Solutions for Future Energy Systems

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Energy System Transformation

At IBM Research - Zurich, we are developing innovative solutions to increase the share of renewable power generation by enabling consumers and industries to play an integral role in balancing the power system.

- Integration of renewables: Increases certainty, increasing need to balance power, drives shift from production control towards consumption control
- Involving consumers: Quantitative description, prediction, and aggregation of electric flexibility
- Increasing value: Innovative market solutions to increase the usage and the value of demand response, location-based and scalable marketplace services for both real-time response and reservation of electric flexibility

Flexibility Clearing House Platform

The Flexibility Clearing House (FLECH) is a market-based platform for trading flexibility products. FLECH provides a platform for both DSOs and TSOs to access large numbers of distributed flexible resources. Such resources can be individual loads, such as flexible industrial processes, but also aggregators that pool large numbers of smaller flexible loads.

Flexibility Aggregation Platform

The flexibility aggregation platform enables optimized use of flexible loads for various objectives, e.g., to minimize expected energy costs. Loads are typically created by heating and cooling systems, electric vehicles, and stationary storage.

The platform uses a standardized format for measurement and control signals as well as for sensors and actuators. It also stores information about individual flexible resources and logs important events.

Pilot Projects

In the FLEXLAST project, large commercial freezer warehouses in Switzerland were used to provide balancing power. Three warehouses are subdivided into units, each having its own cooling system. The units are further partitioned into halls that share a cooling system. The cooling system is required to keep the temperatures inside the modules between -24.5 and -29 °C, and its power rating is on the order of hundreds of kW.

The Danish island of Bornholm is the real-world laboratory for both the EDISON and the ECOSGRID projects. The EDISON project focused on smart-charging EVs and the impact of a large penetration of EVs on the power system.

The ECOSGRID project focused on activating demand response from residential heating. The project included more than 2000 of the small island's households.