- New Regional TA –

Regional Cooperation on Renewable Energy Integration to the Grid

11-12 May 2017

CAREC Energy Sector Coordinating Committee Meeting, Dushanbe, Tajikistan

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Agenda

Launch of new Regional TA on Renewable energy

- Background – Grid readiness problem
- Scope of TA – Approach & expected benefit
- Implementation arrangement
- Conclusion

ISSUES TO BE ADDRESSED

- Grid readiness and storage solutions

1. Background

- Renewable energy development in CAREC -

Fact

- Slow RE development.

Renewable energy related activities

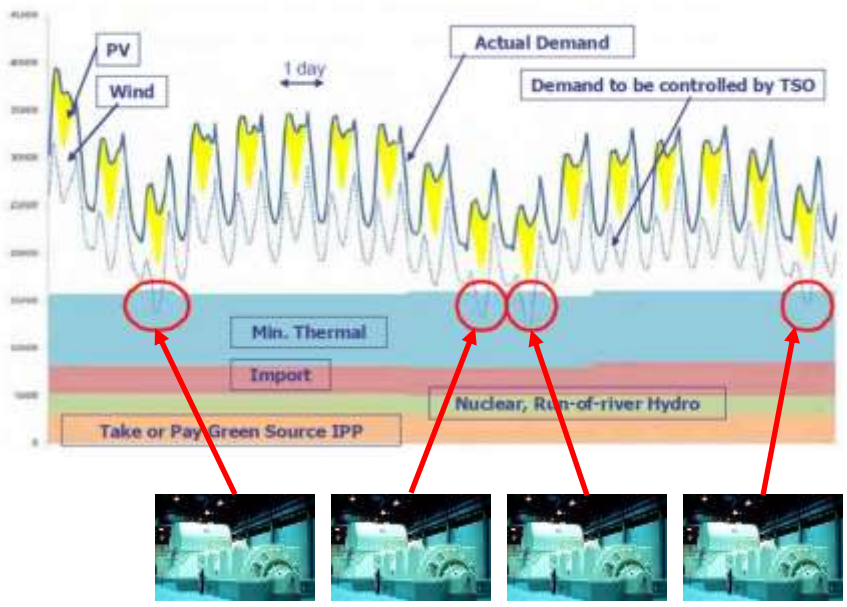
- “Leapfrogging of Clean Technology”
- “Promoting Private Investment”

Missing piece

- **Grid readiness:** Grid operators cannot permit RE connection to grid because grid is not ready.

2. Grid challenge

Q1. Who compensate backup generators' contribution?



GT x 4 units => $xxx?

Fig 1: Demand Supply balance in Terna grid in Italy (August 2011)

Q2. How to control unexpected solar & wind power generation's behavior?

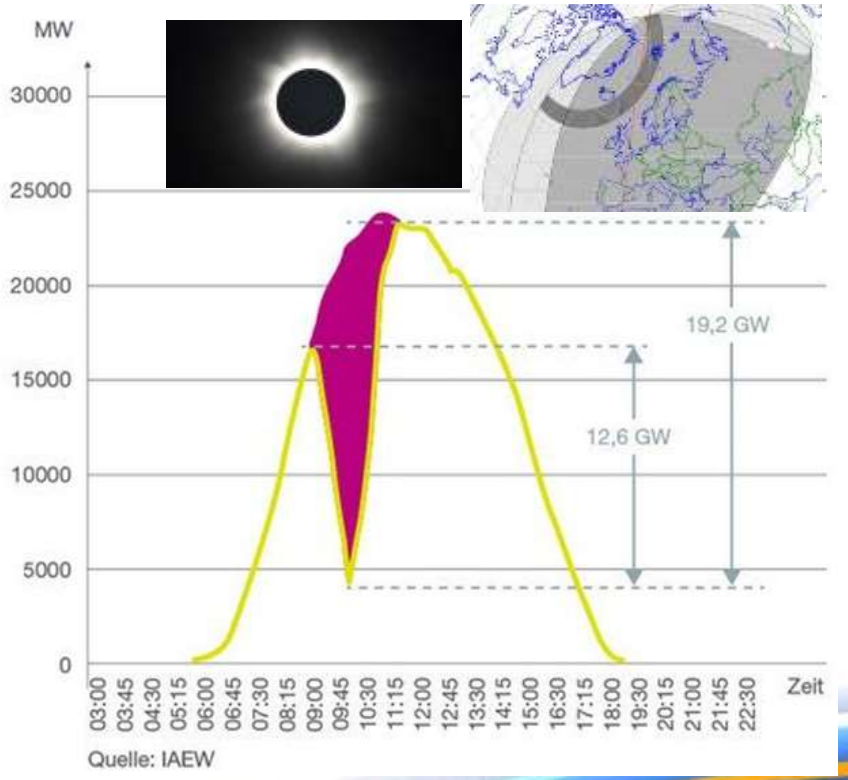


Fig 2: March 2015 Sun eclipse in Europe

New technology investments needed to avoid the risk of widespread blackout due to unmet balance.

3. Key questions

Grid may not be ready to accept large-scale solar & wind power generation.

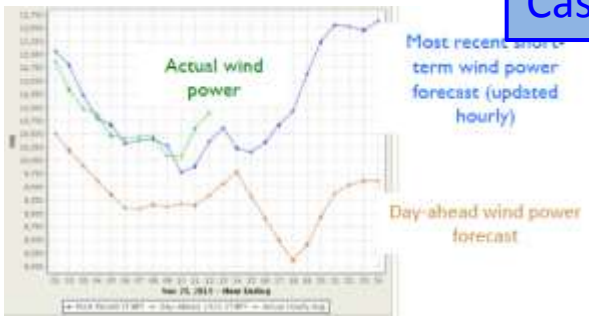
1. **Generator/ transmission:**
   - ❖ Enough spinning reserve capacity?
   - ❖ Enough transmission capacity?
2. **Code:**
   - ❖ Backup generators compensated enough for providing spinning reserve capacity?
   - ❖ Grid connection requirement agreed between TSOs & RE-IPP?
3. **People:**
   - ❖ Enough grid operators who can manage RE behavior?
4. **Technology:**
   - ❖ Investment in appropriate technology?

SOLUTION PROPOSED BY THIS TA

4. International best practice

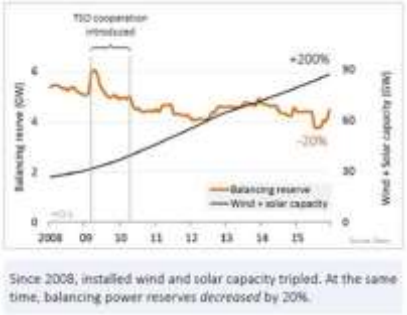
- **Manage renewable energy**
  a) SCADA-connected RE power plants for monitoring (& controlling)
  b) RE output forecasting system for daily dispatch may save fuel cost by reducing the standby backup generators
- **Share resources**
  a) Regional Grid Control Cooperation (GCC): sharing spinning reserve among neighboring countries may lower the capacity reserve development
- **Technology**
  a) Use of up-to-date technology and practices, including storage and electric vehicles

Case in US.



Expected benefit: Reduce standby reserve (save fuel cost)

Case in Germany.



Expected benefit: Reduce reserve capacity (save investment)

5. Proposed TA scope

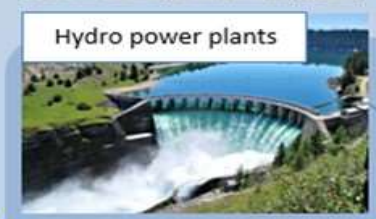
Target: Transmission System Operators (TSO).

1. **Generator**: Assess spinning capacity
   i. How much necessary?
   ii. How much will it cost?
   iii. Who will pay and how?
   iv. Will the cost decrease if developed regionally?
2. **Transmission**: Assess transmission capacity & interconnection needs
   i. When will reinforcement need, including cross-border interconnection?
3. **Code**: Harmonized spinning capacity development
   i. In case of regional cooperation, what aspects need to be discussed among countries?
4. **People**: Capacity development to grid operators
   i. Assess the impact of operation supporting tools.
   ii. Experiencing renewable energy forecasting service in daily dispatch.
   iii. Share lessons among target countries.

6. Covered targets

Gas thermal plants

Hydro power plants



Coal thermal plants

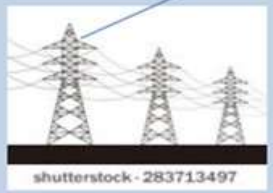
RE power plants

Regulatory support
EWP: 4&6

Utility, Control center

Operation support
EWP: 2&6

Utility, Grid



Operation support
EWP: 2&6

CAREC

1. Developing the regional energy market (E-CASAREM)	2. Promoting regional electricity trade and harmonization	3. Managing energy-water linkages	4. Mobilizing financing for priority projects	5. Capacity development and knowledge management	6. Promoting and prioritizing clean energy technologies

Energy Sector Work Plan 2016-2020

End users

: This TA's intervention

: the other TAs intervention

Storage system

Electric vehicle

Prioritizing clean technology
EWP: 6

7. Expected outputs

Target: Transmission System Operators (TSO).

1. **Generator/ Transmission: Roadmap** of spinning reserve & transmission reinforcement plan for renewable energy.
2. **Code:** Spinning reserve **pricing mechanism**.
3. **People: Training**.
4. **Knowledge sharing: Working committee**.

8. Implementation arrangement

Grid operators as focal

⇒ a **working committee** to share study finding and training.

Western Europe (COoRdination of Electricity System Operator)	Japan (Organization for Cross-regional Coordination of Transmission Operators)
coreso 	OCCTO 

Table 1: Sample of regional working committee

9. Working committee

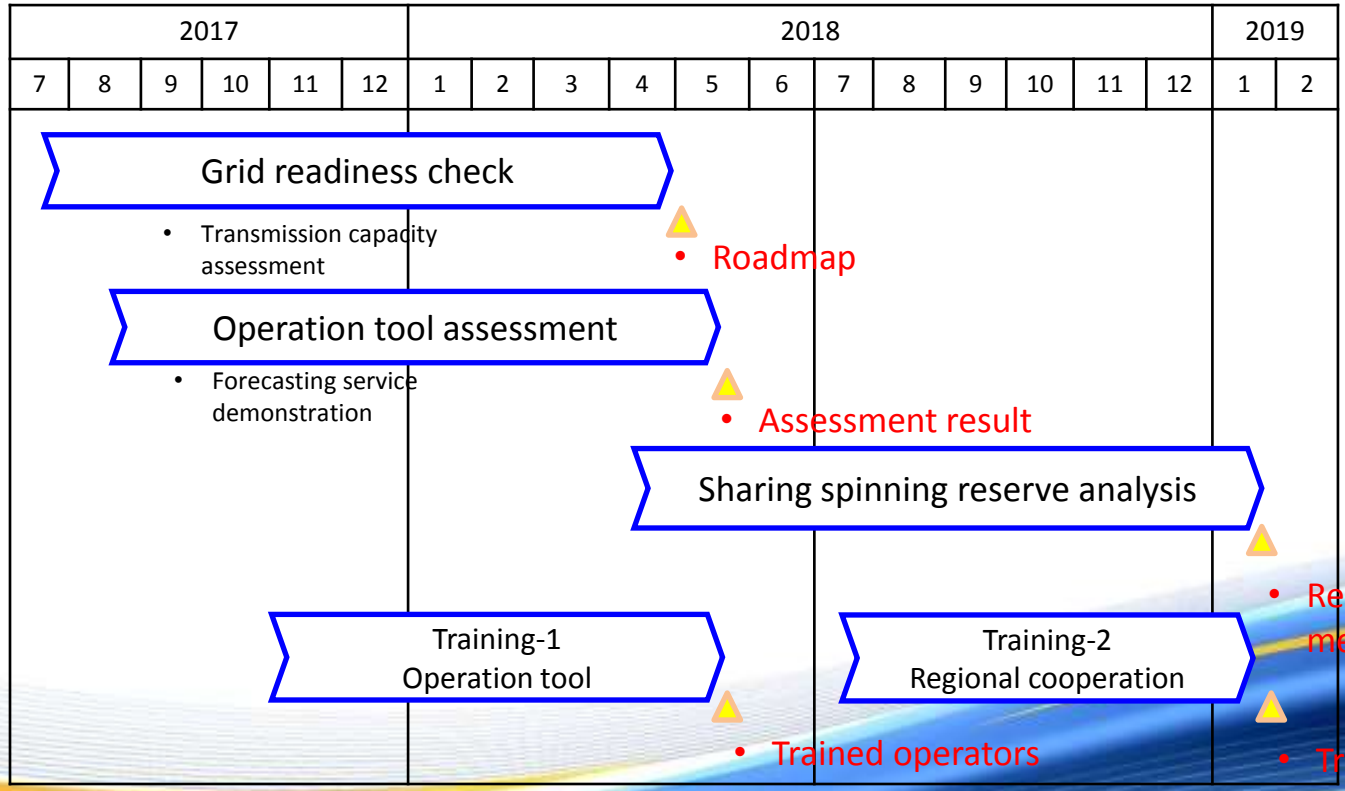
Fig 3:Key role of working committee

10. TA at Glance

Countries: Afghanistan, Kazakhstan, Kyrgyz Republic, Pakistan, Tajikistan, Turkmenistan, and Uzbekistan (countries with power trading)

Input: 40 international and 50 national consultants

Schedule: July 2017 – January 2019 (19 months)



Endorsement/ recommendation from ESCC

To confirm

- Scope: To meet the grid readiness requirement, (i) securing the optimal amount of reserve capacity of backup generators/ storage in less costly manner; (ii) reinforcing the transmission capacity of the network (sample system analysis for Uzbekistan); (iii) educating grid operators to adopt modern tools like forecasting system in their daily dispatching operation to control intermittent RE behavior (sample demonstration of forecasting service at one country).
- Countries participated: Includes Afghanistan, Kazakhstan, Kyrgyz Republic, Pakistan, Tajikistan, Turkmenistan, and Uzbekistan.
- Timeline: Starts in July 2017 and ends in January 2019.
- Arrangement: Formation of working committee comprised of the countries' grid operators as country focal, chaired by Uzbekistan to facilitate the discussion, training, and output dissemination. Consultant hired by ADB will support the working committee in the administration and the coordination.

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