

# Introduction to GPST

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# Global Power System Transformation (G-PST) Consortium

## What?

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

## Who?

*Founding System Operators*



*G-PST Core Team  
Technical Institutes*

*Developing Country  
System Operators*

*Indonesia, Ukraine, Vietnam, India, South Africa,  
Tanzania, Morocco, Peru, Colombia, WAPP and  
others*

## Why?

To drive the  
development and  
transfer of the  
**technical and  
engineering  
knowledge** necessary  
for power system  
operators at the **speed  
and scale required** to  
support the global  
energy transition

# Why system operators are key to transition

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 advances action in 5 key areas

## 1. System Operator Research & Peer Learning



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



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

## 3. Foundational Workforce Development



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



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

## 5. Open Data and Tools



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



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



# Pillar 1 2021-2022 accomplishments & projects

- Accomplishments
  - 15 technology collaboration pilots, 7 including AEMO/AU
  - Redefining resource adequacy [report](#)
  - Grid Forming Technology [report](#)
  - Technology Councils:
    - Grid-forming technologies
    - Control Center of the Future
  - System needs and services [report](#)
  - IEEE-IEC cooperation on GFM
  - Australia Operations Technology Roadmap, supported by CSIRO and interactive with GPST
- Projects
  - UNIFI Consortium (Inverter interoperability)
  - Sharing high-IBR system test outcomes
  - Analysis tools for 100% IBR grids
  - Control Center of the Future roadmap (forthcoming)
  - Development of electromagnetic transient (EMT) model standard



# G-PST Research Agenda Informing CSIRO Research Roadmap

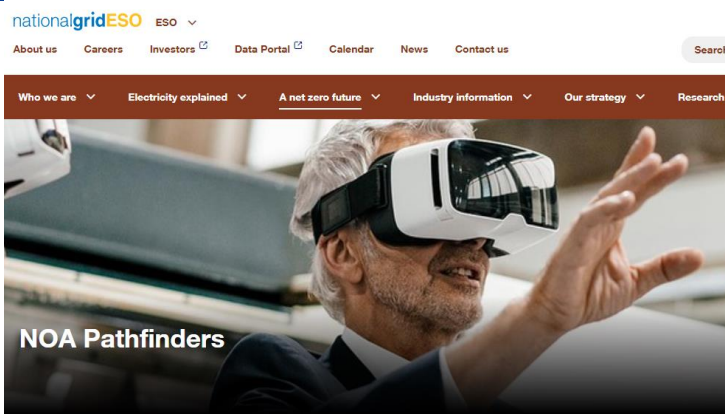
Global Perspective

Australian Expertise

Australian Perspective



# GB Stability Pathfinder Informing AEMO GFM Specs



A tender process for new services needed in high-IBR power system, to gain experience and understanding of new technologies available to provide these services

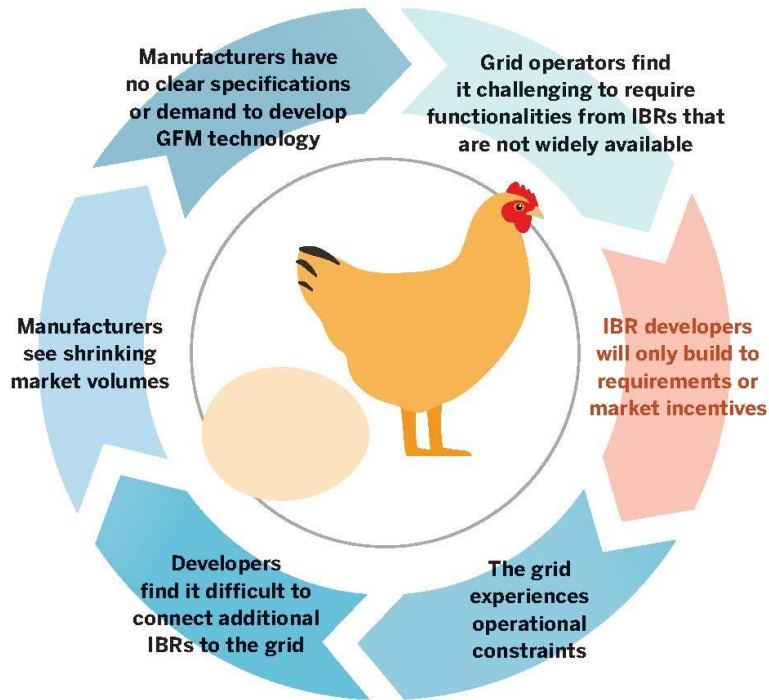
Draft Final Modification Report															
<b>GC0137:</b> Minimum Specification Required for Provision of GB Grid Forming (GBGF) Capability (formerly Virtual Synchronous Machine/VSM Capability) <b>Overview:</b> This modification proposes to add a non-mandatory technical specification to the Grid Code, relating to GB Grid Forming Capability (which was formerly referred to as a Virtual Synchronous Machine ("VSM") capability. The detail pertaining to its creation may be found in Section 3 "Why Change?" but the high-level overview is that the specification will enable parties to offer an additional grid stability service. This will be fundamental to ensuring future Grid Stability, facilitating the target of zero carbon System operation by 2025 and providing the opportunity to take part in a commercial market or become part of other market arrangements such as the stability pathfinder work and/or dynamic containment.	<b>Modification process &amp; timetable</b> <table border="1"><tr><td>1</td><td>Proposal Form 10 December 2019</td></tr><tr><td>2</td><td>Workgroup Consultation 31 March 2021 - 30 April 2021</td></tr><tr><td>3</td><td>Workgroup Report 29 July 2021</td></tr><tr><td>4</td><td>Code Administrator Consultation 03 September 2021 - 04 October 2021</td></tr><tr><td>5</td><td>Draft Modification Report 19 October 2021</td></tr><tr><td>6</td><td>Final Modification Report 09 November 2021</td></tr><tr><td>7</td><td>Implementation TBC</td></tr></table>	1	Proposal Form 10 December 2019	2	Workgroup Consultation 31 March 2021 - 30 April 2021	3	Workgroup Report 29 July 2021	4	Code Administrator Consultation 03 September 2021 - 04 October 2021	5	Draft Modification Report 19 October 2021	6	Final Modification Report 09 November 2021	7	Implementation TBC
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The image shows the AEMO logo and the title 'Grid Forming Inverter Controls Specification'. Below the title, the word 'DRAFT' is written in a smaller font. The entire content is enclosed in a blue-bordered box.

The image is a banner for a webinar series. It features the text 'G-PST/ESIG Webinar Series: Operating the System Towards Zero Carbon' and 'August 30 @ 4:00 pm - 5:30 pm EDT'. Logos for 'GLOBAL PST CONSORTIUM' and 'ESIG' are visible. Below the banner, there is a short description of the webinar's content.

# The Circular Problem of Requirements and Deployment of Advanced IBR Controls



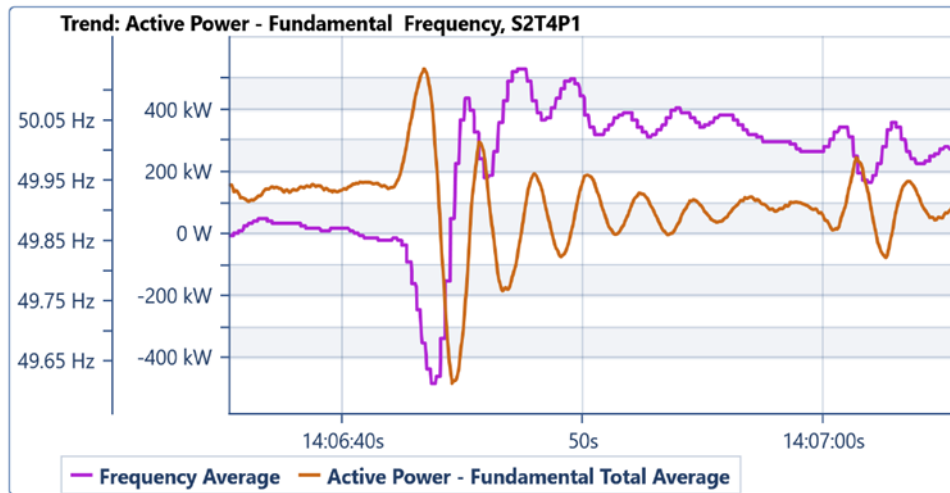
- Which comes first, the requirement for a capability or the capability itself?
- How do grid operators know what performance or capability is possible from new equipment, and therefore what they could conceivably require?
- How can they go about evaluating the costs and benefits of having such equipment on the grid?
- What drives manufacturers to invest in new technology without it being mandated or otherwise incentivized by the market?



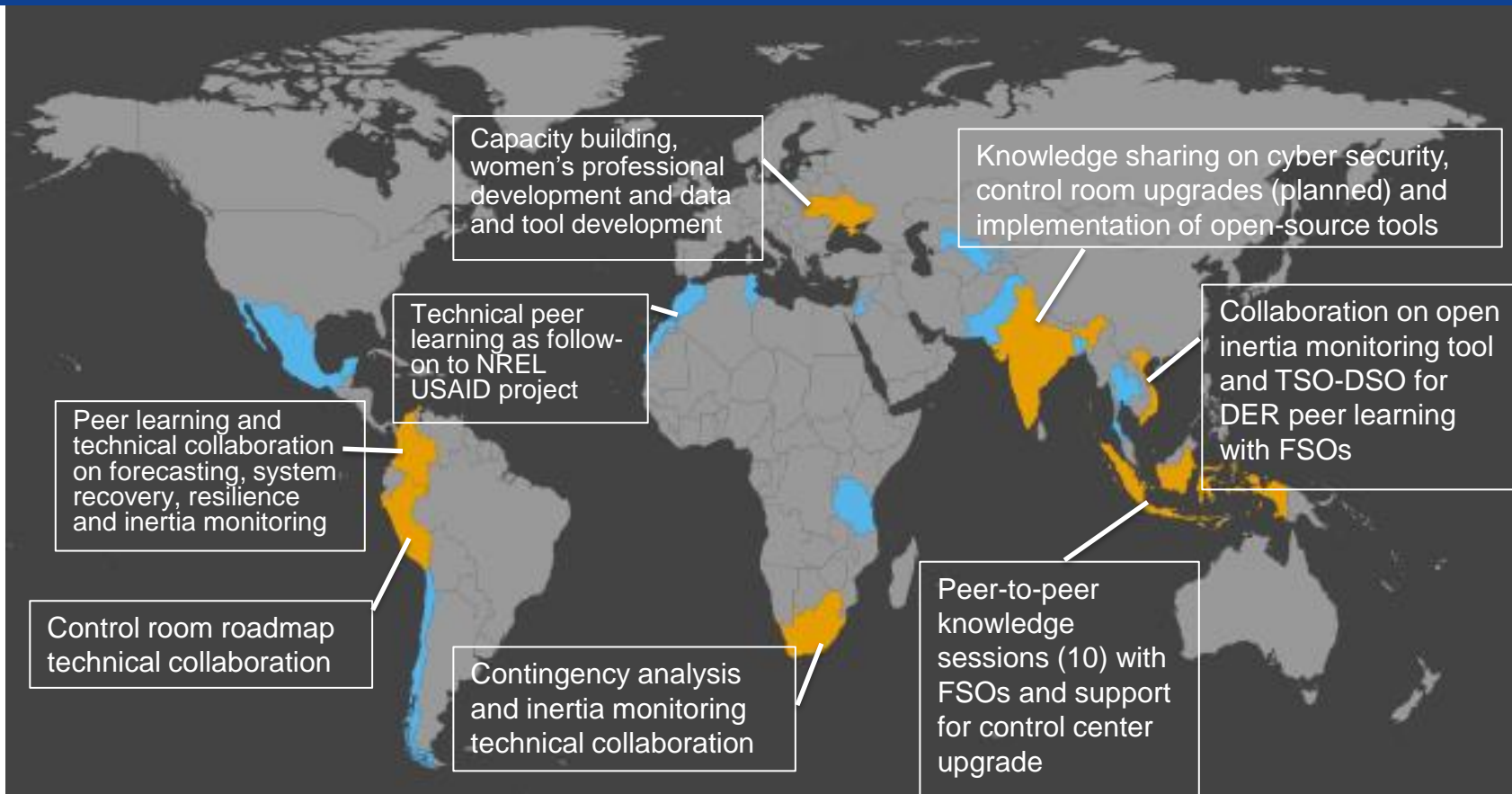
# Monitoring of Grid Forming Batteries

- Five GFM Batteries awarded in the recent tender for provision of stability services in Great Britain (Stability Pathfinder, Phase 2)
- In collaboration with National Grid ESO and awarded project owners, GPST is planning to conduct a pilot monitoring the performance of five new GFM batteries and existing Siemens-Gamesa wind farm converted to GFM
- The goal is to accumulate and disseminate learnings from world-first large-scale use of multiple GFM resources from multiple vendors
- Opportunity to do similar with AEMO/CSIRO, e.g.
  - HPR Upgrade
  - Wallgrove
  - Riverina
  - Broken Hill

## GFM Inverter's Inherent Active Power Response at the Hornsdale Power Reserve Plant During a Generator Trip Event



# Pillar 2: System Operator Technical Support



# Thank You

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