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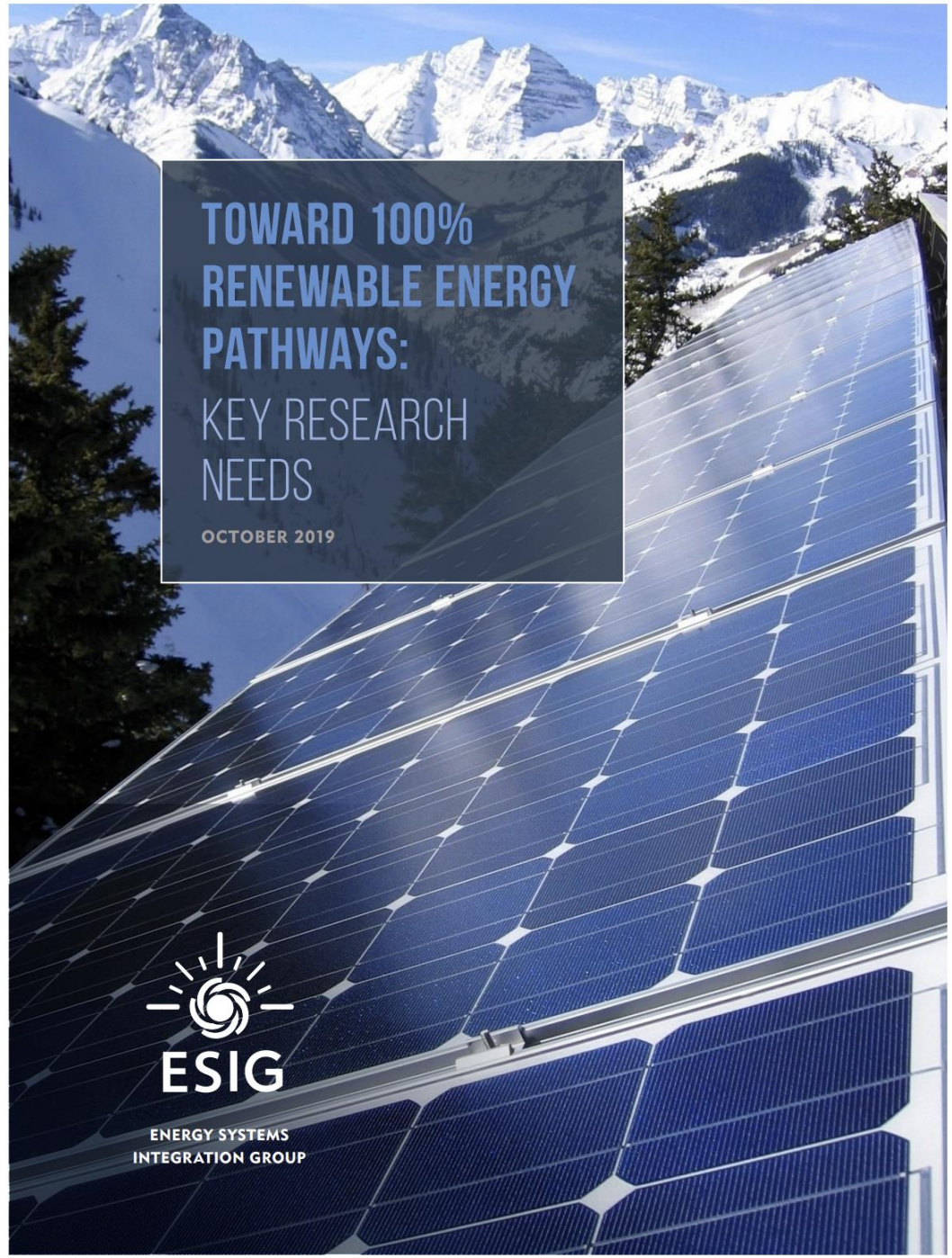

TOWARD 100% RENEWABLE ENERGY PATHWAYS:
KEY RESEARCH NEEDS
OCTOBER 2019
ESIG
ENERGY SYSTEMS INTEGRATION GROUP

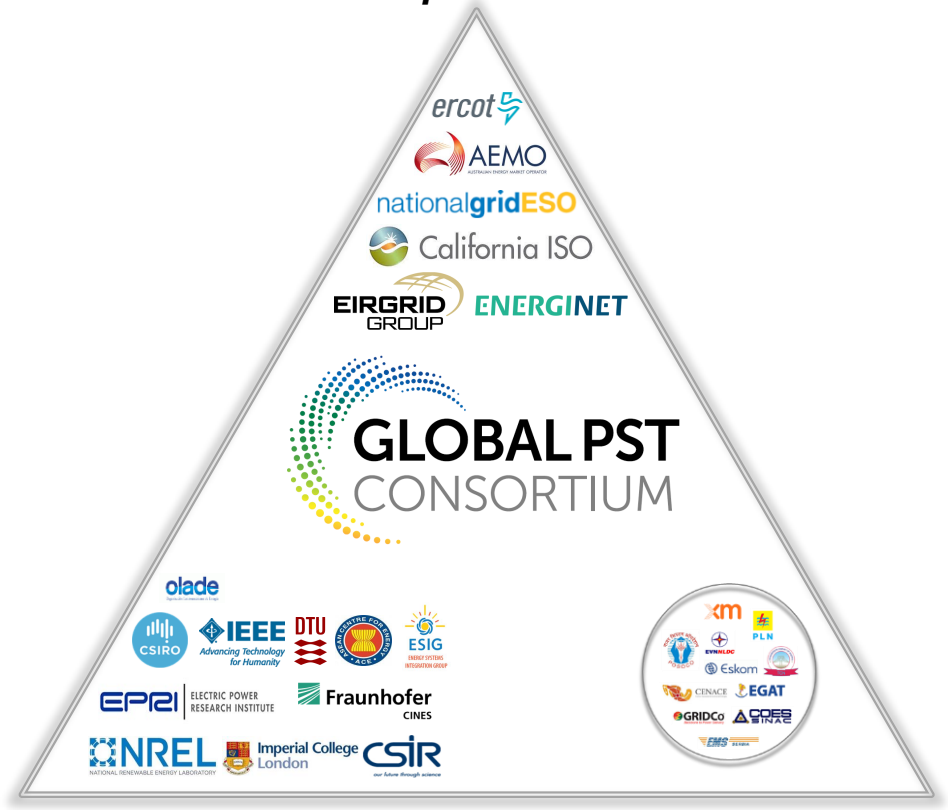
Global Power System Transformation (G-PST) Consortium

What?

A new global **Consortium** focused on support to **power system operators with advanced, low emission solutions**

Who?

Founding System Operators



Core Team

Example Developing Country System Operators

Why?

Because the **technical and engineering knowledge** is not being created or transferred to power system operators at the **speed and scale required to support the global energy transition**

Why work with System Operators?

System Operators are responsible for implementing power system transformation

Policymakers and other stakeholders listen to System Operators, which can help raise confidence and ambition

System Operators must transform procedures and grids to integrate high levels of clean energy and can attract private investment

System Operators best learn from and become inspired by their peers, including those at the forefront of integrating RE

System Operators have an emerging role in cross-sector electrification and end-use efficiency efforts

Global Power System Transformation Consortium will advance action in 5 key *pillars*

1. System Operator Research & Peer Learning

ESIG

Perform cutting edge applied research to create novel system operator solutions and globally disseminate and infuse new insights through peer learning

2. System Operator Technical Assistance

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Provide implementation support to scale established best practice engineering and operational solutions

3. Foundational Workforce Development

Imperial College London

Build the inclusive and diverse workforce of tomorrow through enhanced university curriculum and technical upskilling for utility and system operator staff

4. Localized Technology Adoption Support

IEEE
Advancing Technology for Humanity

Adapt modern power system technologies to individual country contexts through testing programs and standards development activities

5. Open Data and Tools

Fraunhofer CINES

Support rigorous planning, operational analysis and enhanced real-time system monitoring through open data and tools

CORE TEAM – All Core Team members contribute to all activity pillars

REGIONAL LEADS – Coordinate regional peer learning networks and country-level TA delivery efforts for Africa, Asia, and Latin America and the Caribbean

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INTERIM SECRETARIAT – Work program coordination, partnerships and support, outreach, etc.

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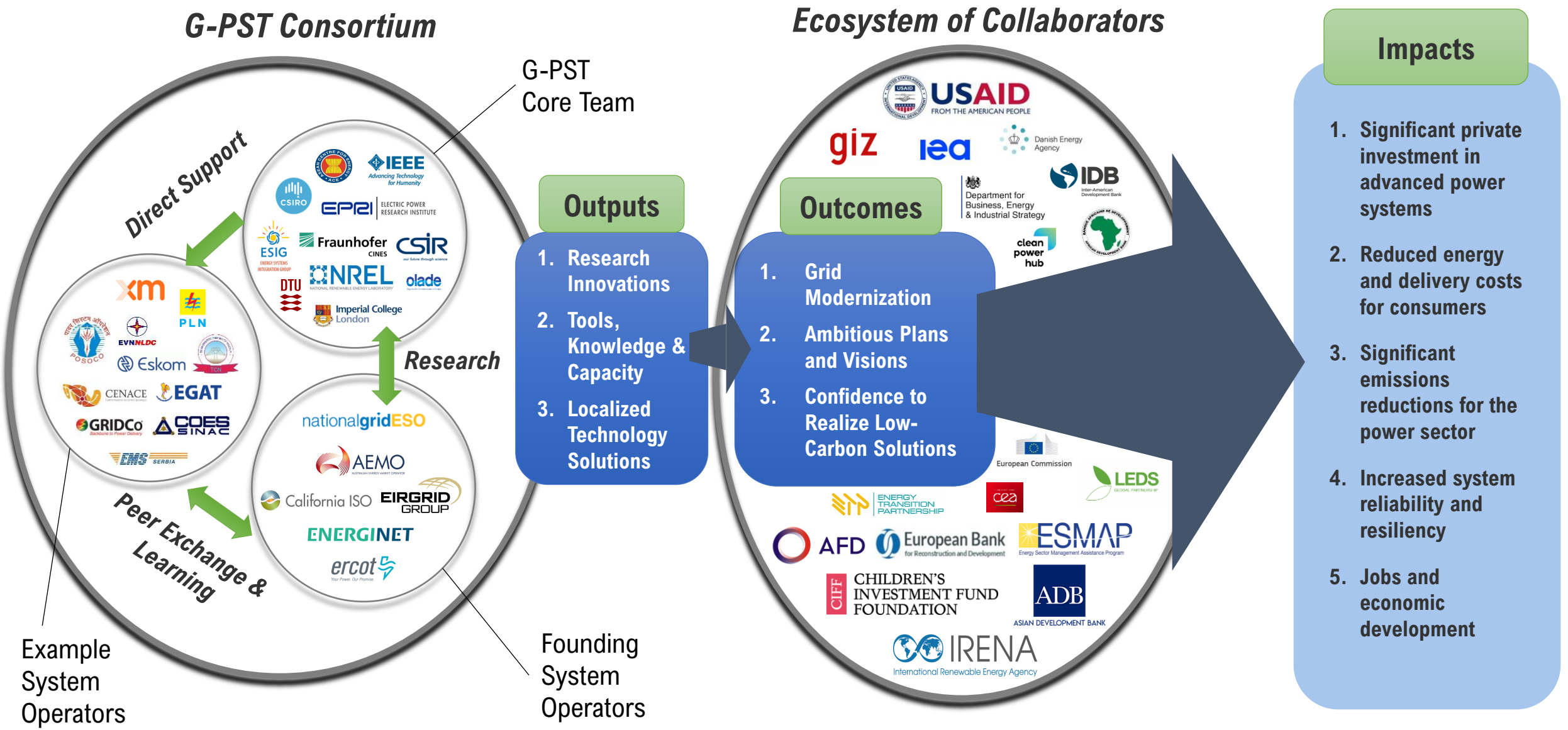
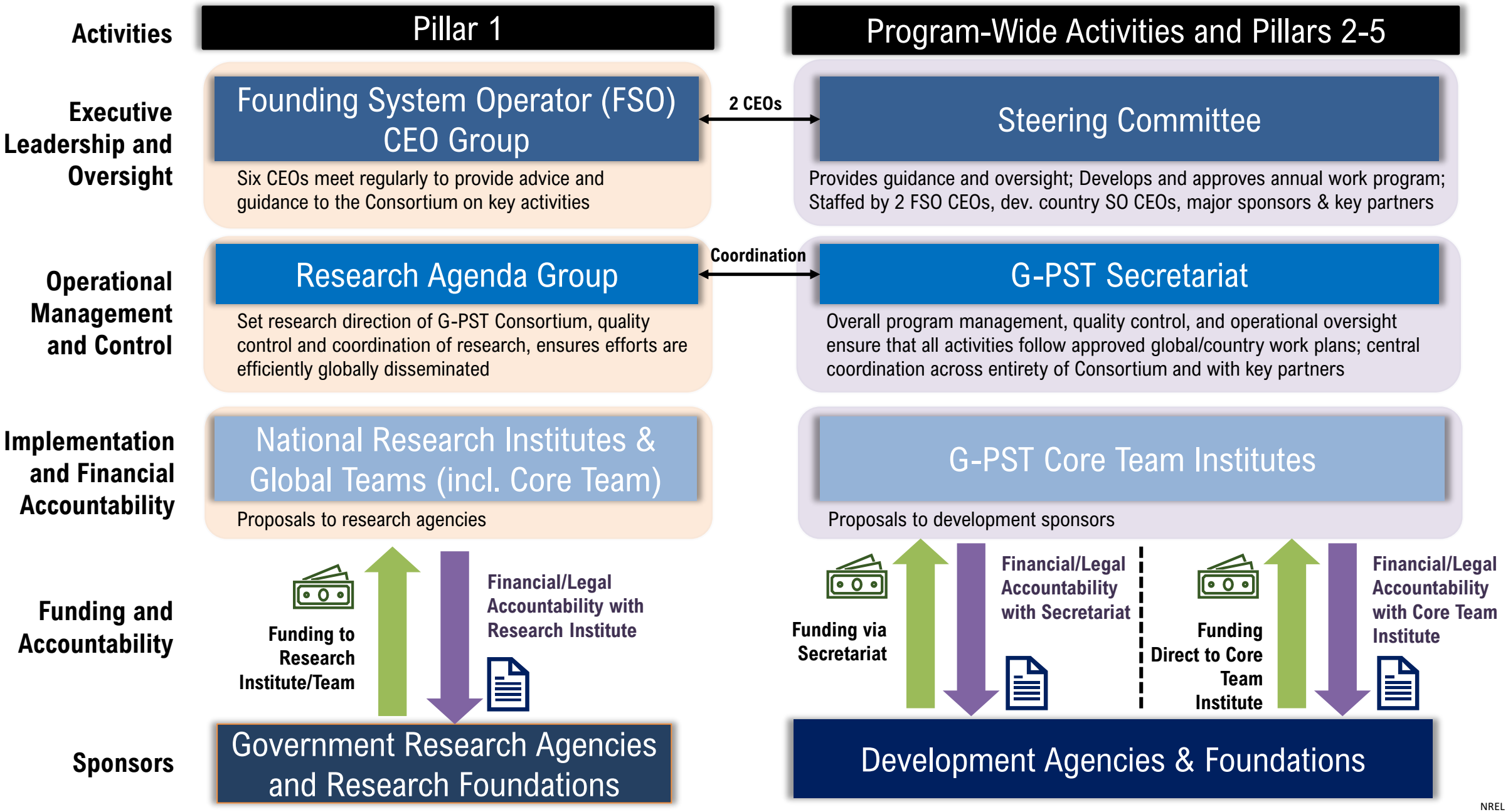
Outputs, Outcomes and Impacts



G-PST Consortium Governance & Funding Model



Pillar 1 – System Operator Research and Peer Learning

RESEARCH AGENDA GROUP

Participants: 6 CTOs (or equivalent) from 6 Founding System Operators + Senior Research Institute Staff

Immediate Focus: Currently finalizing a prioritized list of near-term (i.e., by 2030) research priorities for System Operators on the leading edge of energy transition

Initial group dialogues with Founding System Operators and team of researchers

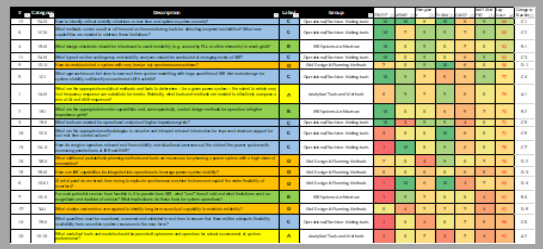
Initial Research Landscape

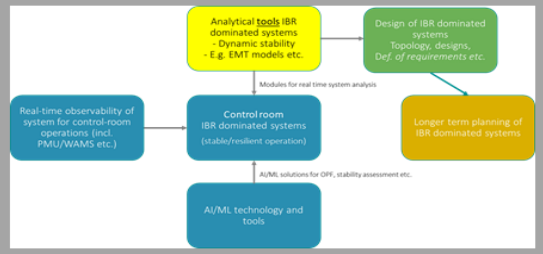
Generated 61 top R&D questions from FSOs

Founding System Operator Survey

Comprehensive survey of FSO internal priorities for 61 R&D questions

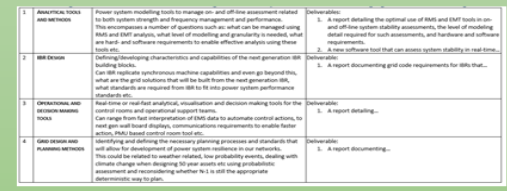
Prioritization and Categorization





18 essential R&D questions categorised into 4 Program Areas by Founding System Operators

Action Sequencing and Phase I Research Task Identification



Four Research Program areas that form top immediate-term priorities

- **Research Planning**
- Project descriptions for Phase I Research Tasks
- Deliverables
- Budgets and resource requirements

Research Programs and Priorities Identified

- **Four Research Programs Identified:**
  - Analytic Tools and Methods
  - IBR Design & Economics
  - Control Room of the Future
  - Planning with IBR and DER
    - Blackstart

- **My Observations:**
  - Driven mainly by IBR characteristics
  - The Control Room is at the heart of the issues
  - Needs a global community that has critical mass to solve including vendors, OEMs etc.
  - We have accomplished much – but there is more to be done and it is different

Conclusion

Let's get stuff done

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