Fraunhofer
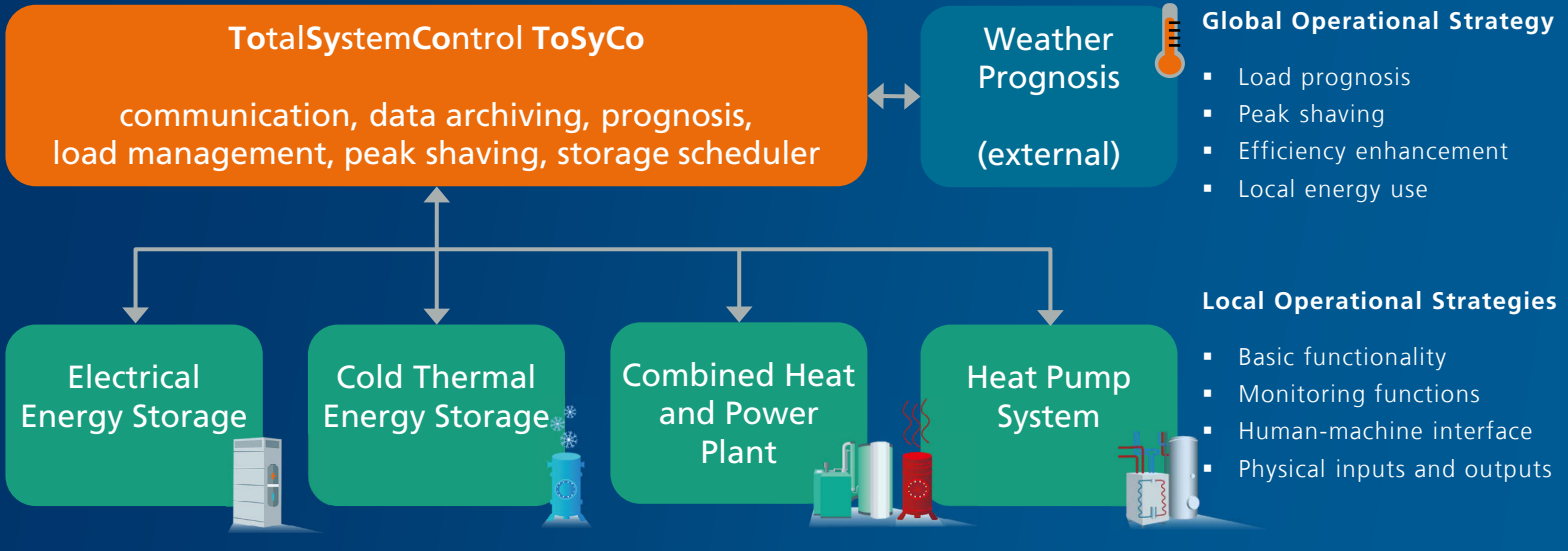
IISB

FRAUNHOFER INSTITUTE FOR INTEGRATED SYSTEMS AND DEVICE TECHNOLOGY IISB

Intelligent Energy Management: ToSyCo

PeakShaving. EfficiencyEnhancement. OperationalStrategy. EnergyStorages

TotalSystemControl ToSyCo

communication, data archiving, prognosis,
load management, peak shaving, storage scheduler

Weather
Prognosis

(external)

Global Operational Strategy

- Load prognosis
- Peak shaving
- Efficiency enhancement
- Local energy use

Electrical
Energy Storage

Cold Thermal
Energy Storage

Combined Heat
and Power
Plant

Heat Pump
System

Local Operational Strategies

- Basic functionality
- Monitoring functions
- Human-machine interface
- Physical inputs and outputs

Description

Fraunhofer IISB offers solutions for the analysis and optimization of decentral energy systems and components as well as simulation and dimensioning of energy storage systems and plants.

Modern energy systems include different forms of energy for electrical consumers, heating, cooling, air conditioning, and so on. They are coupled by gene-ration facilities (e.g., heat pump), which means that the optimization of a single sector is not sufficient, and the entire system must always be considered.

The electrical energy costs usually depend on the maximum peak power and on the energy consumption. It is therefore necessary to reduce peak loads and increase energy efficiency.

The algorithms are validated by the real-world laboratory at Fraunhofer IISB. The test system consists of a battery system (BESS), a cold thermal storage system (TES) with a capacity of 80 m³, a combined heat and power plant (CHP) including a 24 m³ TES and a heat pump system including a 3 m³ TES. Regarding these plants, electrical power peaks could be reduced by 25 % with ToSyCo.

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Services

- **Analysis** and **optimization** of decentral energy systems
  - Data-based modeling of energy plants and components
  - Development and implementation of intelligent operational strategies
- **Simulative investigation** of optimization activities
  - Integration of electrical and thermal energy storages
  - Shifting the operating points of generation plants
  - Optimization of the control algorithms
- **Dimensioning** of energy storages

Solutions

- Energy data **analysis methods**
- **Operational strategies** for
  - Peak shaving with energy storages and plants
  - Efficiency enhancement
  - Increase of self-consumption of renewable energies
- **Dimensioning tools** for
  - Electrical and thermal energy storages
  - Energy plants (e.g., CHP)
- **Tools for prediction** of load profiles
- **PLC modules** for algorithms and operational strategies

Screenshot of App for data and peak analysis, dimensioning of battery systems, simulation of smoothed load profiles, and economic evaluation

Algorithms & Measurement
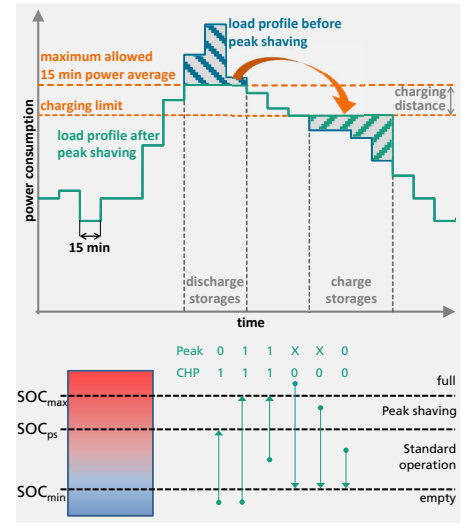
Schematic representation of the algorithm for peak shaving (top) and peak shaving by CHP (bottom)
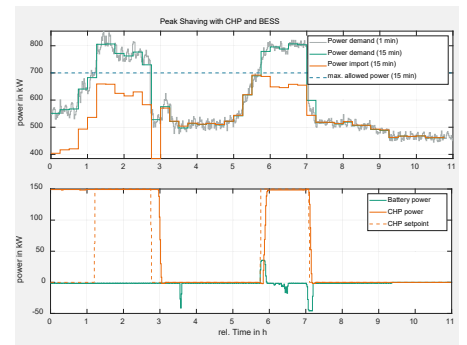
Validation of the peak shaving algorithms for CHP and BESS by the real-world laboratory of Fraunhofer IISB