

Unlocking Zero-Emission, Low-Cost, Secure, and Reliable Power Systems

Countries around the world are committed to rapid energy system decarbonization, with the power system playing a critical role in this transition. However, unprecedented growth in renewable energy deployment creates new and complex operational challenges for power system operators; even the most advanced system operators are unsure about managing these changes while maintaining stable grids. If not resolved, these complex challenges will hinder progress on decarbonization goals.

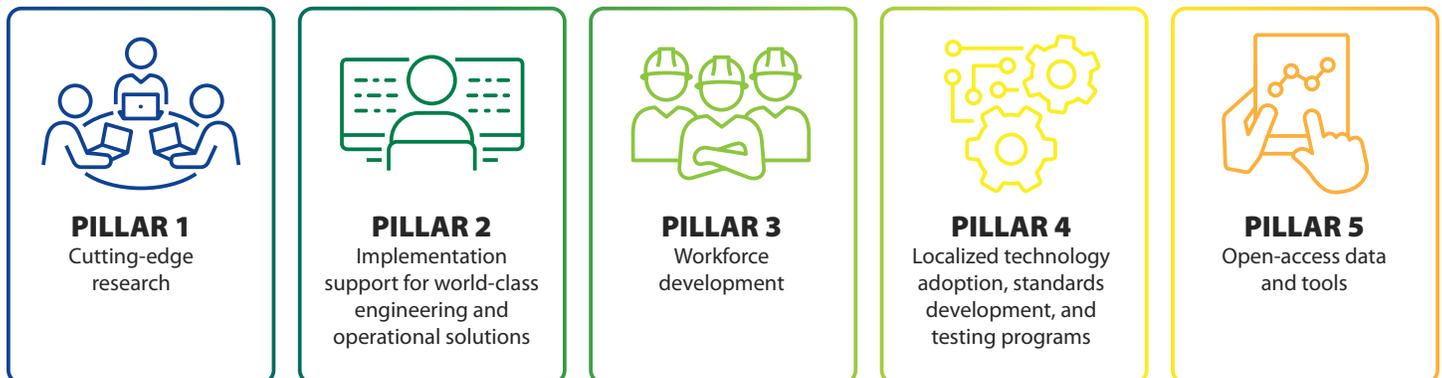
Recognizing this issue, the Global Power System Transformation Consortium (G-PST) was founded in 2019 to accelerate the global clean energy transition by advancing the technical capability of power system operators—enabling all countries to maximize their deployment of renewable generation. **G-PST helps solve system operator challenges by harnessing the power of the world’s leading research institutions to provide coordinated research, technical training, and direct knowledge exchanges among system operators around the world.** By connecting G-PST’s ecosystem of partners with one another to share lessons and insights about common challenges, each partner can more quickly identify solutions to their unique constraints, accelerate their adoption of advanced energy technologies, and chart an aggressive yet achievable path toward their decarbonization goals.

In 2022, G-PST and its founding system operators committed to the operation of a gigawatt-scale system with 100% inverter-based resources by 2025. To enable a broader set of system operators to achieve that milestone, the G-PST also committed to disseminating learnings and technical accomplishments globally to drive a step-change in the decarbonization of energy systems. Collectively, these ambitions aim to drive technical progress at all system operators, no matter where they are in the energy transition, by accelerating the development and sharing of solutions through G-PST’s global network.

Progress and Accomplishments

System operators partnered with G-PST have achieved major operational milestones in their energy transitions. For example:

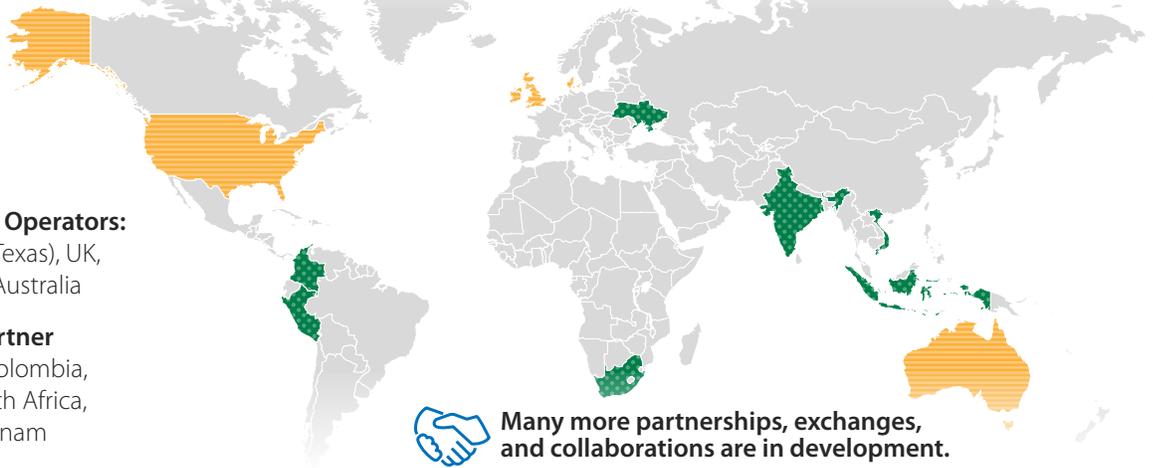
- **Australian Energy Market Operator** reached 60% instantaneous renewable energy generation in 2021.¹
- **California Independent System Operator** achieved 103% instantaneous renewable energy generation in May 2022.²
- **EirGrid (Ireland)** demonstrated that up to 75% of its electricity can be generated from wind and solar at any time.³
- **Eskom (South Africa)** has over 6 GW of renewable energy capacity, with an additional ~1 GW added in 2021, achieving 19% instantaneous wind and solar generation.^{4,5}
- **Power System Operation Corporation (India)** has over 118 GW of renewable energy installed capacity and achieved 30% instantaneous wind and solar generation in 2021.⁶



← G-PST’s Activities Are Organized into **Five Integrated Action Pillars** →

To date, G-PST is formally partnered with **13 system operators across 12 countries**.

-  **Founding System Operators:**
US (California and Texas), UK, Ireland, Denmark, Australia
-  **Pillar 2 Formal Partner Countries:** Peru, Colombia, Ukraine, India, South Africa, Indonesia, and Vietnam



Many more partnerships, exchanges, and collaborations are in development.

While these advancements in power system transformation are the result of a confluence of efforts, they illustrate why G-PST's mission—to answer pressing research questions and share best practices across the system operation industry—is so critical. Further coordination and support for system operators around the world will be necessary to hasten the pace and scale of these types of accomplishments.

Within G-PST, significant progress has also been made across the consortium's direct activities and functions. Examples include:

- Implementing more than 15 collaborations in 2021 among the world's most advanced system operators to share solutions for integration of very high shares of variable renewables.
- Convening a grid-forming technology council of leaders in renewable energy development, system operation, manufacturing, and software development to increase the proliferation of grid-forming technologies and pilot programs, such as the [Network Option Assessment Pathfinder projects](#), launched by National Grid ESO in 2022.
- Building technical capacity and confidence with over 45 staff members from system operators in developing countries across the world through consistent engagement in trainings, technical discussions, and peer exchange.
- Partnering with the United States Agency for International Development to launch the [Women in Power System](#)

[Transformation initiative](#) which addresses barriers to women's and other underrepresented groups' participation and leadership in the power sector. The initiative concluded its inaugural internship program in August 2022.

- Identifying and publishing a [teaching agenda](#) of 90 power system transformation topics that G-PST is developing into no-cost, university-level course material. Five of these topics are being introduced through train-the-trainer activities with universities worldwide in 2023.
- Strengthening best practices for grid standards, testing, and certification through targeted training and resources, including the release of a [white paper](#) on applicable standards, testing, and certification activities to support power system transformation. Support also includes collaboration with stakeholders in the government and power system of Panama on the implementation of IEEE 1547.
- Establishing a [tools portal](#) to connect operators with open-source power system operation tools, in addition to building capacity on open data and tools through no-cost peer-learning programming.
- Hosting over 40 technical webinars since 2021, attended by thousands of practitioners around the world, and which are available to watch at no-cost through the [G-PST's resource library](#).

Learn more about the G-PST's accomplishments: globalpst.org

¹ Daniel Westerman's Australian Energy Week speech: Orchestrating the pace of change so the energy system stays functional through the transition, AEMO. <https://aemo.com.au/newsroom/news-updates/orchestrating-the-pace-of-change>.

² California just ran on 100% renewable energy, but fossil fuels aren't fading away yet, NPR. <https://www.npr.org/2022/05/07/1097376890/for-a-brief-moment-calif-fully-powered-itself-with-renewable-energy>.

³ Electricity Grid to Run on 75% Variable Renewable Generation Following Successful Trial, EirGrid. <https://www.eirgridgroup.com/newsroom/electricity-grid-to-run-o/>.

⁴ Eskom Data Portal. <https://www.eskom.co.za/dataportal/>.

⁵ Statistics of utility-scale power generation in South Africa in 2021, CSIR. <https://www.csir.co.za/sites/default/files/Documents/20220503-Statistics%20of%20power%20in%20SA%20H2-2021-CSIR-%5BFINAL%5D%20%281%29.pdf>.

⁶ Physical Progress, Ministry of New and Renewable Energy. <https://mnre.gov.in/the-ministry/physical-progress>.



If you are interested in partnering with G-PST, email globalpst@nrel.gov.
To get news and event updates from G-PST, join our mailing list at globalpst.org/get-involved.

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