SweGRIDS

Energy Management System (EMS) models for the optimal real-time operation and control of Battery Energy Storage Systems (BESS) for peak shaving and frequency regulation

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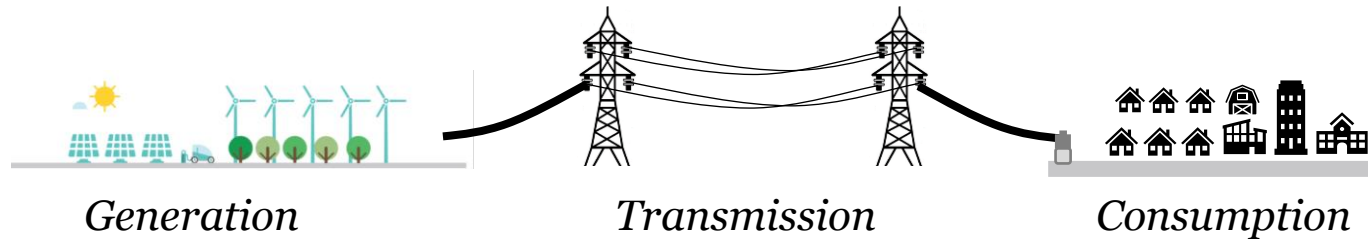
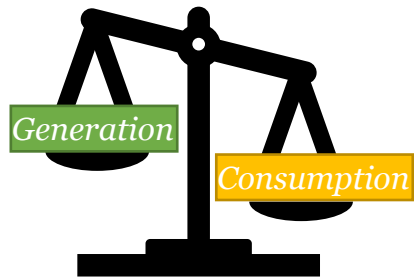**Project funded by:**

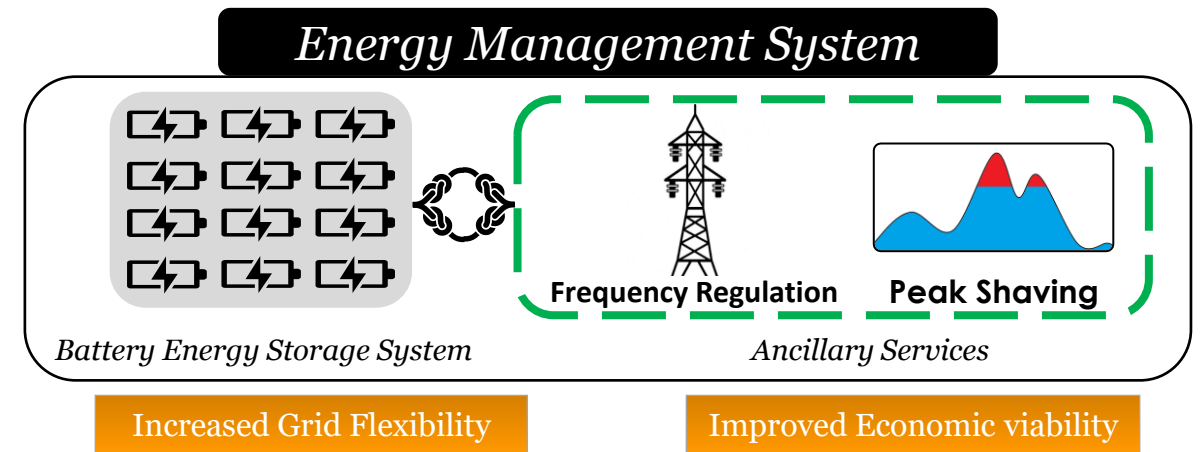# Motivation: Challenge & Opportunity

Future we want

Generation — Transmission — Consumption

Challenges we have

Non-dispatachable energy sources

Electricity Demand-Supply Imbalance

Generation / Consumption

Solutions we propose

Energy Management System

Frequency Regulation   Peak Shaving

Battery Energy Storage System   Ancillary Services

Increased Grid Flexibility   Improved Economic viability

Approach: EMS Architecture
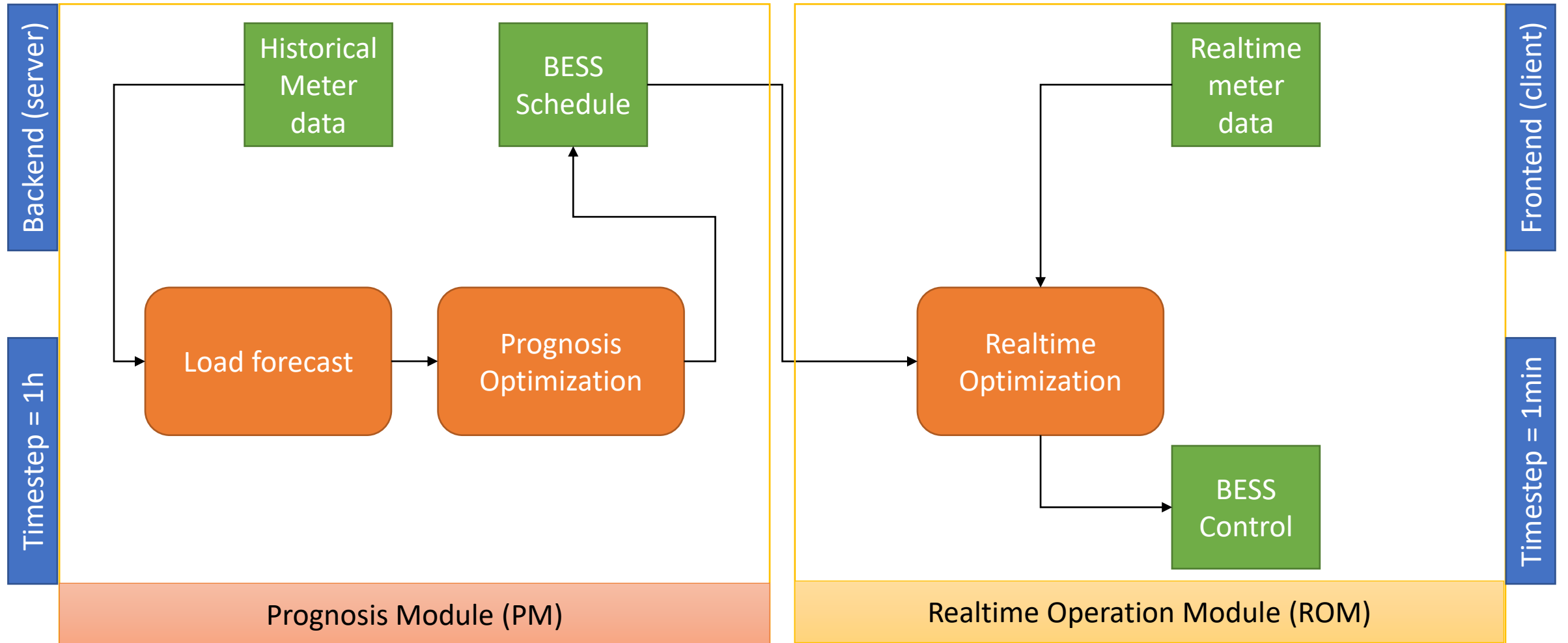
Validation: Case Studies

Öckerö Ice rink[1]

Solar Peak Power (DC) : 180 kW

Proposed Usable BESS : 46 kWh / 46 kW

12% cost-saving in the monthly Grid Tariff

21% reduction in Peak power

3 hours of BESS capacity reserve for FCR-N for the test day

Catena Jakobsberg [2]

Solar Peak Power (DC) : 220 kW

Proposed Usable BESS : 150 kWh / 100 kW

24% Return on Investment of the System

13% reduction in Peak power

479 hours of BESS capacity reserve for FCR-N annually

- [1] H. Shafique, L. B. Tjernberg, D. -E. Archer and S. Wingstedt, "Energy Management System (EMS) of Battery Energy Storage System (BESS) – Providing Ancillary Services," 2021 *IEEE Madrid PowerTech*, 2021.

- [2] H. Shafique, L. Bertling Tjernberg, D. -E. Archer and S. Wingstedt, "Behind the Meter Strategies: Energy management system with a Swedish case study," in *IEEE Electrification Magazine*, vol. 9, no. 3, 2021.

THANK YOU