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The **11th** **CENTRAL ASIA TRADE FORUM**

CENTRAL ASIA: POST-COVID RECOVERY THROUGH BETTER CONNECTIVITY

**OCTOBER
4-8, 2021**

A VIRTUAL EVENT

WWW.CATRADEFORUM.ORG

INTEGRATING RENEWABLE ENERGY IN THE CENTRAL ASIAN POWER SYSTEM

Challenges and Solutions

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Central Asia

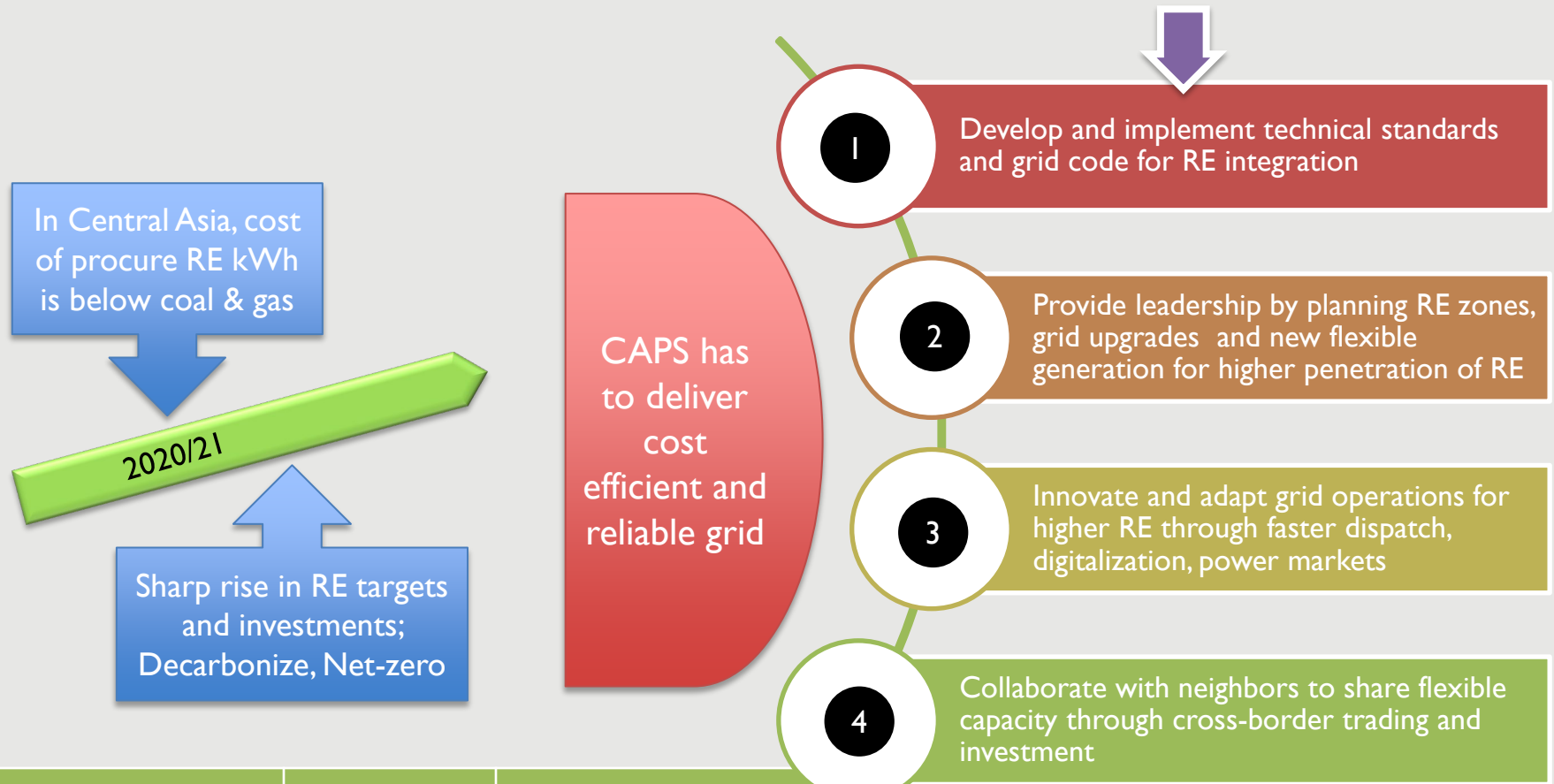
President, Innovative Wind Energy, Inc.

AGENDA

- Why is renewable energy interesting in CA?
- What is grid integration of RE?
- Why is grid integration important?
- Key messages

WHY IS RENEWABLE ENERGY INTERESTING IN CA?

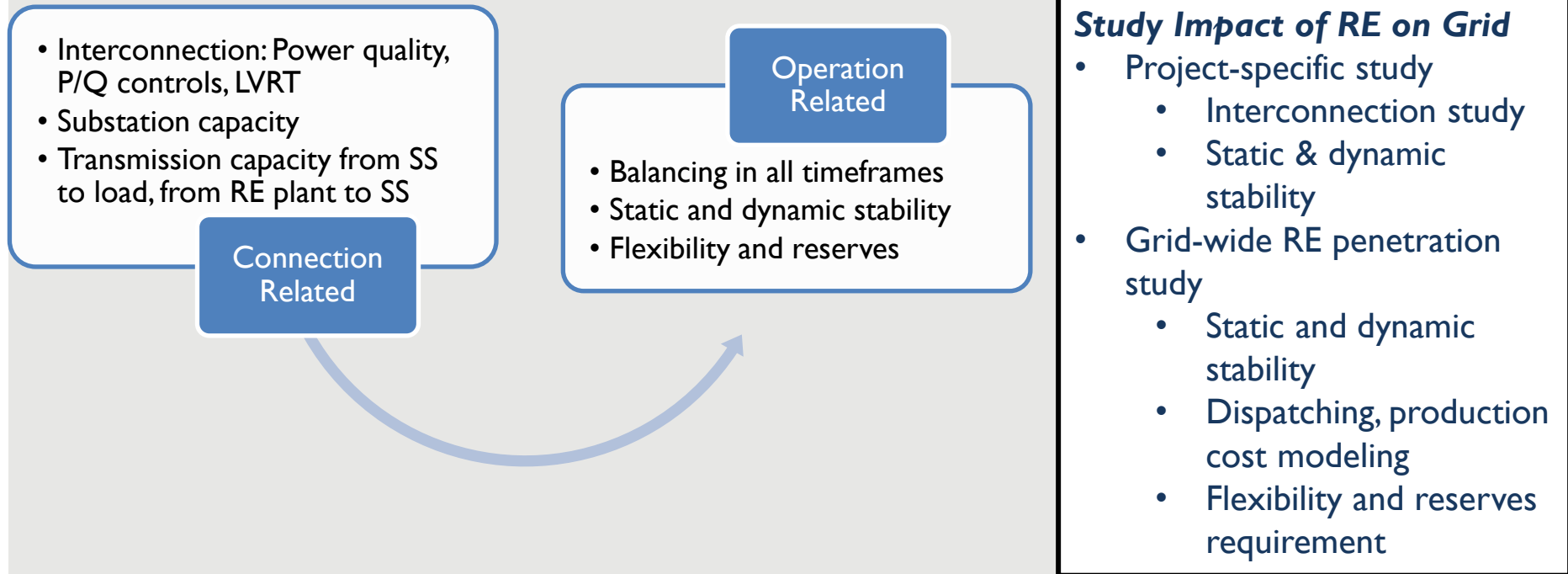
USAID'S POWER THE FUTURE AND POWER CENTRAL ASIA ARE PROVIDING TECHNICAL ASSISTANCE TO CA IN INTEGRATING HIGHER GENERATION FROM RE IN 4 AREAS



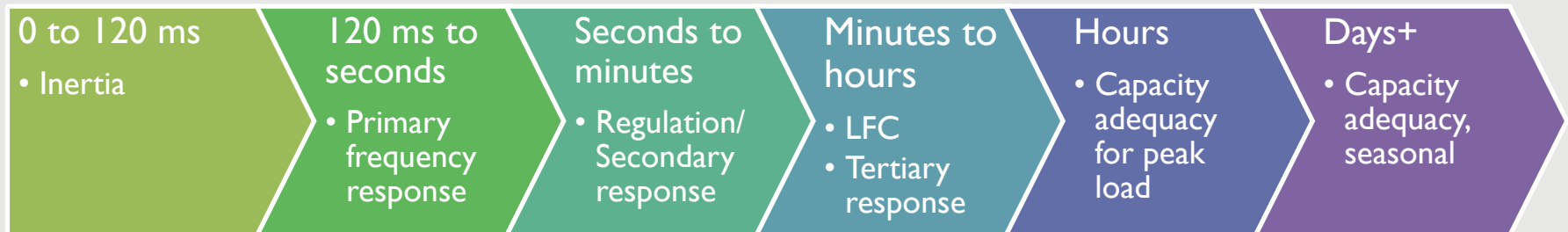
RE Auctions in 2021	US cents/kWh	Projects
Uzbekistan, Solar	1.791 1.805 1.823	200 MW, Samarkand, IFC 200 MW Sherabad, ADB 200 MW Jizzakh, IFC

CAPS: Central Asia Power System
 IFC: International Finance Corp
 ADB: Asian Development Bank

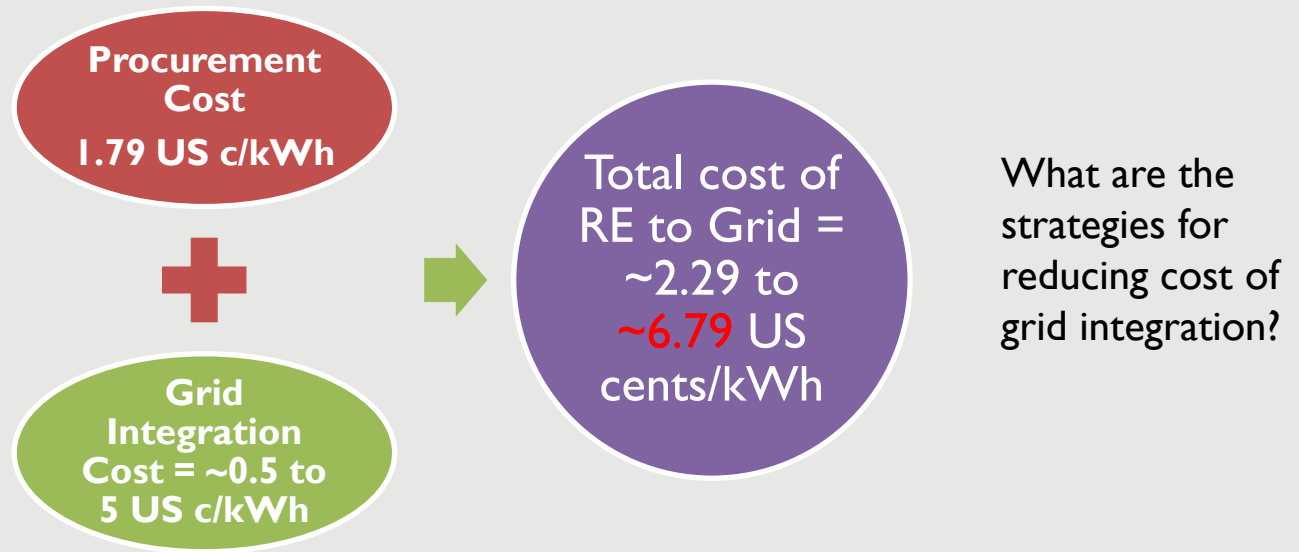
WHAT IS GRID INTEGRATION OF RE?



Balancing in different timeframes



WHY IS GRID INTEGRATION IMPORTANT?



Grid Integration Cost Components

Scenario	Transmission & Substation	Flexible Generation	Reserves	System Operations	Others
Low RE	<input checked="" type="checkbox"/> Local upgrade			<input checked="" type="checkbox"/> RE Gen Forecasting	<input checked="" type="checkbox"/> Grid code, Tech. standards
Medium RE	<input checked="" type="checkbox"/> Static stability, DLR, ANM	<input checked="" type="checkbox"/> Higher LFC	<input checked="" type="checkbox"/> Higher RR, Ramping R	<input checked="" type="checkbox"/> Sub-hourly dispatch	<input checked="" type="checkbox"/> REZ, Bigger Balancing area
High RE	<input checked="" type="checkbox"/> Dynamic stability, new lines, C-RAS	<input checked="" type="checkbox"/> BESS	<input checked="" type="checkbox"/> Higher PFR	<input checked="" type="checkbox"/> Faster Dispatch, RE in DAM & BM	<input checked="" type="checkbox"/> RE District Heating
90+% RE	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> Long-term ESS	<input checked="" type="checkbox"/> Higher inertia	<input checked="" type="checkbox"/> Real time dispatch	<input checked="" type="checkbox"/>

KEY MESSAGES ON GRID INTEGRATION FOR CA

When Grid integration is done poorly, it can result in significant curtailment of RE generation, larger import/export, higher use of expensive peaker plants, lower reliability, delays in interconnection of commissioned plants, and others.

Recommendations

Develop a roadmap

- ✓ Adopt best practices from grids with high RE
- ✓ Vision, strategy
- ✓ Policy and regulations
- ✓ Roles/ responsibilities and timeline

Conduct Studies

- ✓ Production cost modeling, Dispatchability study
- ✓ Static/ dynamic stability study
- ✓ Flexibility and reserves study
- ✓ Others: protection, power quality

Require RE plants to do more

- ✓ RE+BESS for improving capacity adequacy
- ✓ High technical standards
- ✓ Limited must-run

Modernize the grid

- ✓ Digitalization of system operations
- ✓ Smart grid
- ✓ WAMS, DLR, ANM
- ✓ Demand response
- ✓ Real time market

Adopt a regional approach

- ✓ Trade flexibility
- ✓ Trade reserves
- ✓ Upgrade transmission

BESS: Battery energy storage system, WAMS: Wide area measurement system, DLR: Dynamic line rating, ANM: Active network management