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# CENTRAL ASIA TRADE FORUM CAREM ECONOMIC BENEFITS

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OCTOBER 6<sup>TH</sup>, 2021



# RATIONALE

## Diagnosis

Low volume of cross border trading

Studies show important potential benefits and increase of security by a regional market

Existing cross border transmission facilities, agreements and a regional institution like CDC

## Objective

Improve the regional market to increase trading and security

## Actions

Identify the measures, agreements and regulations to launch shortly the regional market (CAREM)

# WHY CAREM?

- Highly concentrated and diverse energy resources
- National power systems are aging (e.g. generation and transmission)
- Open market trading can allow for lower electricity prices
- Increased revenues for resource rich countries
- Export of electricity is a valuable source of foreign currency
- More efficient utilization of power generation and increased energy efficiency
- Increasing export opportunities will help increase renewable energy projects



# POTENTIAL BENEFITS FROM CROSS-BORDER ELECTRICITY TRADING

- **Reduction of variable costs** by exports from countries with lower variable costs. Trading is based on bilateral contracts or a day ahead spot market. In the future a real time market can also produce benefits based on the same criterion.
- **Reduction of CO<sub>2</sub> emission** using economic dispatch
- **Mutual support during emergencies**, reducing non supplied energy or reducing time with unsecure operation;
- **Trading of ancillary services**, reducing costs to provide frequency regulation and increasing operational security. A particular case is trading of balancing energy, allowing a country without appropriate regulating resources to obtain frequency regulation from another country;
- **Sharing of long-term reserves**, i.e., reserves necessary to maintain the supply when there are planned or unplanned outages of major generation units or transmission facilities, unexpected increase in demand (temporary or permanent) or low renewable generation;
- **Possibility to build power plants of regional scale**, which may be too big for a single country.

# ESTIMATION OF BENEFITS IN CAREM

Benefits arise from a regional dispatch that minimizes variable costs (VC) to supply the regional power demand.



The study's objective is the estimation of these benefits.

## **Methodology:**

Long-term horizon simulation of the operation of national power systems with and without cross-border trading.

VC to supply the local demand **vs** VC to help supply the regional demand

## **Results:**

VC in each country to supply the aggregated regional power demand.



The sum of the differences in VC (with/without) is the total benefit for the overall region.

Benefits are allocated to each country using a defined mechanism to price the traded energy: hourly Marginal Price.

MP = market price or the cost of the most expensive unit dispatched.

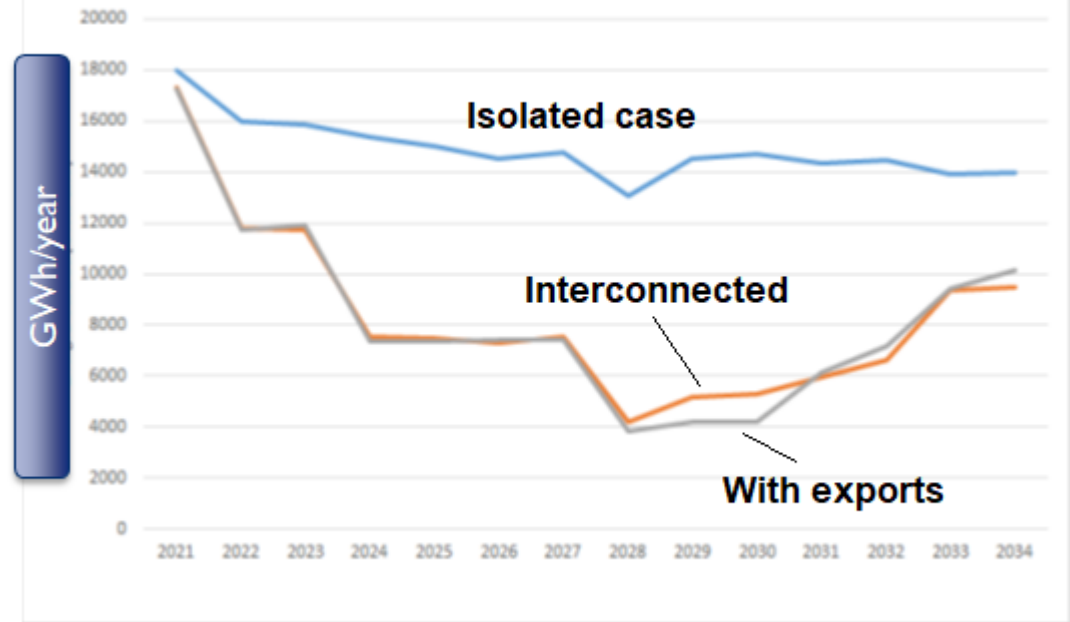
# WHAT NEXUS OPTIMIZATION CAN PROVIDE FOR CA COUNTRIES

- A new vision on water management strategies, particularly a dynamic approach for transfer of water from summer to winter, and from wet to dry years;
- Taking advantage of the total water regulating capability of existing and new reservoirs jointly with a cooperative approach to water management can lead to:
  - Reducing risk of water shortages;
  - Reducing costs to meet the electricity demand by a optimized operation of reservoirs linked to efficient cross border trading of electricity;
  - And improving security of supply.

# REDUCTION OF WATER SPILLAGE

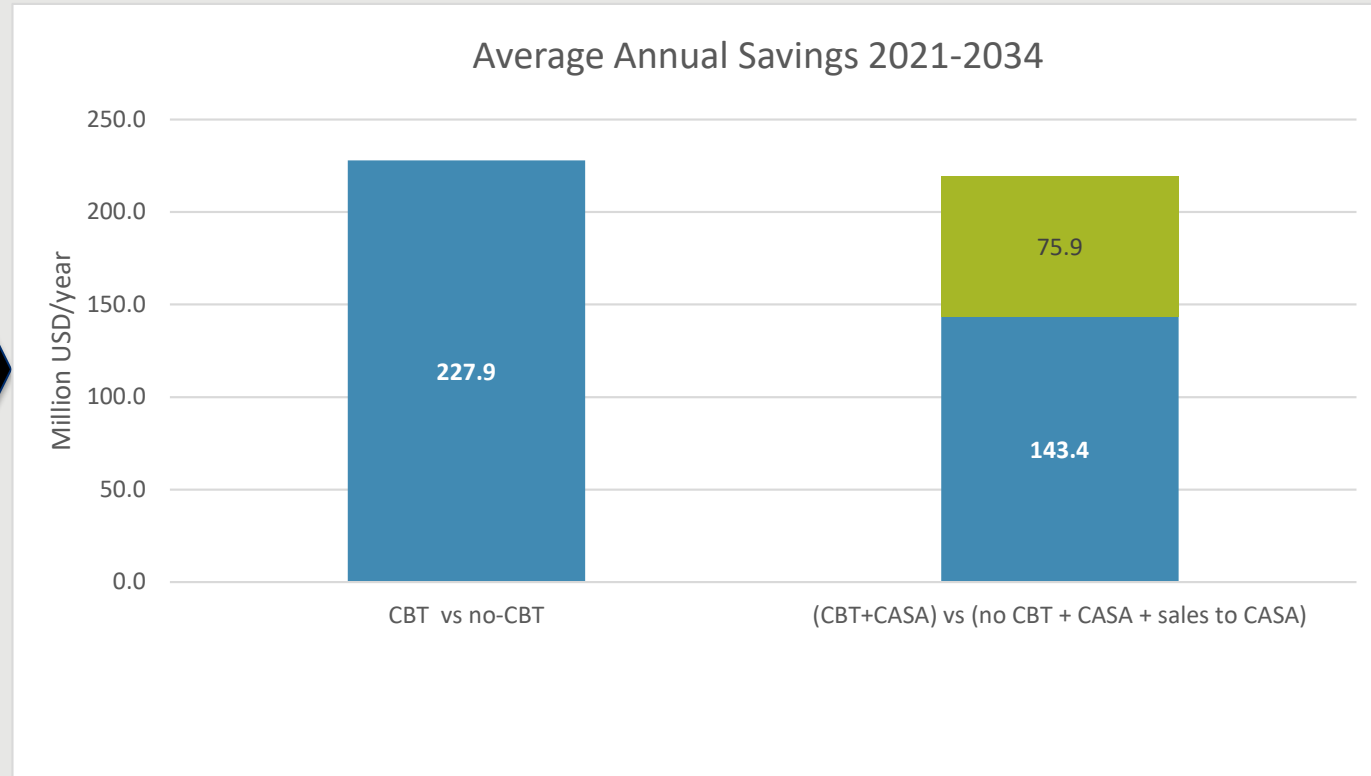
Cross border trade allows exporting energy that in case the countries operate isolated, would be spilled. Most of savings are in TJ

Annual Energy of Spilled Water




# AVERAGE ANNUAL ECONOMIC BENEFITS DURING 2021-2034

CASA-1000 generation cost valued at marginal cost in Sangtuda generation system.





A large wind turbine with a red and orange tower and white blades stands in a field of brown, harvested crops. Another smaller turbine is visible in the distance. The sky is filled with heavy, grey clouds.

CENTRAL ASIA REGIONAL ELECTRICITY MARKET

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