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MODELLING THE FUTURE

UTAustin Portugal

# ML@GridEdge / Distributed ML Solutions for Coordinating DER at the Edge of the Power Grid

**Advanced Computing**
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## MOTIVATION

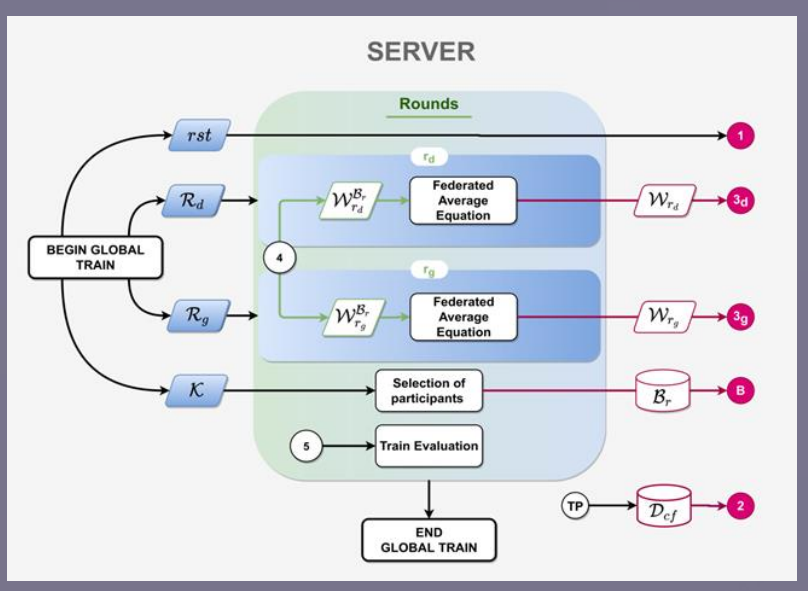
- Smart buildings and **energy communities** are the cornerstones of future sustainable power grids.
- Tomorrow's energy communities and the resilient operation of the energy infrastructure hinges on **accurate prediction** of buildings' net energy demand.
- **Traditional prediction** models primarily leverage historical information (such as net energy demand) at the grid or building level.
- The ML@GridEdge project developed a novel distributed machine learning model for **predicting the temporal net energy demand** of future connected communities.

## APPROACH

- A novel **federated learning (FL) model** is used for predicting building net energy demand.
  - Leverages centralized oversight of a **central server** to manage distributed collaboration among the buildings.
  - Use of the **private data** at the building level without the need of sharing such data with other entities.
  - Two independent systems are used to forecast **generation and demand**.
  - **Third-party data provider** to the weather data.

## METHODOLOGY

- The **server** receives the information from several clients.
- It fine-tune their models by computing the **average of the received weights**. and sending it back to the buildings.
- A single server was designed to control the systems to forecast **demand and generation**.




## CONCLUSIONS

- The presented framework has the capability of forecast demand, generation, and net demand **through collaboration**.
- Regardless of the variances associated with different times of the year, the forecasting models consistently demonstrate good performance, showcasing their **adaptability**.
- The implemented strategy improves the **models' generalization** and benefits new communities.
- These improvements result from **intercommunity collaborations**.

ML@GridEdge

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