Session-6, Day 2

Role of Policy and Regulations for Economizing RE tariff

SAARC Knowledge Sharing Workshop on Modern Techniques including Renewable Energy Auctions for Economizing Renewable Energy Tariff

By Ajit Pandit, Director Idam Infra

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Contents

- Overview of global trends in RE deployment
- Renewable Energy Development in India
- Legal and Regulatory Framework for Development of Renewable Energy in India
- Evolution of market model: Indian Experience
  - OA and Wheeling Model
  - FIT based Model
  - REC based model
  - Competitive Bidding
- Way Forward on role of Policy and regulations in Economizing RE Tariff for SAARC countries
Overview of Global RE capacity development

- Global Cum.RE installed capacity
- Policy Options and instruments
- Trends in FIT and Auctions
Global renewable power capacity was ~ 2 000 GW at the end of 2014, around 1 200 GW higher than in 2000. The share of hydropower in the renewable total went from 93% in 2000 to ~ 60% in 2016 as solar and wind experienced very rapid growth,
RE Policy options and instruments across countries – 1/2

Source: REN21, 2017b
RE Policy options and instruments across countries – 2/2

Source: REN21, 2017b

Note: FIT = feed-in tariff, FIP = feed-in premium, RPO = renewable purchase obligations, RPS = renewable portfolio standards.
Trends in adoption of FIT/Auctions across countries

Adoption of FIT and Auction route by countries

Avg. Global Price trend for SPV and Onshore Wind

Source: REN21, 2015-2017

Source: REN21, 2017b
Renewable Energy Development in India
India’s Power Scenario & Share of Renewable Energy

As per India’s INDC, 40% of Energy in India shall be from non-fossil fuels by 2030.
Growth in RE – Historic Trends and Growth Enablers

- The certainty in legal framework at National level and supportive regulatory framework at state level along with conducive policy framework by Government has ensured Private Sector’s interests in Renewable Energy Development

Cumulative RE capacity addition (MW)

- Tariff Policy, 2006
  - Discom shall fix RPO
  - Discom to procure RE power through competitive bidding
- NEP, 2005
  - SERC to determine preferential tariff
  - Promote private sector participation in RE
- Electricity Act 2003
- NAPCC guidelines
- REC Regulation
- JNNSM Phase II guidelines
- Tariff Policy, 2016
  - SPO of 8% by 2022
  - State-wise proportion as per resource avail.

- Waste to Energy
- Small Hydro Power
- BM Power/Cogen
- Solar Power
- Wind Power
- Total Capacity
RE Capacity Addition Targets

**NAPCC**
- NAPCC target of 5% for RE Procurement in 2010
- Target to increase by 1% each year to reach 15% by 2020

**CEA perspective plan for FY 2032**
- CEA has projected RE capacity additions till 2032
- RE penetration level to increase by 8%, 18% up to 20% by 2032

**RE Invest 2015**
- Targets 175 GW by 2022
- Includes **60 GW from Wind, 100 GW from Solar** and 15 GW from other RE
- **90%** of the targeted RE capacity addition planned from Wind and Solar source which are inherently **variable in nature**

**COP -21, Paris**
- Reducing carbon emission intensity levels by 35% by 2030 compared to 2005 levels.
- INDCs Commitment- **40% of the total installed power generation capacity would be from non-fossil fuel sources by 2030.**

**NTP amendments**
- **8% of electricity consumption shall be from solar energy** by Mar’22.
- **RGO (Renewable Generation Obligation):** New coal based plants to establish RE capacity
- **Promotion of micro grids and ancillary services for RE**
- **Waiver of interstate charges for wind and solar**
Legal and Regulatory Framework for Development of Renewable Energy in India
The Electricity Act, 2003: Enabling provisions for RE scale up

- The EA 2003 has outlined several enabling provisions to accelerate the development of RE generation

- Section 3
  - National Electricity Policy and Plan for development of power system based on optimal utilization of resources including renewable sources of energy

- Section 61
  - Development of Tariff Regulations by Regulatory Commission for promotion of generation from RE sources in their area of jurisdiction

- Section 66
  - Regulatory Commission shall endeavor to promote the development of market (including trading) in power.

- Section 86(1) (e)
  - Provides Statutory Framework and Mandates SERC for promotion of Generation of Electricity from RE sources
Promotion of RE is by Policy Design and Regulatory Initiative

Central Government
- Electricity Act 2003 (Jun 2003)
- National Electricity Policy (Feb 2005)
- National Tariff Policy (Jan 2006, Amendment 2011, Jan 2016)
- National Action Plan on Climate Change (Jun 2008)

Central Electricity Regulatory Commission
- Regulations for Preferential Tariff for RE (2009, 12 & 17)
- Renewable Energy Certificate Mechanism (Jan 2010)
- Implementation Framework (continuously amended)

State Electricity Regulatory Commission
- Preferential RE Tariff Orders by SERCs (2002 onwards)
- All states have mandated Renewable Purchase Obligations
- Modification to RPO and adoption of REC framework
Role of Regulator for promotion of RE

- Area of jurisdiction for RE limited to within State boundary
- SERCs to be responsible for all matters related to renewable energy

Role of Regulators

- Preferential Tariff / FIT determination
- Contractual mechanism for promotion of RE technologies
- Specifying RPO
- Ensuring Connectivity to Grid
# Institutional Framework and role of each entity for harnessing of renewable energy

<table>
<thead>
<tr>
<th>Concurrent Policy Making</th>
<th>Central Government (MoP, MNRE)</th>
<th>State Government</th>
</tr>
</thead>
<tbody>
<tr>
<td>Regulations</td>
<td>Central Electricity Regulatory Commission</td>
<td>State Electricity Regulatory Commissions</td>
</tr>
<tr>
<td>System Operators</td>
<td>National Load Despatch Centre</td>
<td>5 Regional Load Despatch Centres</td>
</tr>
<tr>
<td>Generation</td>
<td>Central Generating Stations</td>
<td>State Generating Stations</td>
</tr>
<tr>
<td>Transmission</td>
<td>Central Transmission Utility</td>
<td>State Transmission Utility</td>
</tr>
<tr>
<td>Distribution</td>
<td>State Distribution Companies</td>
<td>State / UTs Electricity Depts</td>
</tr>
<tr>
<td>Markets</td>
<td>Power Exchanges</td>
<td>Trading / Bilateral Exchange</td>
</tr>
</tbody>
</table>
Wind Energy – growth so far

**Wind Capacity Addition (GW)**

<table>
<thead>
<tr>
<th>Year</th>
<th>Capacity (GW)</th>
</tr>
</thead>
<tbody>
<tr>
<td>FY 09</td>
<td>1.5</td>
</tr>
<tr>
<td>FY 10</td>
<td>1.6</td>
</tr>
<tr>
<td>FY 11</td>
<td>2.3</td>
</tr>
<tr>
<td>FY 12</td>
<td>3.2</td>
</tr>
<tr>
<td>FY 13</td>
<td>1.7</td>
</tr>
<tr>
<td>FY 14</td>
<td>2.2</td>
</tr>
<tr>
<td>FY 15</td>
<td>2.3</td>
</tr>
<tr>
<td>FY 16</td>
<td>3.4</td>
</tr>
<tr>
<td>FY 17</td>
<td>5.4</td>
</tr>
</tbody>
</table>

**Key Statistics**

- Cumulative capacity of 34,046 MW (as on Mar 2018)
- Wind capacity comprises 56% of total RE installed capacity
- Wind capacity comprises ~ 11% of total installed capacity
- Wind generation contributes to ~6% of total generation of the country

**Key Drivers**

- Policy of Accelerated Depreciation, concessional import duty
- FIT for wind projects (for both inter & intra State projects)
- GBI for encouraging generation and IPPs
- RPO and REC Mechanism
- NAPCC with national level targets for RE procurement
Policy Options and Regulatory Instruments for promotion of Renewable Energy technologies

- Capital Subsidy
- Grant for pilot projects
- Generation Based Incentives
- Soft loans / Interest subvention
- REC mechanism
- Competitive bidding guidelines
- Standard contracts for Auction Process
- Payment security arrangements

- Concessional Import duty
- Electricity Duty waiver/exemption
- Accelerated depreciation / Tax benefits
- Support in VAT/GST regime
- Solar Park development scheme

Regulatory framework

Market Mechanism

Fiscal support

Financial Instruments
Renewable Energy Market models and Evolution of policy framework and regulatory regime
Evolution of Market Model

- A - Market model based on Open Access/wheeling for self use
- B - Model based on FIT and RPO for sale to distribution licensee & third party, within State
- C - Market model based on instruments with cross border features (REC) catering to National level demand
- D - Competitive Procurement of RE – predominantly solar and later wind
Alternate A : Open Access and Wheeling Model

- RE Power Plant setup mainly to meet captive/third party requirements
- Wheeling of power limited to two or three locations
- Governed by State Government policy provisions or concessional wheeling arrangements

Key Considerations for Prospect of OA Wheeling Model

- Market models based on Wheeling and Open Access have the following difficulties
  - Compatibility with Open Access Regulations
  - Pricing Reforms and un-bundling of State Utilities have resulted into High Transmission/Wheeling Charges
  - Complex scheduling and Energy Accounting requirements pose limitation on Inter-State wheeling transactions

Open Access : Wheeling charges & Other Conditions continue to be prohibitive
Possible transactions for sale of power under Open Access - & Institutions involved

Possible transactions for sale of power:

1. to TOA Consumer using STU/transmission network
2. to TOA Consumer through trader using STU/transmission network
3. to DOA Consumer through trader using STU/transmission network
4. to DOA Consumer using STU/transmission and DISCOM network

STU: State transmission utility
SLDC: State load despatch centre (State Grid Operator)
DISCOMs: MEDCL, RInfra-D, TPC-D
Power Exchange: IEX, PXIL
TOA Consumer: OA consumers connected to Transmission n/w
DOA Consumer: OA consumers connected to Distribution n/w

Based on consumer type
- Captive usage
- 3rd party sale

Based on network used
- Transmission
- Distribution
### Applicable OA charges

**Intra-state OA wheeling for wind or solar**

<table>
<thead>
<tr>
<th>Charges</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Key OA charges</strong></td>
<td></td>
</tr>
<tr>
<td>1. Transmission charges and transmission losses</td>
<td>Applicable for usage of transmission network (uniform across the State)</td>
</tr>
<tr>
<td>2. Wheeling charges and wheeling losses</td>
<td>Applicable for usage of distribution network of DISCOMs (varies with DISCOMs)</td>
</tr>
<tr>
<td>3. Cross-subsidy surcharge (CSS)</td>
<td>Applicable when an industrial/commercial consumer decides to purchase power from an independent generator and not from the DL in that area, that DL loses the cross subsidy amount. The CSS is imposed on the consumer to ensure that DL does not pass on this additional amount to consumers, which can result in rise in cost of power (varies with DISCOMs)</td>
</tr>
<tr>
<td><strong>Other incidental charges</strong></td>
<td></td>
</tr>
<tr>
<td>4. Standby charges</td>
<td>Applicable for availing standby supply from DISCOMs (varies with DISCOMs)</td>
</tr>
<tr>
<td>5. Additional surcharge</td>
<td>Applicable for availing supply from source other than DISCOM to which they are connected. (Varies with DISCOMs). Such charges are levied to compensate DISCOM for fixed cost (n/w cost &amp; or Fixed cost for power sourcing) incurred by DISCOMs with regard to serving such OA consumer moving out of it.</td>
</tr>
<tr>
<td>6. Reactive energy charges</td>
<td>Applicable for importing reacting power into the Grid. (Varies with Load and nature of Power Supply)</td>
</tr>
<tr>
<td>7. Any other charge as approved by Commission</td>
<td>Applicable for availing supply from source other than DISCOM to which they are connected. (Varies with DISCOMs)</td>
</tr>
<tr>
<td>8. Scheduling fees &amp; charges</td>
<td>Applicable for incorporating the day ahead transaction schedule in DISCOMs schedule. (Uniform across State)</td>
</tr>
</tbody>
</table>
Alternate B: Preferential Tariff Based Market Model

- Preferential tariffs determination by various SERCs
- Generic tariff approach based on Norms for projects to be commissioned over pre-specified control period
- Substantial addition of capacity occurred under this market model

Issues in determination of preferential tariff

- Different Approaches for Tariff determination across States:
- Ambiguity over the definition of preferential tariff, control period etc.
- Wide variation in financial parameters like O&M expense, interest rate, which is not State specific
- Constant tariff over the Control Period, not reflecting changes in market conditions and underlying parameters
Key Parameters preferential tariff (FIT) framework

General Parameters
- Tariff Period
- Control Period
- Tariff Structure
- Tariff Design

Financial Parameters
- Capital Cost
- Debt Equity Ratio
- Return on Equity
- Interest on loan
- Depreciation
- Working Capital

Technology specific Parameters
- O&M expenses
- CUF / PLF
- Aux Consumption
- De-ration factor
- Station Heat Rate
- Fuel parameters

Development of Base Case or Generic Case
- Eligible RE technologies
- Configuration / Sizing / capacity range & limits
- Resource assessment
  - Geographic factors, diversity & seasonal factors
- Operational Performance
  - Benchmarking – CUF/PLF
- Funding mix & Sources
- Treatment for Grants and Subsidies, Incentive
Renewable Energy Certificate Mechanism to enable Inter-State exchange of RE power

REC mechanism seeks to address the mismatch between availability of RE sources and the requirement of the obligated entities to meet their renewable purchase obligation across States.

REC mechanism shall facilitate emergence of large number of cross-border RE transactions based on non-firm RE sources and firm RE sources

Aspects considered for REC Design in Indian Context

- Electricity Market is Regulated to large extent
- More than 90% of electricity volumes continue to be transacted at regulated price
- Preferential RE Tariff Regime to continue (Feed – in – Tariff % REC shall co-exist)
REC Pricing Framework

Renewable Energy

Electricity Component
- Bilateral Agreement (de-regulated) (OA User/Trader)
- Average Pooled Power Purchase Cost (Distribution Utility)
  - Andhra Pradesh: Rs 3.58/kWh
  - Maharashtra: Rs 3.63/kWh
  - Karnataka: Rs 3.39/kWh
  - Kerala: Rs 3.73/kWh
  - Tamil Nadu: Rs 3.49/kWh
  - Gujarat: Rs 2.48/kWh
  - Rajasthan

REC Component (Environmental Attribute)
- Market Discovered Price (Obligated Entity/Voluntary Buyer)

Parameters
- Non Solar REC
- Solar REC
- Forbearance Price (Rs/MWh)
  - 2,900
  - 2,500
- Floor Price (Rs/MWh)
  - 1,000
  - 1,000
Status update on REC transactions and inventory

- Accumulated Inventory of RECs is slowly depleting; closing as on April 2018 is around 7 million RECs.
- Stringent enforcement of RPO is expected to reduce the inventory further
- RECs are mostly traded at floor prices owing to weak demand

<table>
<thead>
<tr>
<th>Month, Year</th>
<th>Opening Balance (A)</th>
<th>REC Issued (B)</th>
<th>RECs Redeemed through Power Exchanges (C)</th>
<th>RECs Retained by RE Generators (D)</th>
<th>Total E = (C + D)</th>
<th>Closing Balance (F = A+B-E)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jan, 2018</td>
<td>12,507,215</td>
<td>667,587</td>
<td>1,230,826</td>
<td>55,514</td>
<td>1,286,340</td>
<td>11,888,462</td>
</tr>
<tr>
<td>Feb, 2018</td>
<td>11,888,462</td>
<td>336,128</td>
<td>2,358,396</td>
<td>25,004</td>
<td>2,383,400</td>
<td>9,841,190</td>
</tr>
<tr>
<td>Mar, 2018</td>
<td>9,841,190</td>
<td>492,681</td>
<td>2,769,433</td>
<td>72,153</td>
<td>2,841,586</td>
<td>7,492,285</td>
</tr>
<tr>
<td>Apr, 2018</td>
<td>7,492,285</td>
<td>330,789</td>
<td>1,062,661</td>
<td>28,704</td>
<td>1,091,365</td>
<td>6,731,709</td>
</tr>
<tr>
<td>May, 2018</td>
<td>6,731,709</td>
<td>174,254</td>
<td></td>
<td></td>
<td>6,905,963</td>
<td></td>
</tr>
<tr>
<td>Total:</td>
<td>46,603,045</td>
<td>38,105,832</td>
<td>1,591,250</td>
<td></td>
<td>39,697,082</td>
<td></td>
</tr>
</tbody>
</table>
### Alternative D: RE Capacity Addition Target – National and State perspective

#### Technology

<table>
<thead>
<tr>
<th>Technology</th>
<th>Potential (MW)</th>
<th>Targets (MW)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Solar</td>
<td>749,000</td>
<td>100,000</td>
</tr>
<tr>
<td>Wind</td>
<td>103,000</td>
<td>60,000</td>
</tr>
<tr>
<td>Bio-energy</td>
<td>25,000</td>
<td>10,000</td>
</tr>
<tr>
<td>Small hydro power</td>
<td>20,000</td>
<td>5,000</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>897,000</strong></td>
<td><strong>175,000</strong></td>
</tr>
</tbody>
</table>

#### Capacity allocation in GW

- **Maharashtra**: 57% Solar, 34% Wind, 6% Biomass, 3% SHP
- **Uttar Pradesh**: 40% Solar, 23% Wind, 5% Biomass, 2% SHP
- **Andhra Pradesh**: 50% Solar, 18% Wind, 10% Biomass, 2% SHP
- **Tamil Nadu**: 45% Solar, 15% Wind, 5% Biomass, 5% SHP
- **Gujarat**: 50% Solar, 10% Wind, 5% Biomass, 5% SHP
- **Rajasthan**: 40% Solar, 10% Wind, 5% Biomass, 5% SHP
- **Karnataka**: 50% Solar, 10% Wind, 5% Biomass, 5% SHP
- **Madhya Pradesh**: 30% Solar, 10% Wind, 5% Biomass, 5% SHP
- **West Bengal**: 30% Solar, 10% Wind, 5% Biomass, 5% SHP
- **Punjab**: 20% Solar, 10% Wind, 5% Biomass, 5% SHP
- **Haryana**: 20% Solar, 10% Wind, 5% Biomass, 5% SHP
- **Delhi**: 10% Solar, 10% Wind, 5% Biomass, 5% SHP
- **Bihar**: 10% Solar, 10% Wind, 5% Biomass, 5% SHP
- **Orissa**: 10% Solar, 10% Wind, 5% Biomass, 5% SHP
- **Jharkhand**: 10% Solar, 10% Wind, 5% Biomass, 5% SHP
- **Kerala**: 10% Solar, 10% Wind, 5% Biomass, 5% SHP
- **Chhattisgarh**: 10% Solar, 10% Wind, 5% Biomass, 5% SHP
- **North Eastern Region**: 10% Solar, 10% Wind, 5% Biomass, 5% SHP
- **Jammu & Kashmir**: 10% Solar, 10% Wind, 5% Biomass, 5% SHP
- **Others**: 10% Solar, 10% Wind, 5% Biomass, 5% SHP
- **Uttarakhand**: 10% Solar, 10% Wind, 5% Biomass, 5% SHP
- **Himachal Pradesh**: 10% Solar, 10% Wind, 5% Biomass, 5% SHP
- **Goa**: 10% Solar, 10% Wind, 5% Biomass, 5% SHP
- **Telangana**: 10% Solar, 10% Wind, 5% Biomass, 5% SHP

#### Driver for RE Capacity Addition

- JNNSM (Central Govt. initiative)
- Experience summary
- Wind Bidding guidelines Overview
Alternative D: Policy framework for Solar and Wind - 1/2

In order to achieve the targets, various initiatives have been taken by the Government which inter alia includes:

• Amendments in **Tariff Policy** for strong enforcements of **RPO and for RGO**
• Scheme for development of **solar parks (20000MW)** and **Ultra Mega solar parks**
• Development of power transmission network through **Green Energy Corridor project**
• Identification of large **government complexes/building for rooftop projects**
• Provision for **roof top solar and 10 % renewable energy as mandatory** under Mission statement and guidelines for development of **smart cities**
• **Infrastructure status** for solar projects
• Raising finds from bilateral and international donors as also form the Green Climate Fund to achieve the target
## Alternative D: Policy framework for Solar and Wind - 2/2

### Target (Utility Scale Solar)

<table>
<thead>
<tr>
<th>Target (Utility Scale Solar)</th>
<th>Batch-I and Batch-II</th>
<th>Batch-I</th>
<th>Batch-II Tranche-I</th>
<th>Batch-III</th>
<th>Batch-IV</th>
</tr>
</thead>
<tbody>
<tr>
<td>1000 MW to 2000 MW</td>
<td>1000 MW to 2000 MW</td>
<td>750 MW</td>
<td>3000 MW</td>
<td>2000 MW</td>
<td>5000 MW</td>
</tr>
<tr>
<td>FY 16-1250 MW</td>
<td>FY 16-1250 MW</td>
<td>FY 17-1250 MW</td>
<td>FY 17-1250 MW</td>
<td>FY 18-1250 MW</td>
<td>FY 18-1250 MW</td>
</tr>
</tbody>
</table>

### Scheme

<table>
<thead>
<tr>
<th>Scheme</th>
<th>Batch-I</th>
<th>Batch-II Tranche-I</th>
<th>Batch-III</th>
<th>Batch-IV</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bundling of power</td>
<td>VGF</td>
<td>Bundling of power</td>
<td>VGF</td>
<td>VGF</td>
</tr>
</tbody>
</table>

### Others

<table>
<thead>
<tr>
<th>Others</th>
<th>Batch-I</th>
<th>Batch-II Tranche-I</th>
<th>Batch-III</th>
<th>Batch-IV</th>
</tr>
</thead>
<tbody>
<tr>
<td>84 MW (under Migration scheme) &amp; DCR (30% under Solar Thermal)</td>
<td>375 MW (DCR)</td>
<td>500 MW (DCR)</td>
<td>250 MW (DCR)</td>
<td>5000 MW</td>
</tr>
<tr>
<td>FY 16-1250 MW</td>
<td>FY 16-1250 MW</td>
<td>FY 17-1250 MW</td>
<td>FY 17-1250 MW</td>
<td>FY 18-1250 MW</td>
</tr>
</tbody>
</table>

Capacity addition of at least 8 to 10 GW per annum is necessary to achieve target by 2022.
Overarching framework for bidding in solar

**Driver for RE Capacity Addition**

**Central Govt. initiative**

**JNNSM Overview**

**Wind Bidding guidelines Overview**

**Experience summary**

### Category
- Open
- Domestic Content Requirement (DCR)

### Bidding Process
- Single stage two envelope process
- Single stage two envelope process followed by e-Reverse Auction

### Location
- Solar Park
- Non-Solar Park
- Taluka wise (e.g. Karnataka)
- District/Substation wise (e.g. Telangana)

### Bidding Mechanism
- Bundling of solar power with thermal power
- VGF based Bidding

### Tariff Structure
- Levelised tariff
- Tariff with fixed escalation (e.g. REWA, MP)

### Procurer
- Multiple Discoms
- Single Discom
- PSUs

### Model
- Ground Mounted
- Roof Top
- Capex (Turn-key Basis)
- Developer (or RESCO)
Alternative D: Competitive Bidding framework (Solar) – 2/2

Driver for RE Capacity Addition

JNNSM Overview

Central Govt. initiative

Experience summary
Alternative D: Competitive Bidding framework (Wind) – 1/2

**Bid Size**
- Inter-State bid capacity 25 MW
- Inter-State bid capacity 50 MW

**Bidding Parameters & Process**
- Tariff (single part) based
- Single stage two envelope process
- Single stage two envelope process followed by e-Reverse Auction

**Preparatory Activities**
- Identification of 100% land at bidding stage-procession within 7 months from PPA
- Clearances (Environmental/Forest)
- Grid Connectivity

**Timelines and milestones**
- Issue of RFP to PPA – 105 days
- Financial Closure – 7mths from PPA
- CoD – 18 mths from PPA

**PPA Terms&conditions**
- 25 years
- To declare CUF upfront and allowed one time revision in first year of CoD
- Allowed to repower plant

**Qualification & Bidding conditions**
- Past track record; timely execution etc
- Financial criteria - (at least 20% of est. cap cost)
- EMD, PBG

**Overarching framework for bidding in Wind**

**Curtailment compensation**
- Offtake constraints due to Grid Unavailability-
- Offtake constraints due to Back down-

**Payment Security**
- LC (equiv. of 1 mth billing)
- PSF (equiv. of 3 mths billing)
- SGG (to cover energy charges plus termination compensation)(optional)
The reverse auction in wind energy sector brings the wind energy tariffs closer to the recently discovered tariffs in the solar power sector.

PPAs for 1050 MW of the concluded auction signed.
Way Forward on Role of Policy and Regulatory framework for RE promotion in SAARC countries
Overview of Energy Mix in SAARC countries

Overview:

- **Sri Lanka**: Thermal dominated state followed by Hydro Generation.
- **Pakistan**: Thermal dominated, but has a good mix of other generation sources like Hydro, Nuclear, Solar, Wind etc.
- **Bangladesh**: Gas dominated, imports electricity from India.
- **Nepal & Bhutan**: Small power system, dominated by Hydro Power Generation, cross border exchange of power from India.
- **Maldives**: Very small power system distributed in different Islands, mostly supported by Diesel Generating Plants.

*Ref.: Compiled from various sources CEA, IRENA, Ministry reports of SAARC countries, USAID SARI Report, World Bank data, ADB Reports, Elsevier Papers etc.*

South Asia - Country Wise Energy Mix
### Summary of Power sector & RE initiatives in SAARC countries:

**At a glance**

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Sri Lanka</th>
<th>Pakistan</th>
<th>Maldives</th>
<th>Bangladesh</th>
<th>India</th>
<th>Afghanistan</th>
<th>Bhutan</th>
<th>Nepal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Installed Capacity (~MW)</td>
<td>4057</td>
<td>25,347</td>
<td>245</td>
<td>13555</td>
<td>344002</td>
<td>1297</td>
<td>1614</td>
<td>523 (excl. Imports)</td>
</tr>
<tr>
<td>Per Capita Consumption (~kWh)</td>
<td>603</td>
<td>462.48</td>
<td>760.95</td>
<td>308.22</td>
<td>1122</td>
<td>136.8</td>
<td>2600</td>
<td>139</td>
</tr>
<tr>
<td>Peak Demand (~MW)</td>
<td>2406.4</td>
<td>24107</td>
<td>39</td>
<td>7900</td>
<td>158520</td>
<td>850</td>
<td>291</td>
<td>1385</td>
</tr>
<tr>
<td><strong>Fuel Mix</strong></td>
<td><strong>Coal, Hydro, Biomass, Other Renewables etc.</strong></td>
<td><strong>Coal, Hydro, Biomass, Other Renewables etc.</strong></td>
<td><strong>Diesel &amp; Solar Rooftops</strong></td>
<td><strong>Solar, Gas, Oil, &amp; Imports ~ 60%</strong></td>
<td><strong>Hydro, Diesel</strong></td>
<td><strong>Solar, Gas, Oil, &amp; Imports ~ 60%</strong></td>
<td><strong>Hydro, Diesel</strong></td>
<td><strong>Hydro, Diesel, Solar, etc.</strong></td>
</tr>
<tr>
<td>RE Potential (MW)</td>
<td>7,200</td>
<td>109,000</td>
<td>44</td>
<td>55,300</td>
<td>900,000</td>
<td>4500</td>
<td>24,000 (hydro)</td>
<td>47,100 (hydro)</td>
</tr>
<tr>
<td>RE Installed Capacity (MW) (incl. hydro power)</td>
<td>1,940</td>
<td>9,250</td>
<td>10.3</td>
<td>470 (excl. hydro)</td>
<td>106,200</td>
<td>340</td>
<td>1,650</td>
<td>1,070</td>
</tr>
</tbody>
</table>

*Ref.: Compiled from various sources CEA, IRENA, Ministry reports of SAARC countries, USAID SARI Report, World Bank data, ADB Reports, Elsevier Papers etc.*
Co-existence of FITs, RECs, CBG framework

Renewable Attributes

- Preferential Tariff regime
- APPC + REC regime
- Captive/Third Party RE Wheeling
- Competitive Bidding ??

Electricity Component

Regulated

Market determined

RPO target setting and Enforcement is crucial

RE resource specific RPO target setting and stringent enforcement is crucial
Summary: Role of Policy options and regulatory instruments

- In summary, there are **multiple Policy options** and regulatory instruments that are available for harnessing renewable energy potential in the country/state.

- **Choice of policy option** or regulatory instruments would depend upon several factors: viz. status of power sector, RE potential, number of market players and preparedness of entities, ecosystem for private participation etc.

- **Market Readiness or Preparatory work** in terms of site identification, resource assessment, land availability, clearances, evacuation arrangement which not only addresses information asymmetry but also mitigates development risk would yield maximum benefit of Bidding process with wider participation.

- **Guidelines may be formulated** with pilot/demonstration bidding in few cases to garner investor confidence and address regulatory/policy gaps, if any.

- **Co-existence of various** other policy instruments viz. FITs/RECs is likely to continue for some time. Strengthening of REC mechanism need to be addressed at early date.
Thank You

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