power interconnections; Initiation of energy trading among SAARC Member States
- **Borders recognized as opportunities rather than threats**

# A Compliment to the Late Mr. Hilal A Raza



**Domestic energy development and bilateral cooperation alone will not solve power crisis. The engagement has to be multilateral**

— HILAL RAZA, DIRECTOR,  
SAARC ENERGY CENTRE, ISLAMABAD

**Thanks For Your Attention**