



GridFM: enable the emergence of foundation models for power grids

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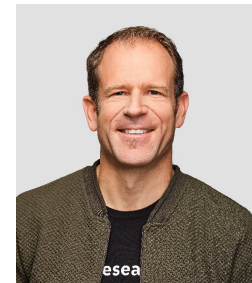
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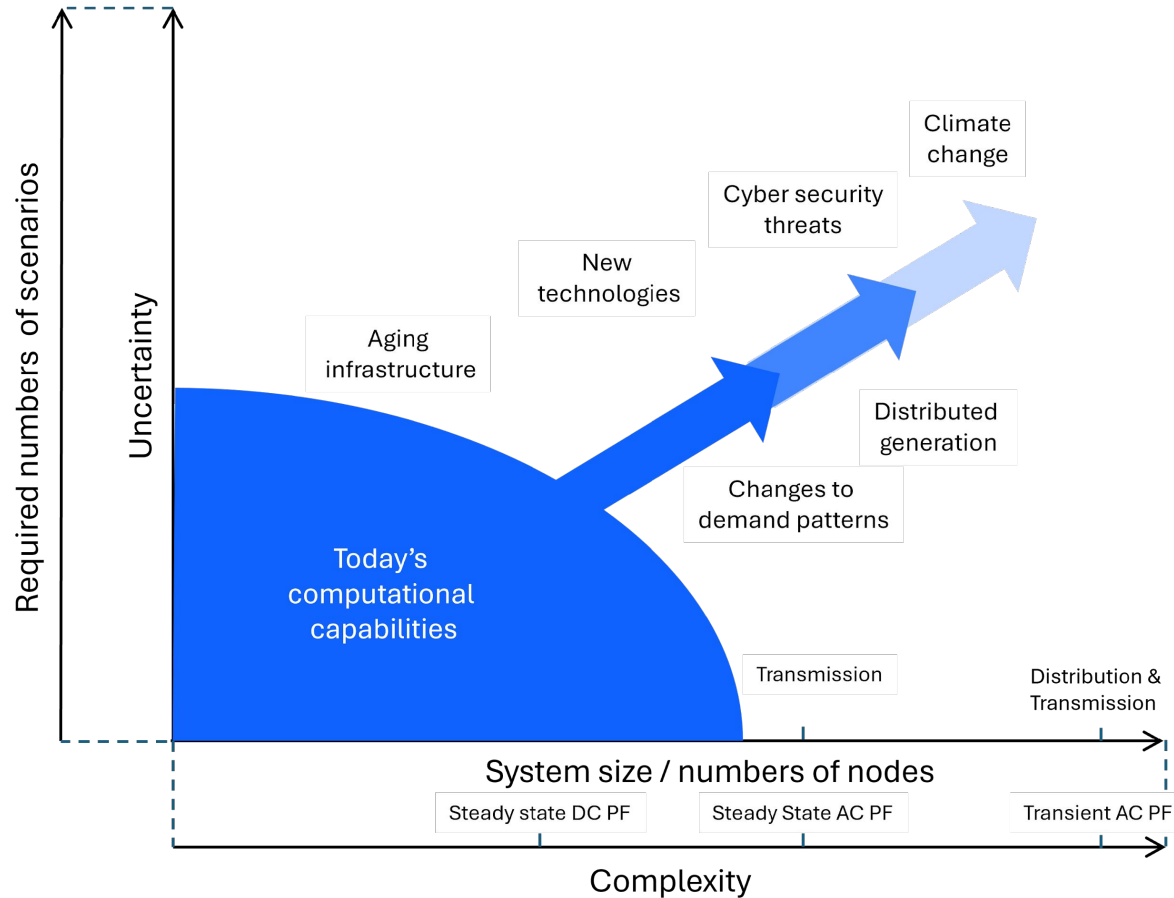


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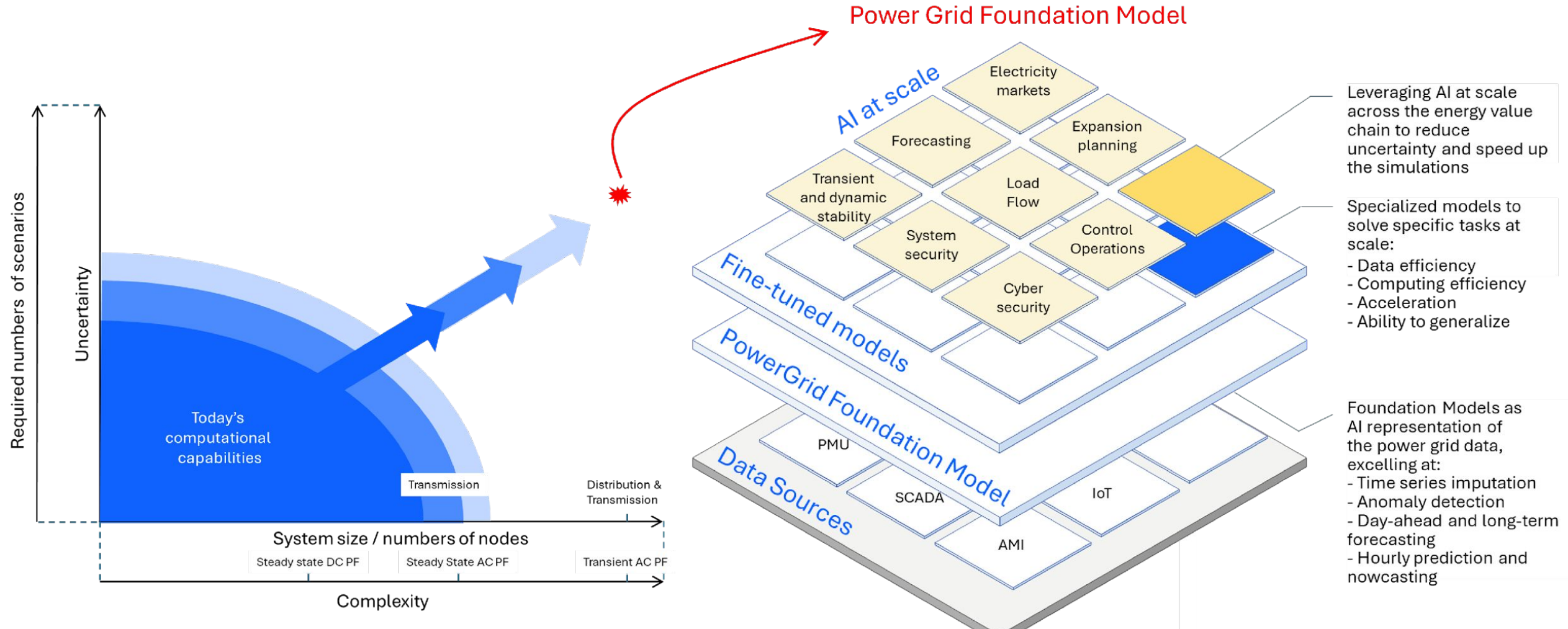
Challenges of future power grids



Structural changes to power grids brought by the energy transition lead to a higher uncertainty and complexity as well as variable grid inertia.

Higher computational capabilities are needed to cope with these structural changes.

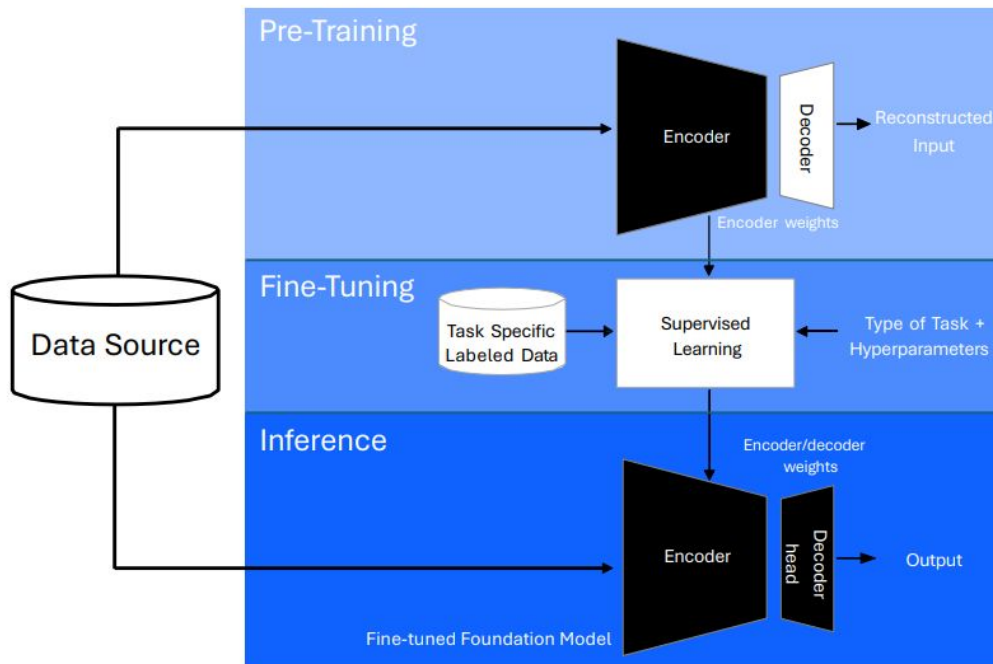
GridFM: power grid foundation model



From H. Hamann et al. A Perspective on Foundation Models for the Electric Power Grid
<https://arxiv.org/abs/2407.09434>

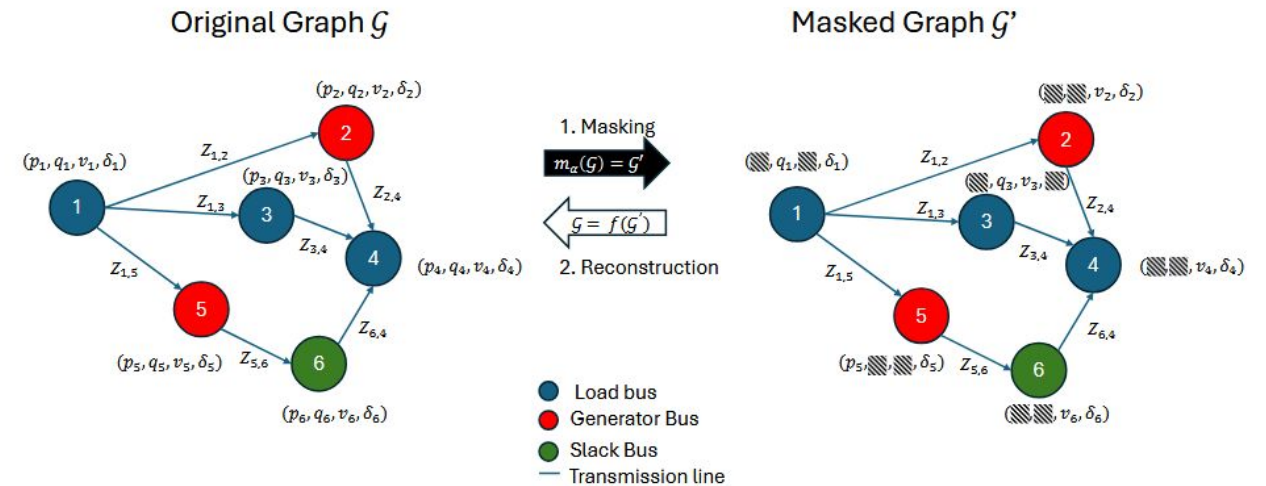
Anatomy of the GridFM

The three FM life-cycle phases



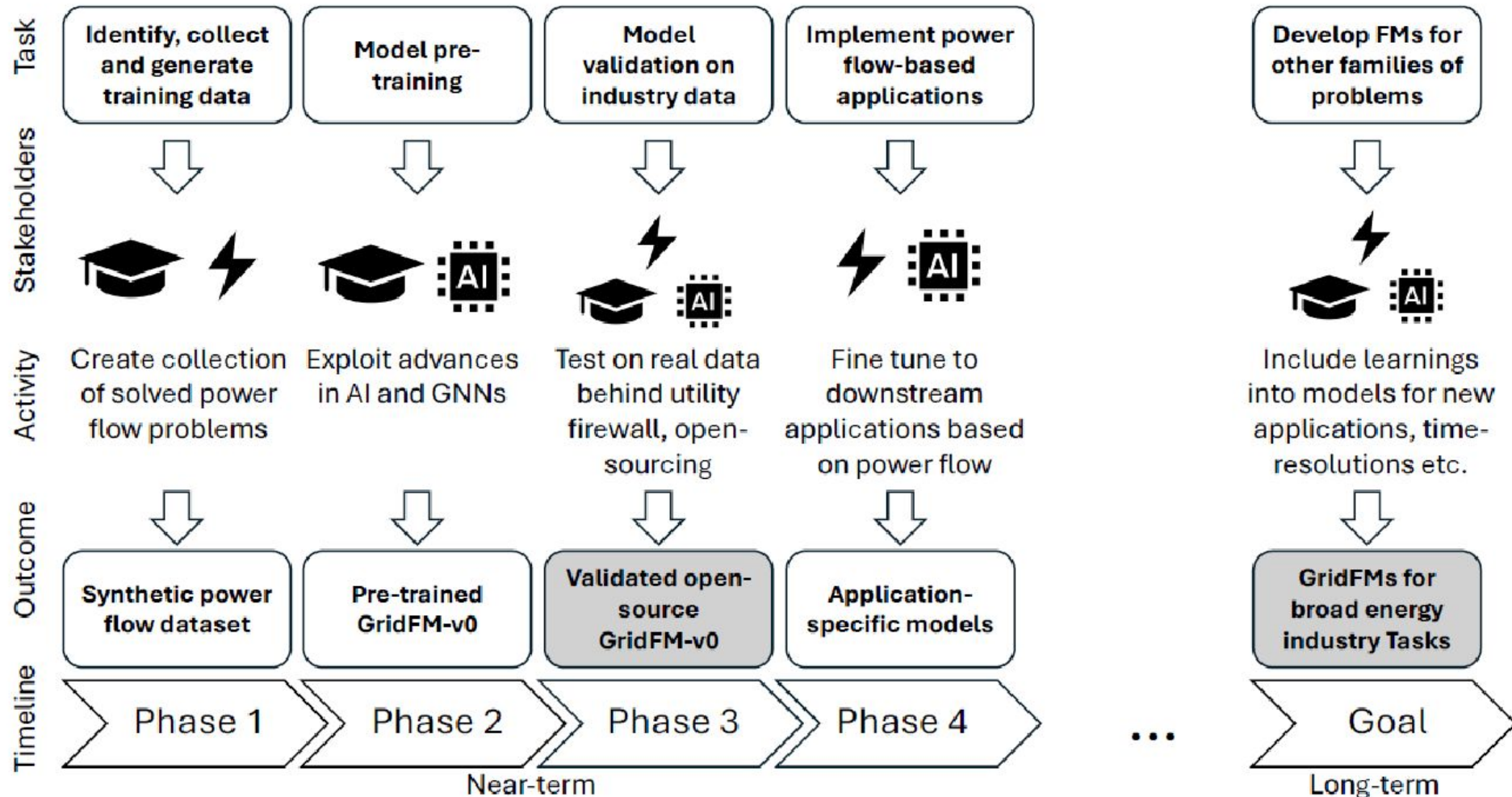
From H. Hamann et al. A Perspective on Foundation Models for the Electric Power Grid
<https://arxiv.org/abs/2407.09434>

GridFM self-supervised pretraining



From A. Puech, et al. *Optimal Power Grid Operations with Foundation Models*, <https://arxiv.org/abs/2409.02148>

GridFM development roadmap

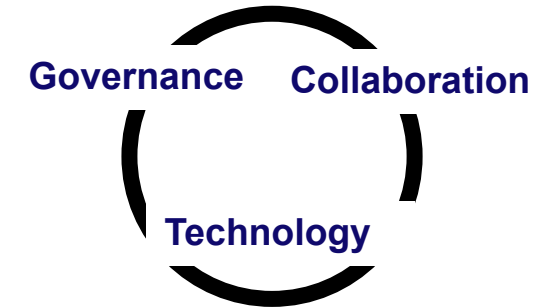


GridFM community

Goal:

Bring together stakeholders from industry and academia to study and evaluate the potential and impact of FMs for the electrical energy industry by:

- Collaborating through technological exchanges :
 - **Monthly meetings**
 - **Workshops:**
 - Feb. 12th 2024: IBM Research, Yorktown Heights, USA
 - June 15th 2024: Imperial College London, UK
 - *Upcoming:* Feb 13th 2025: Argonne National Lab, USA
- Investigating technical feasibility of GridFM.
- Increasing the stakeholder circle.
- Reaching out to governments and regulators to further enable GridFM.



Structured in working groups:

Initiator:



Industry:



Academia:



Government:



GridFM community and OSS framework

GridFM will greatly benefit from open collaboration



Utilities have data and operational experience.



IT companies have scalable compute power and AI expertise.



Academia and National Labs have a deep knowledge of electrical systems features and industrial use cases.

A call for collaboration:

“One foundation for all and all data for one”

Treat the encoder as a common good, as well as the infrastructure to use it (input/output/inference) and train it as part of a federated learning process.

The encoder can be implemented / trained for specific / internal needs but **CANNOT** be released / embedded outside the project and its license. This means adaptations to the encoder for specific uses must be contributed back unless it is a purely internal use.

Decoder applications can be open or proprietary. When proprietary, decoder side use cases enable business sustainability.

Why GridFM as a LFE project?

Alignment with LFE mission statement:

Licensing flexibility to maintain a good equilibrium between openness, scalability and business sustainability.



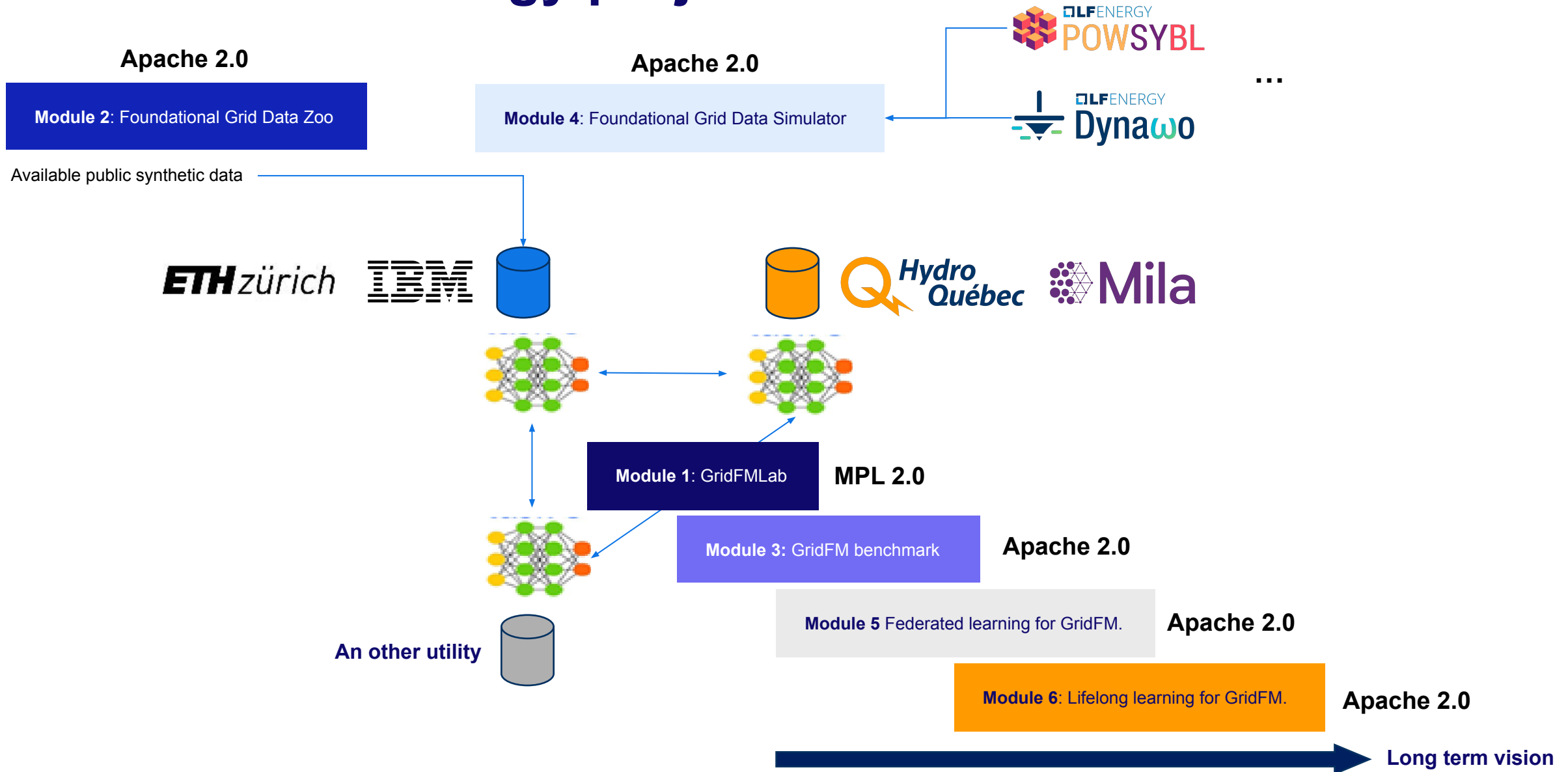
Leverage LF energy's expertise creating and growing open-source communities

..."creating a technology ecosystem to support rapid decarbonization that benefits the environment, enables economic prosperity, and leads to social well-being for future generations..."

From <https://lfenergy.org/about/why-lf-energy/>

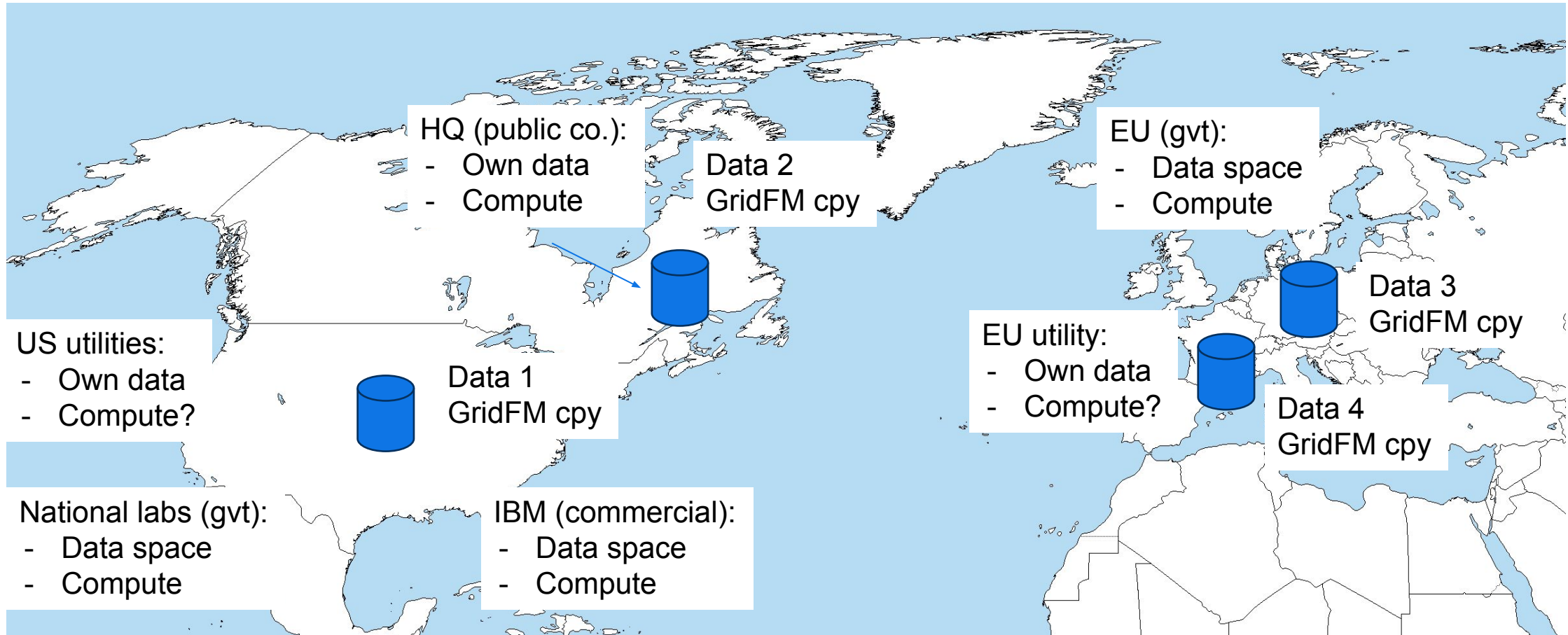
Scaling thanks to a neutral ground for frictionless collaboration

GridFM as a LFEnergy project



The long term vision

Data streams from different utilities update a GridFM in a distributed way, by jurisdiction:



Next practical steps

- **Structure GridFM project in OSS framework**
- **Ramp up the activities of the technology working group:**
 - Data
 - Model Development
 - Cybersecurity and privacy
 - Model governance and trust
- **Strategy to grow a community**



Thanks for your consideration!

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