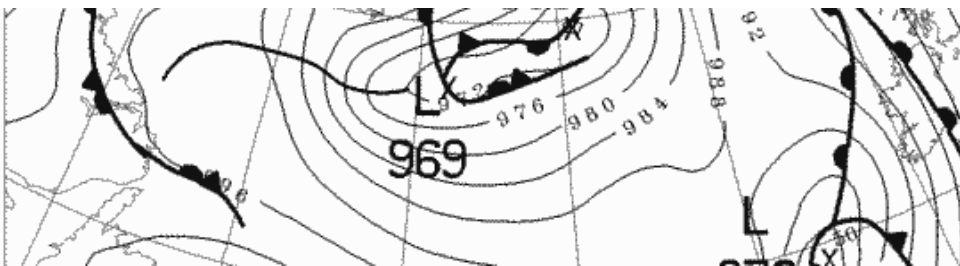




# Demand Side Management: communication requirements

**Dr. Ulrich Focken**

Workshop on International Standardization for Distributed Energy Resources  
Oldenburg, 19.06.2007





## energy & meteo systems

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- Services for effective integration of renewable energy sources into the power systems
- Services in energy meteorology:
  - upgrading of weather information for the power industry
- Core business wind power prediction *Previento*
- Support: e.g. training workshops for dispatcher
- Development of distributed energy management system
- Guidance for politics (studies etc.)
- Applied R&D

## „Demand Side Management“ (DSM)

- Demand Side Management via Pooling of several loads
- Central „Control-plant“ manages Pool
- Subjects of the Control-plant:
  - Intelligent network-management
  - New services in the energy-market
    - Optimization of electricity purchase
    - Supporting balance energy management
  - Acting as supplier of balance energy
- Evaluation of technical realization
  - Two cold stores in Bremerhaven
  - Several 100 kW installed capacity

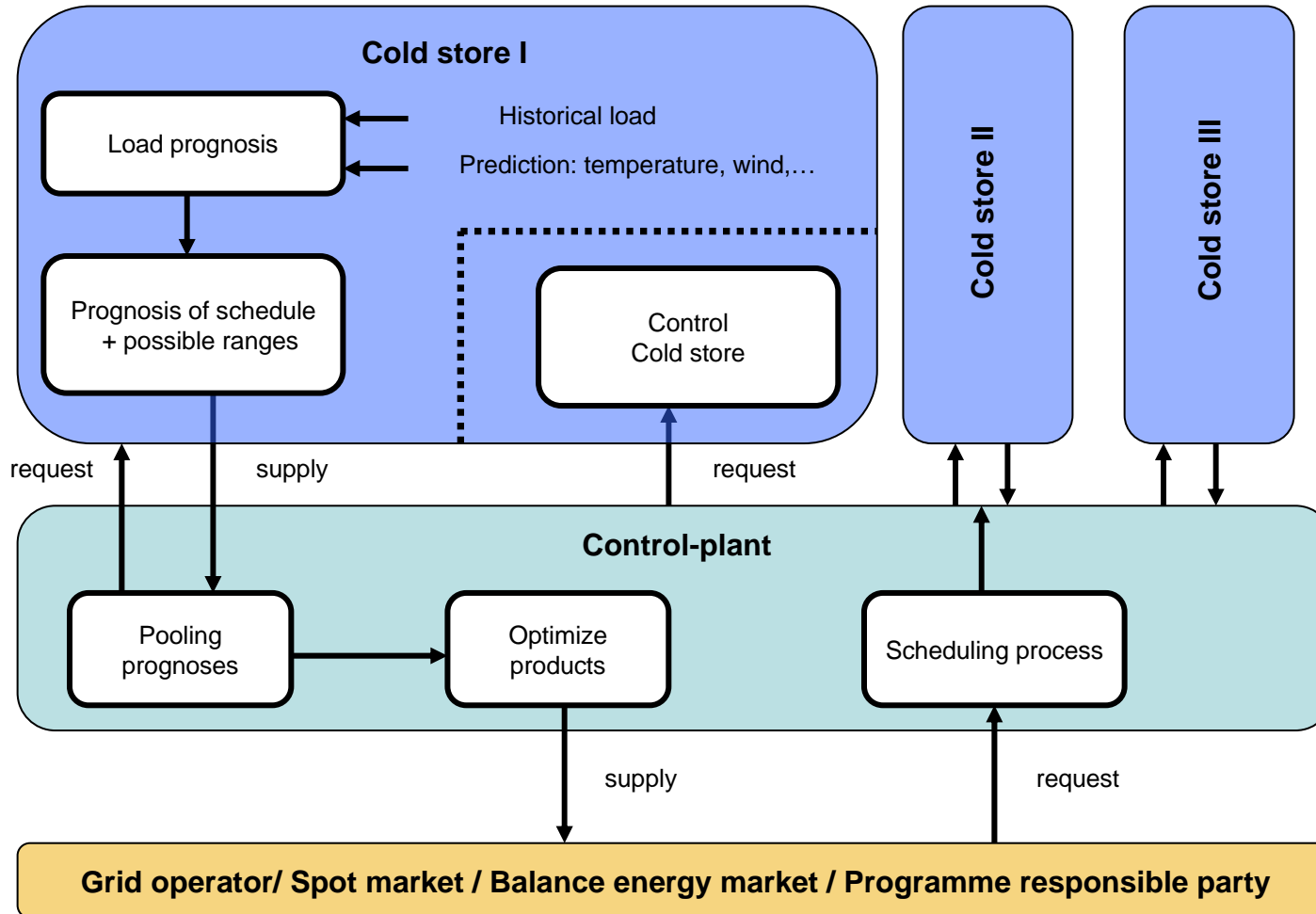
## some dates:

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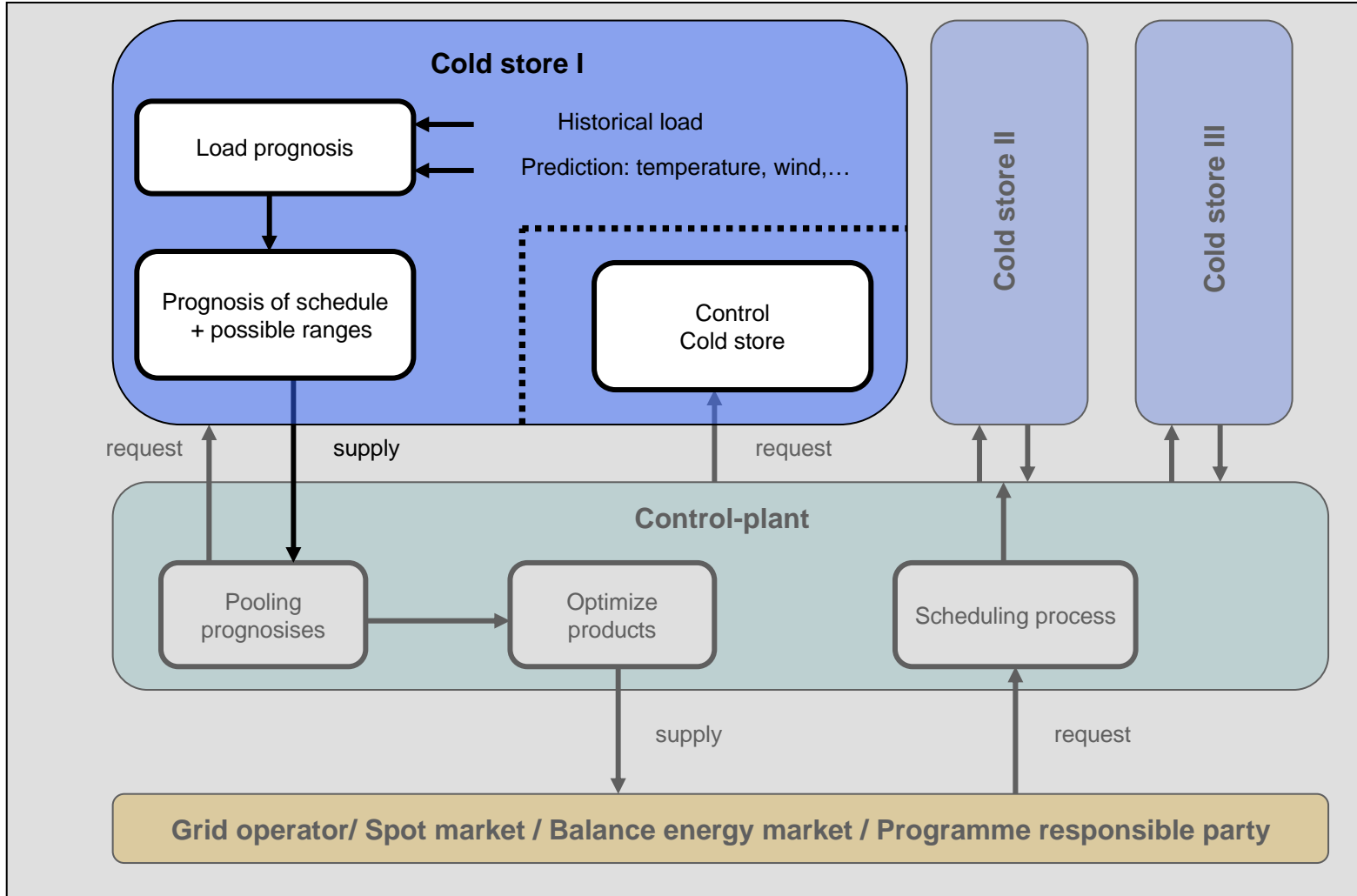
- **Capacity deep frosted** 60.000 m<sup>3</sup>
- **Number pallets deep frozen** 15.000



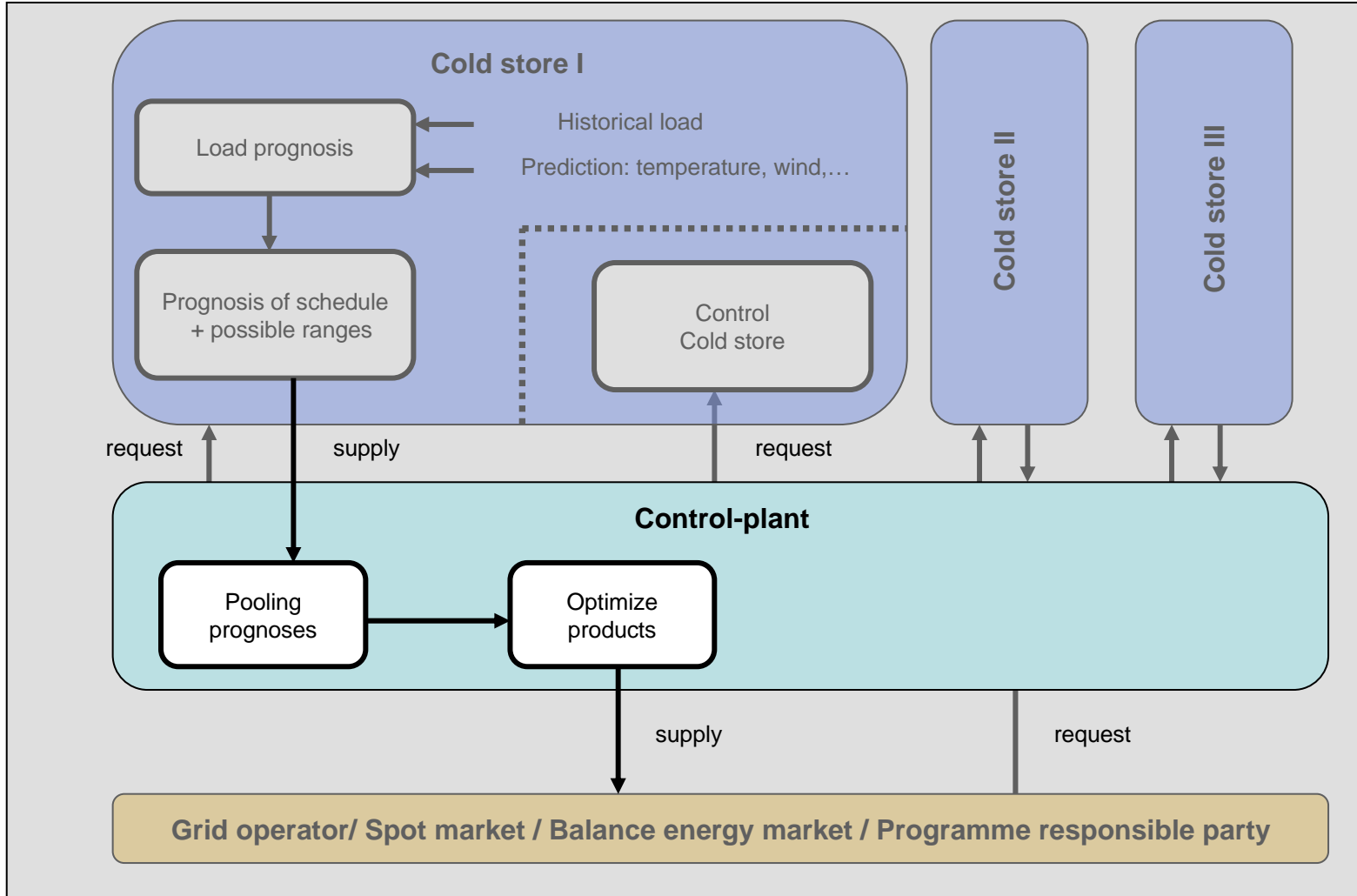
# concept of the Control-plant



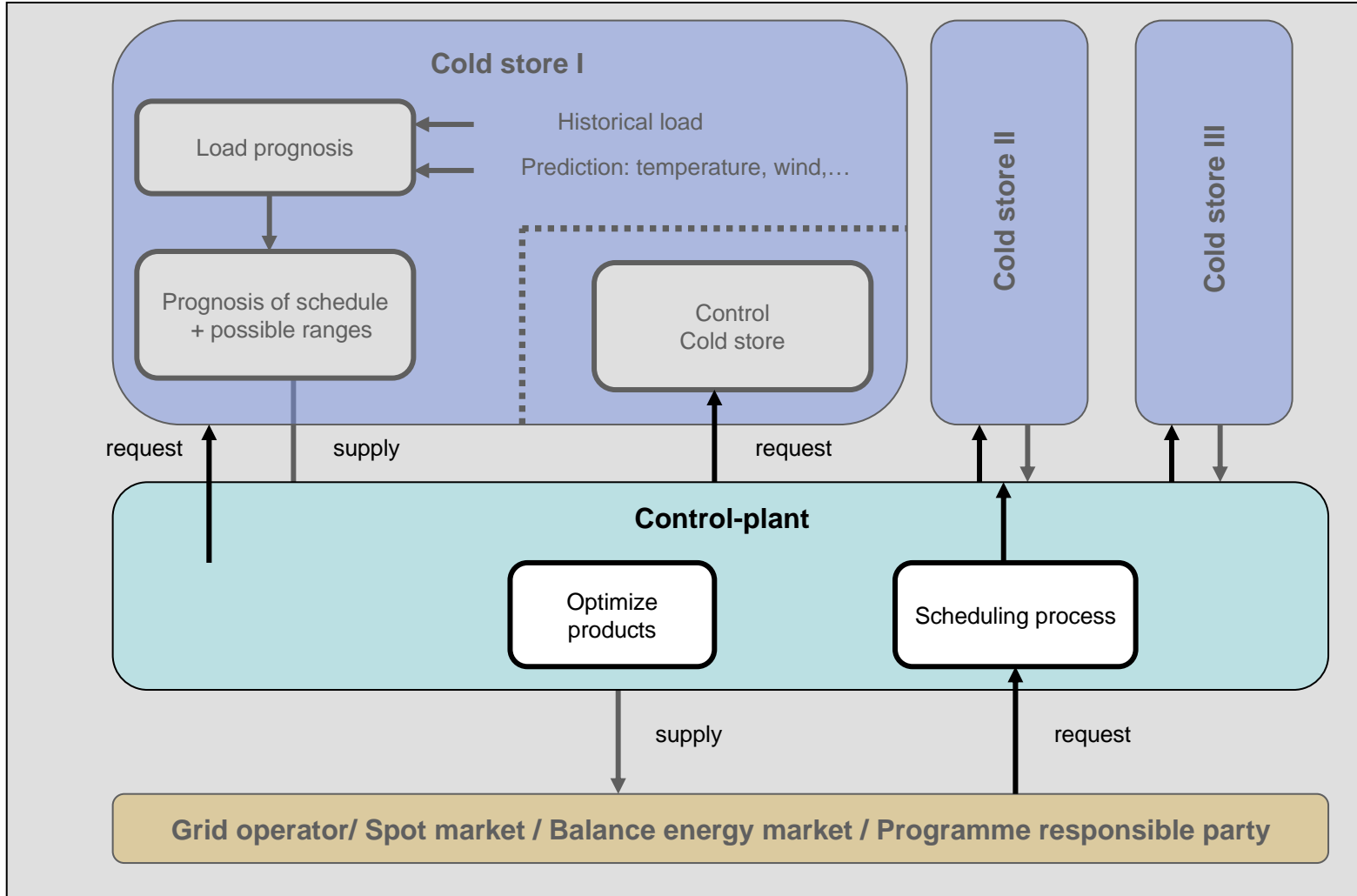
# concept of the Control-plant



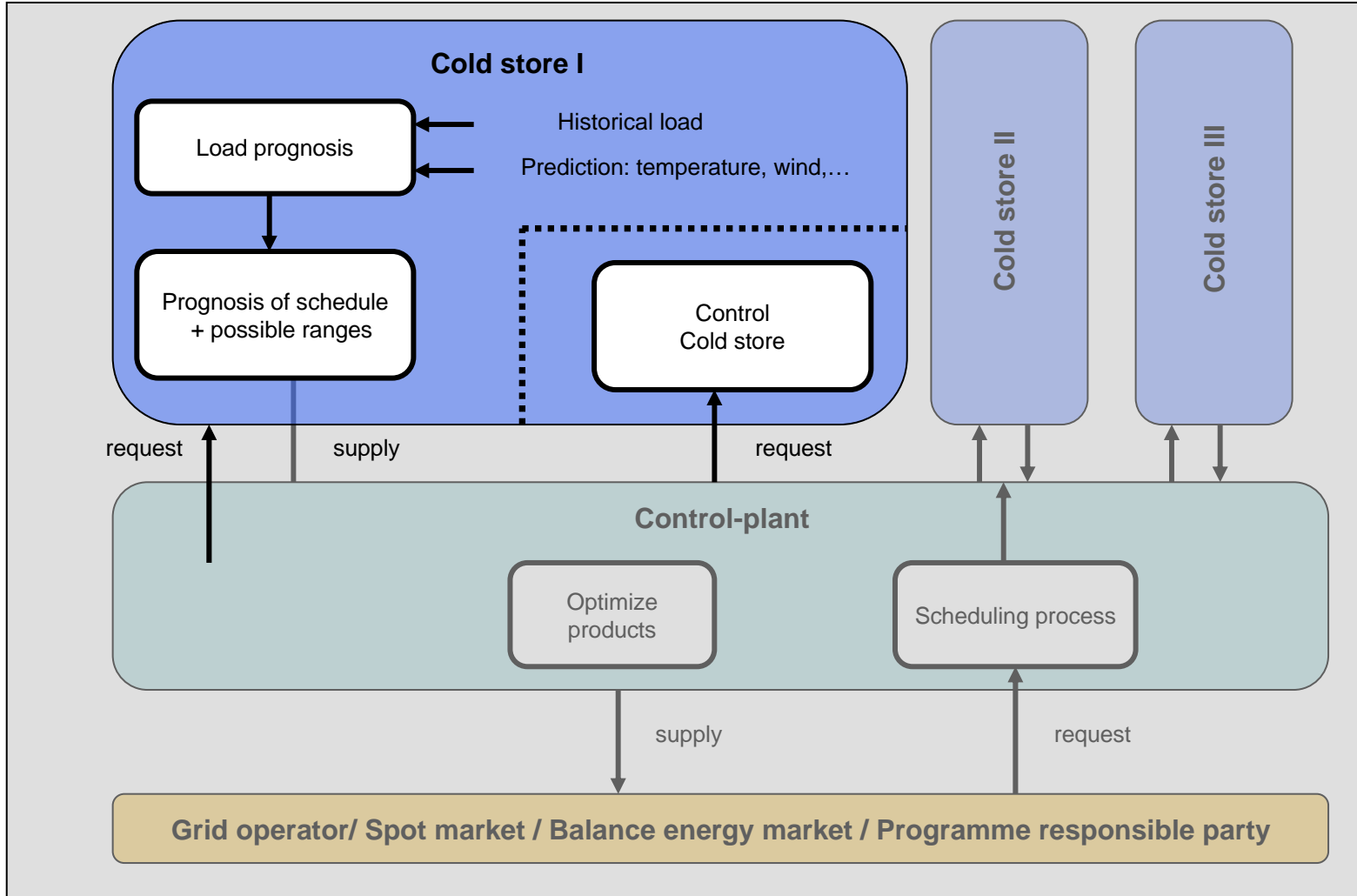
# concept of the Control-plant



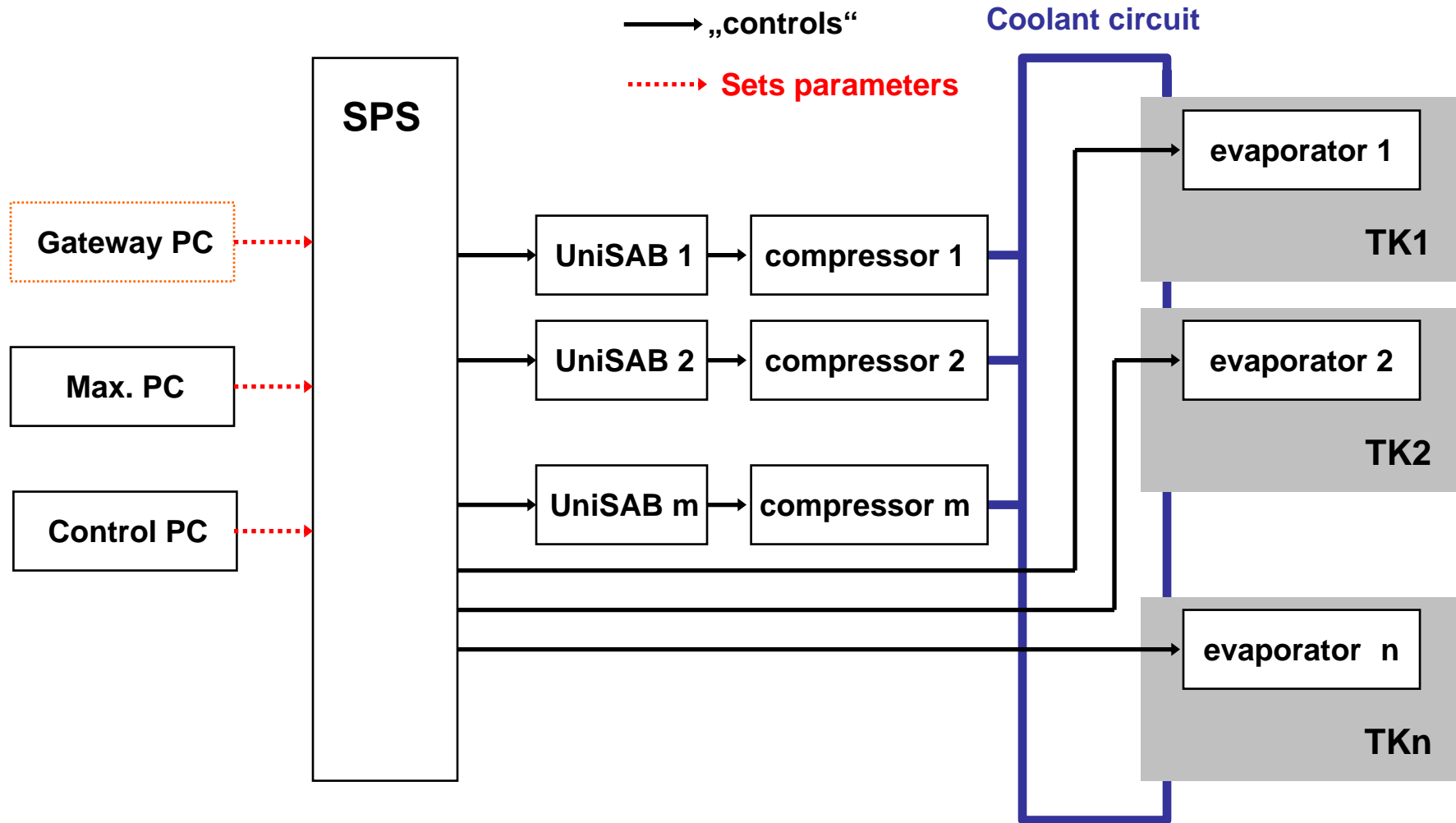
# concept of the Control-plant



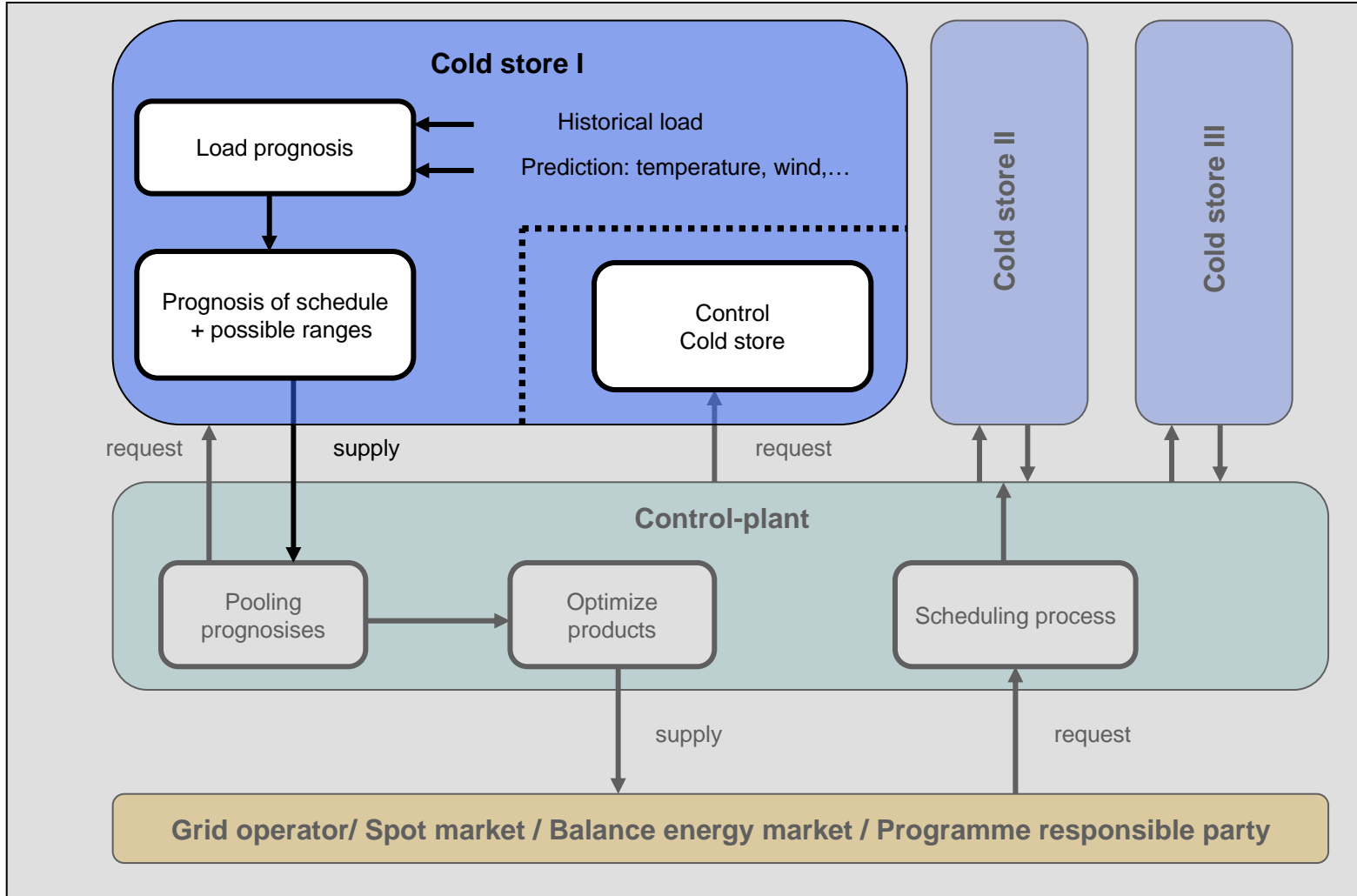
# concept of the Control-plant



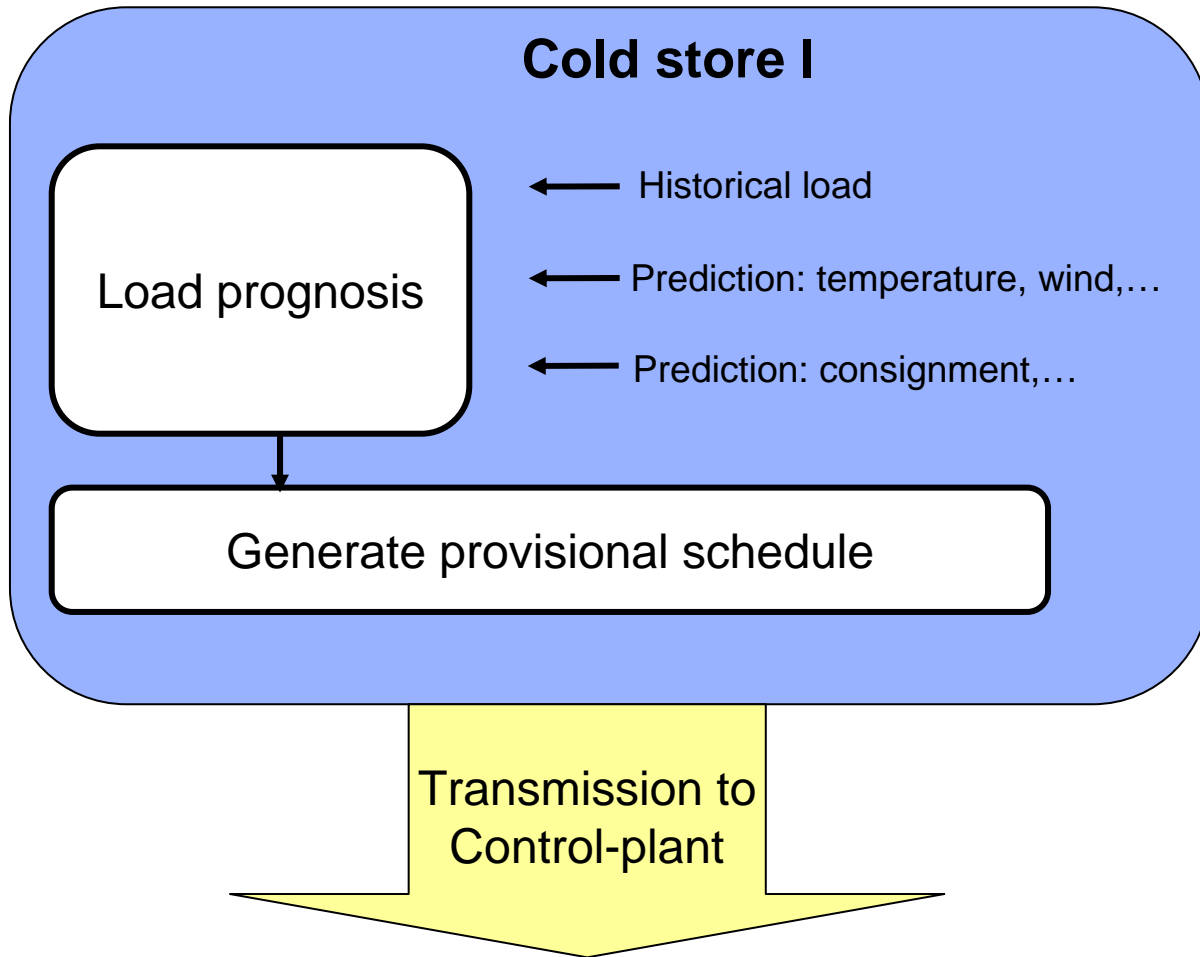
# Real example for cold store control



# concept of the Control-plant



# module cold store: prognosis & scheduling



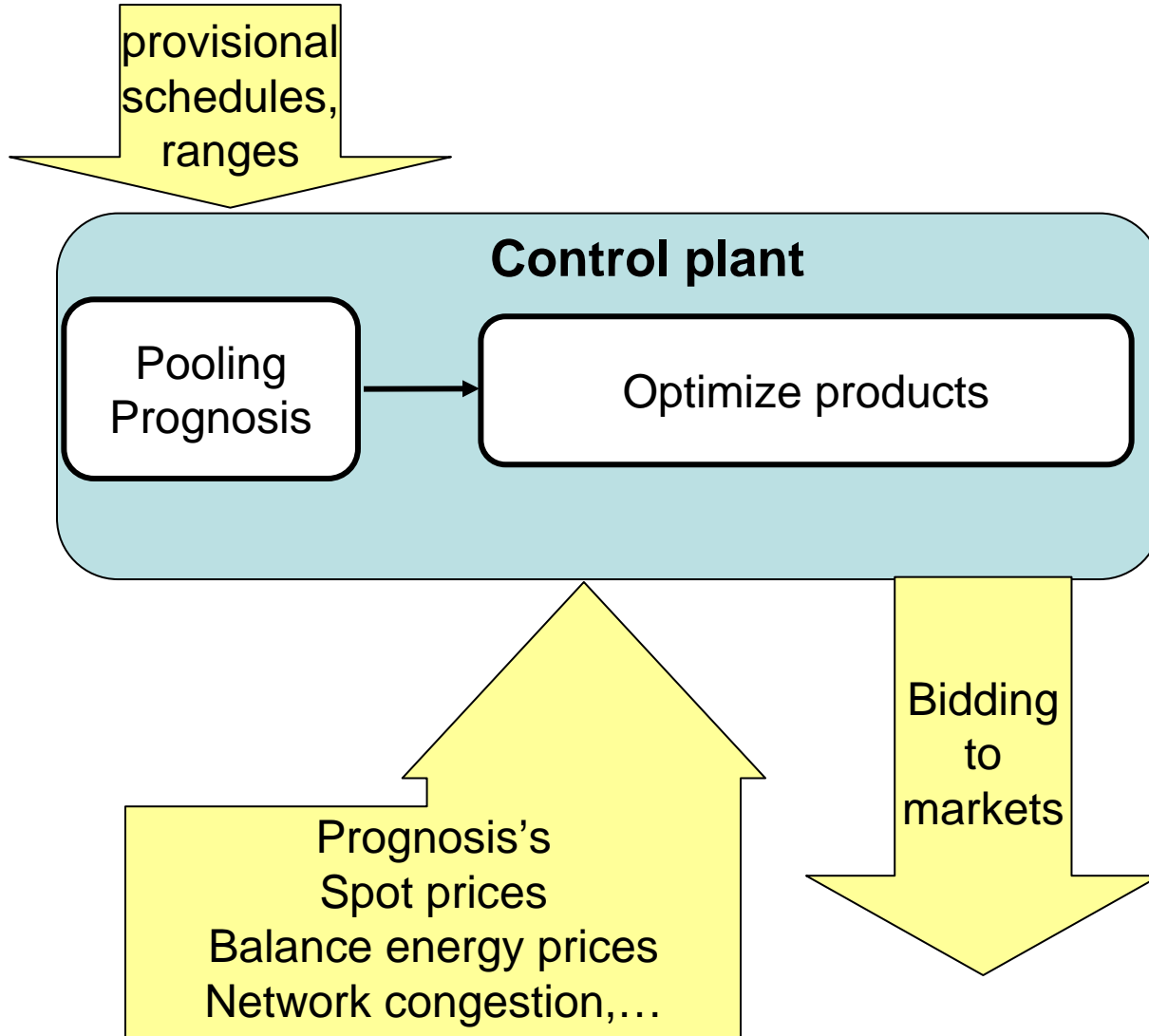
## Variables:

- Temperatures outside and inside (some values a day)
- Load
- Predicted events (occurrence, duration, impact)
- Schedule (96 values each day)

## Timeframes:

- daily
- maybe some updates

# module Control-plant: pooling & generate products



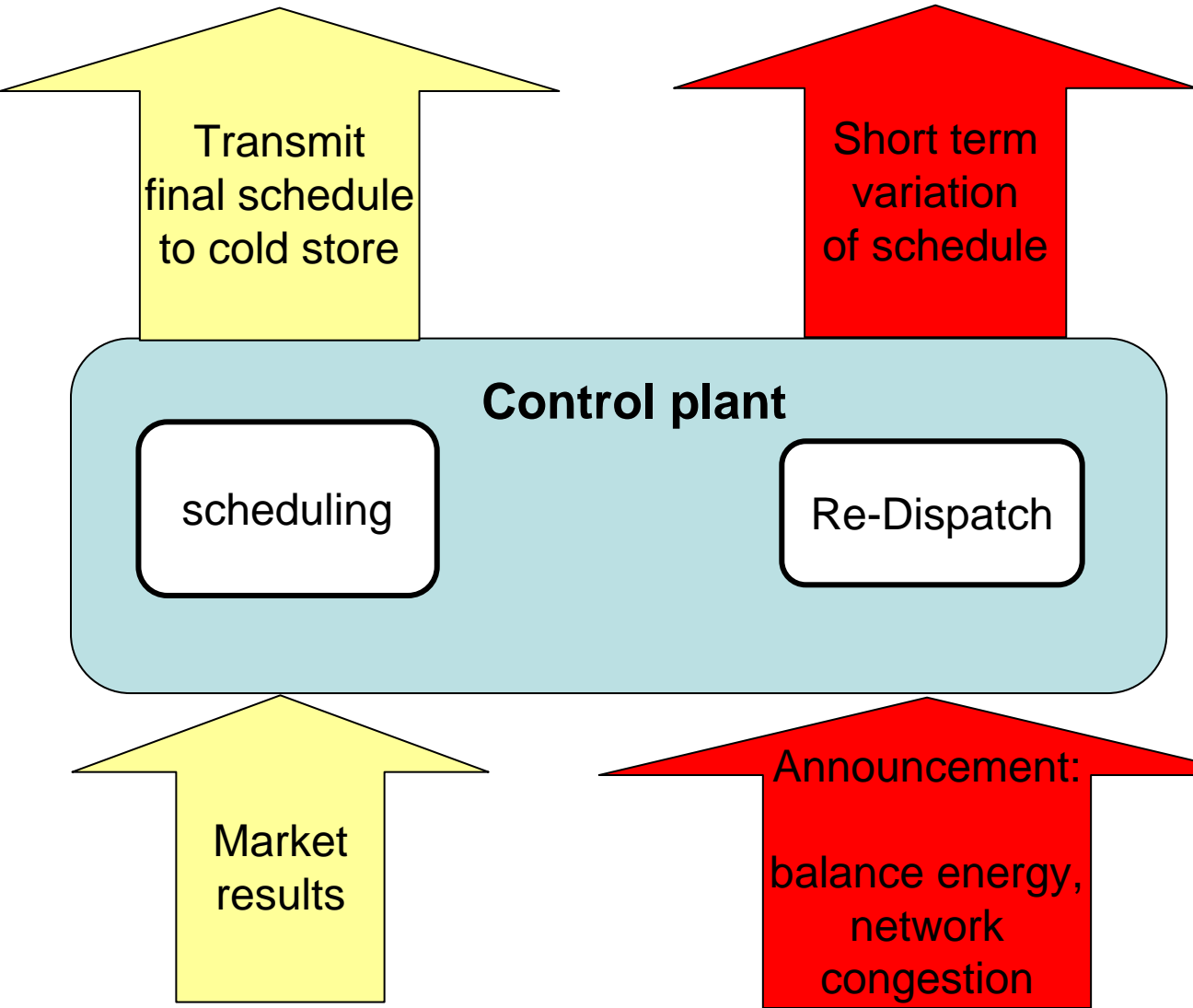
## Variables:

- Schedule (96 values each day)
- Spot prices (24 values per day)
- Balance energy prices (24 values each day)
- Congestions (up to 96 values per day)

## Timeframes:

- daily
- maybe some updates

# module Control-plant:scheduling & redispatch



## Variables:

- as before
- Market results (traded volumes: 24 values per day)
- Correction of schedule (up to 96 values)
- Announcements (logical yes or no)

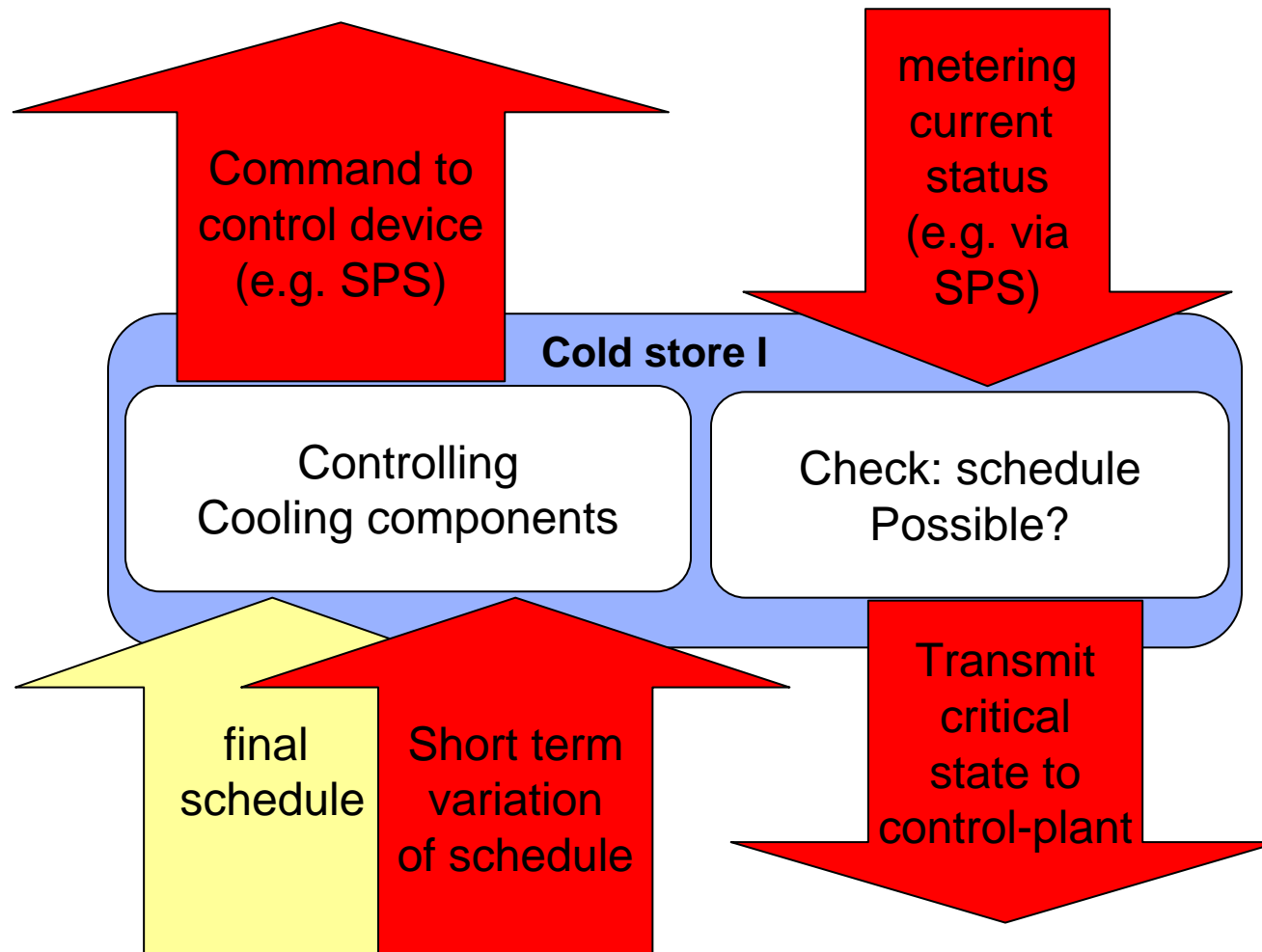
## Timeframes:

- daily
- maybe some updates

## Timeframes:

- online (some seconds to maximum 5 minutes)

## Module cold store:



### Variables:

- as before
- current state (temperatures, system pressure, load,...)
- commands (setting parameters)
- Announcements (logical yes or no)

### Timeframes:

- daily
- maybe some updates

### Timeframes:

- online (some seconds to maximum 5 minutes)

## Requirements for standardization

- Prognosis's and schedules
  - Low requirements
  - Consistent data format sufficient
- markets
  - Formats exist already for Spot and balance energy markets
  - consistent data format for network-and programme responsible party is necessary
- Control-process
  - High requirements
  - harmonized protocols for controlling components
  - Online data transmission required

## requirements

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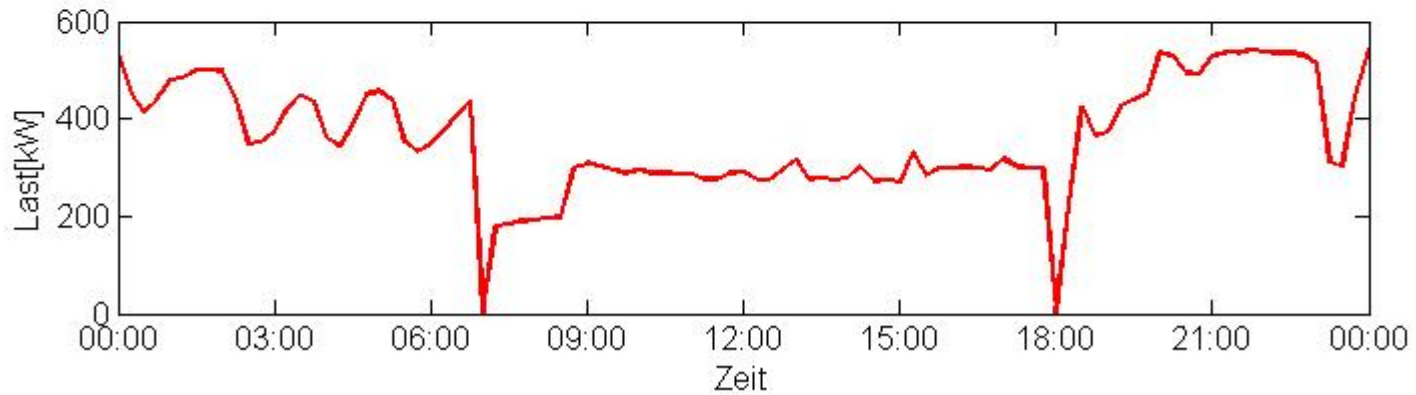
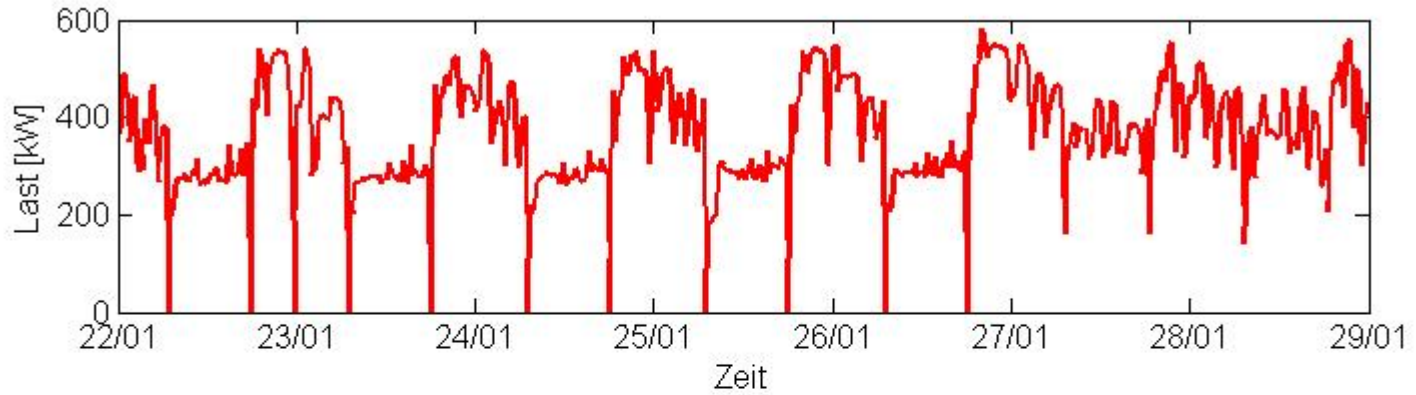
- Some slow channels for different prognosis's and schedules (maybe 10 per unit)
  - Hourly communication sufficient
- Online channels for measuring and controlling
  - Several temperatur channels
  - Several pressure channels
  - Load channel
  - Event channel
  - Command channel for each component
  
  - Communication each few seconds required
  - Site dependent: 20 to 100 channels



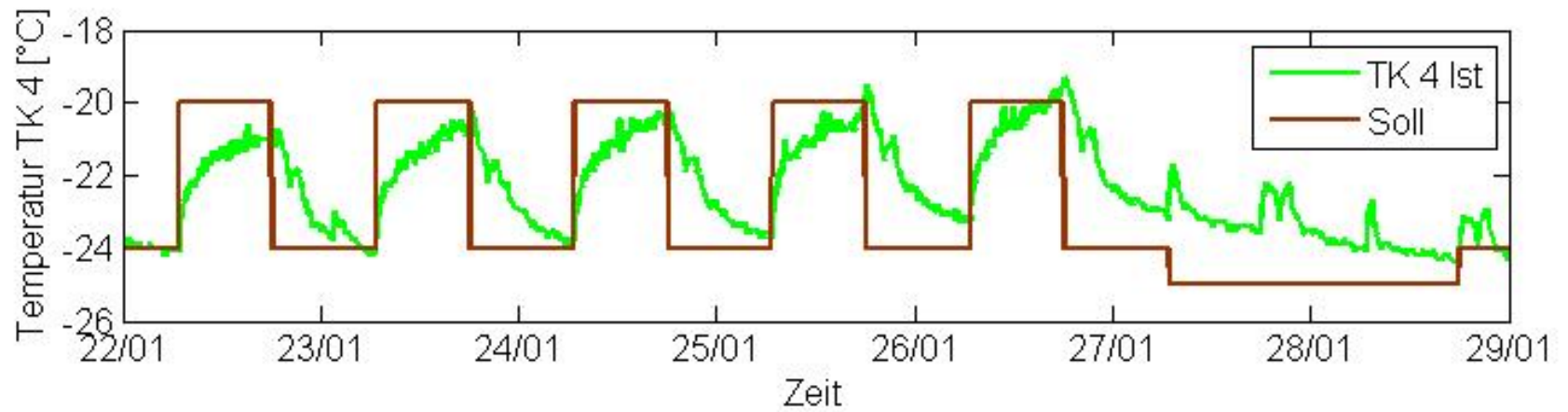
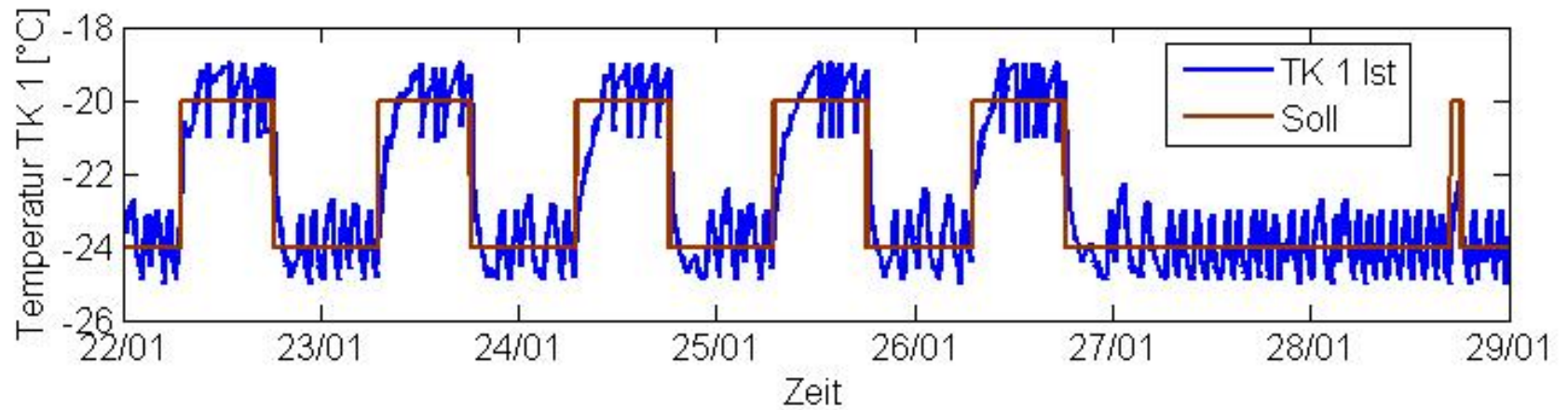
.....

# Some examples of measured timeseries

# Weekly and Daily pattern



# Temperature of cold store 1 and 4



**Thanks for your attention !!**



## contact

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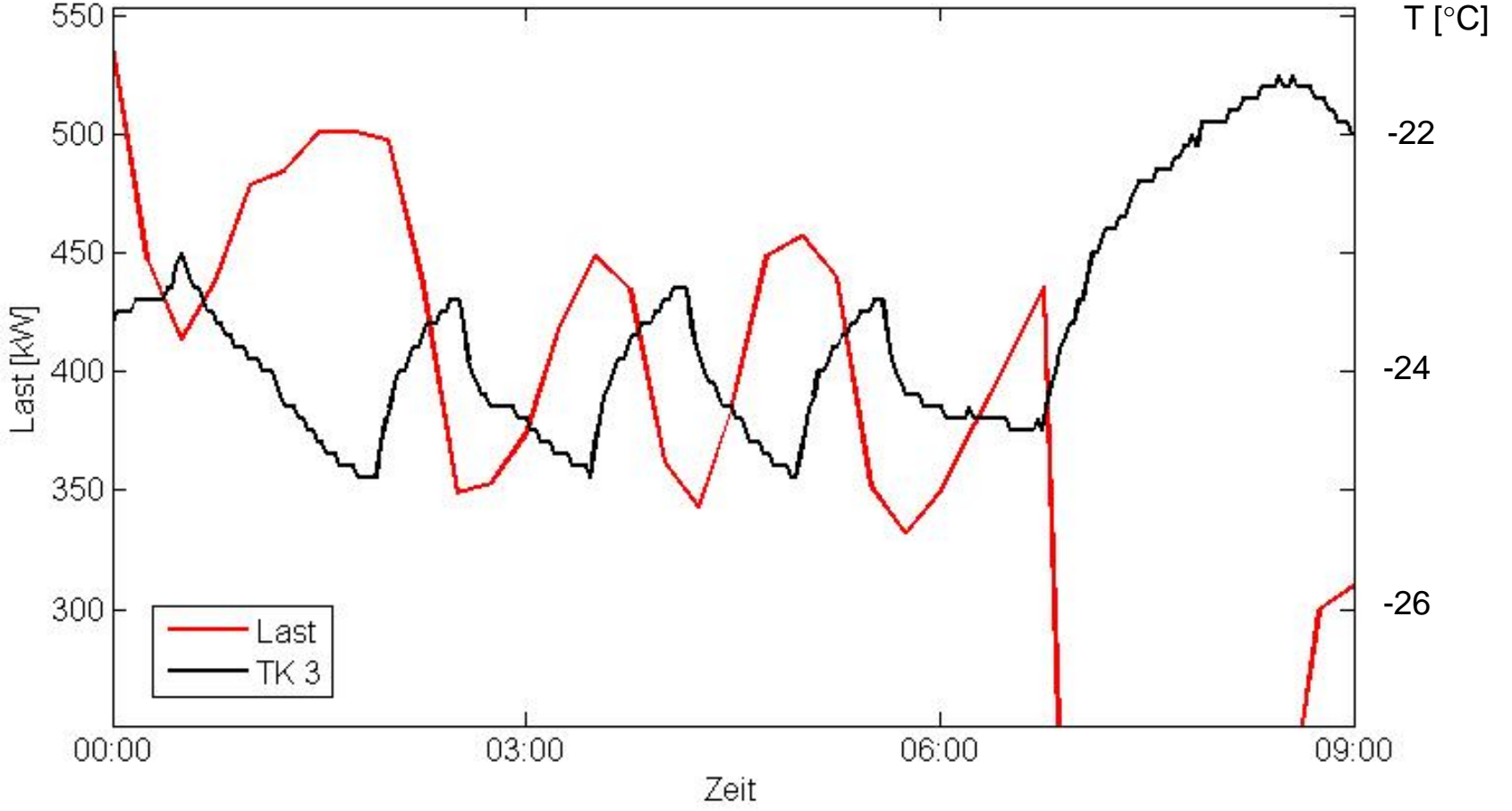
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# Superposition at night: temperature – load



# Optimisation load due to spot market

