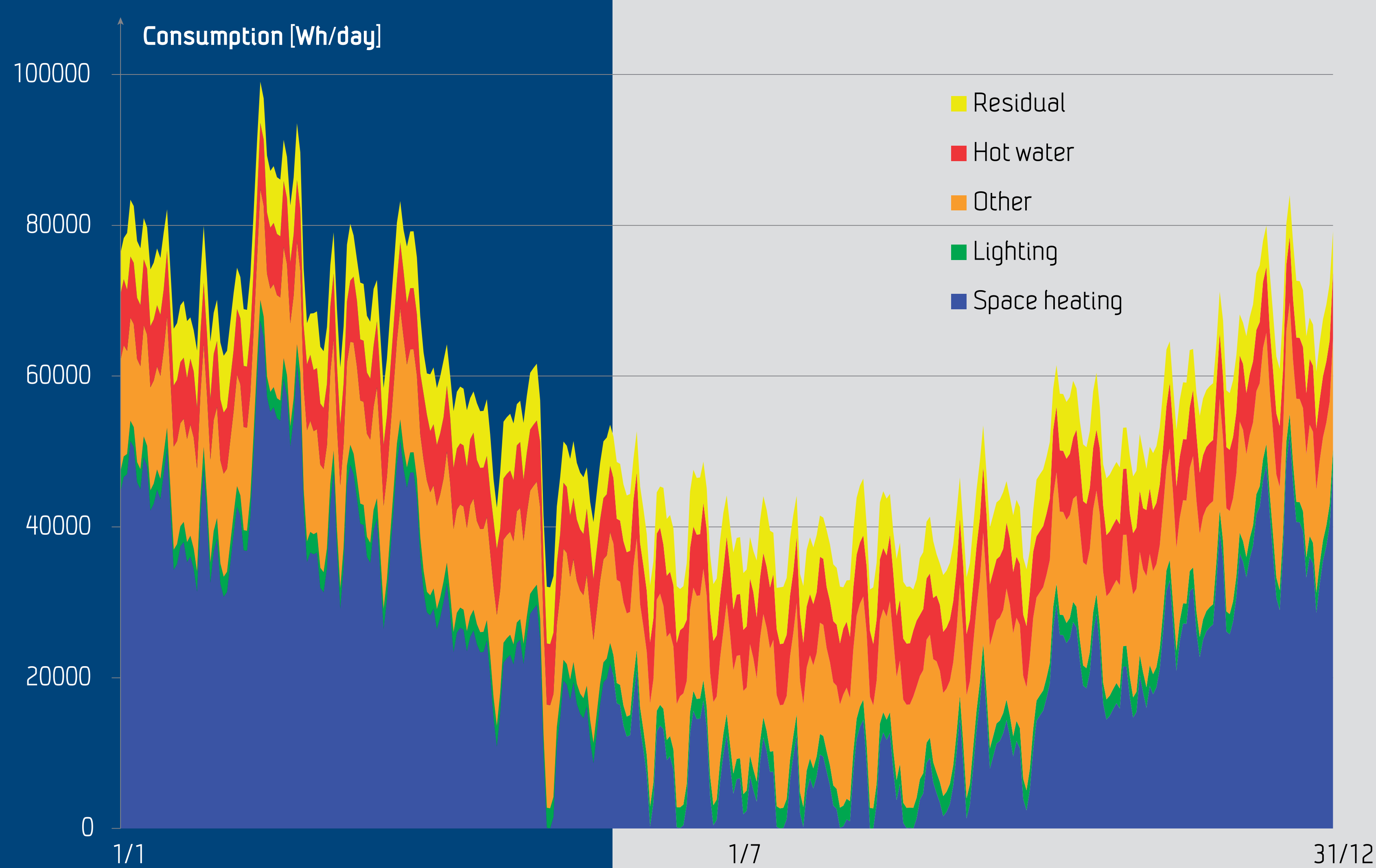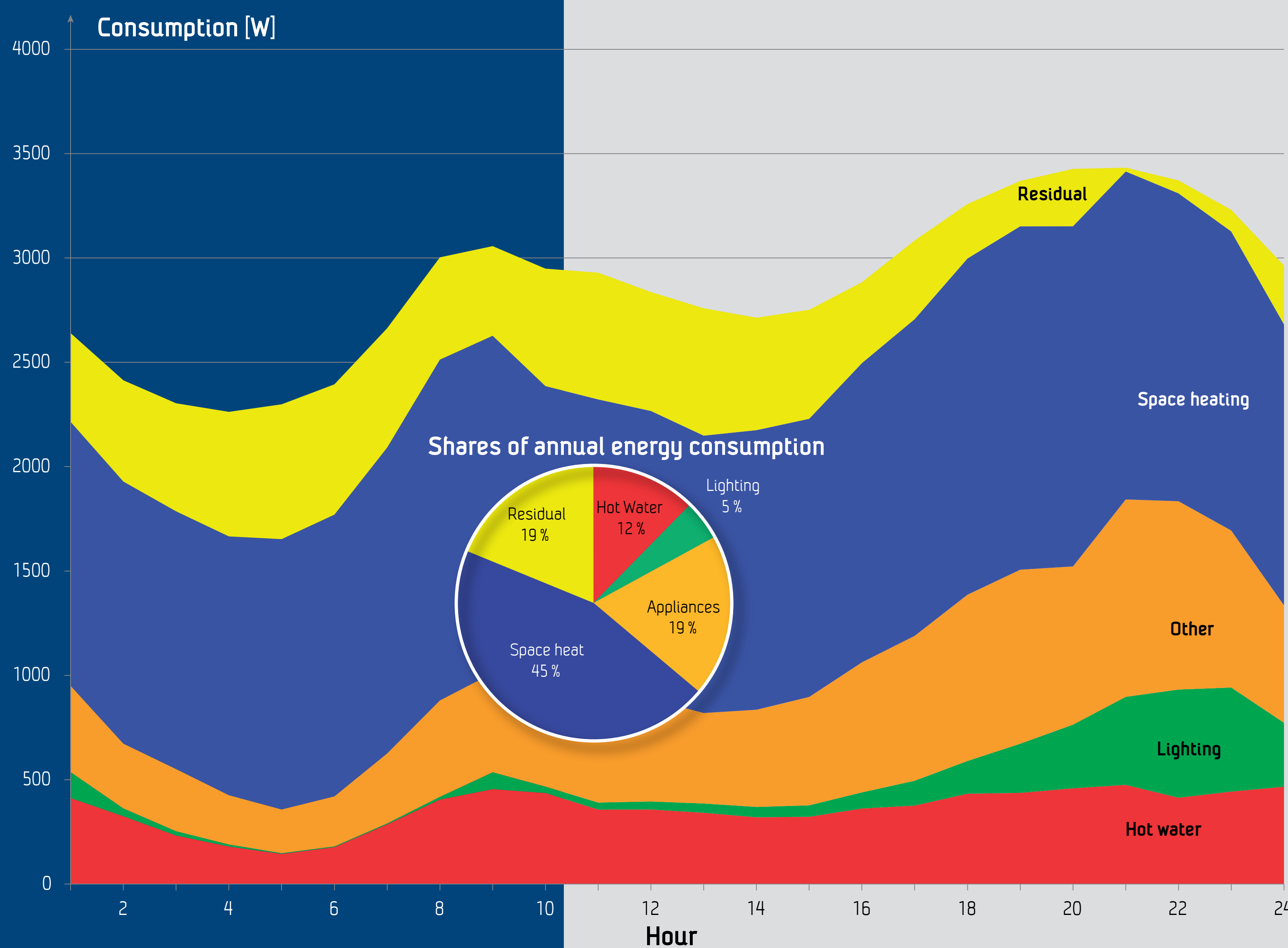# Method for
Detection of weather dependent load

- Detection of weather dependent load from hourly Smart metering (AMR)
- Automatic segmentation of load into end-uses
- New methodology incorporated into Useload tool

End-use segmentation for customer type: Eldek totalt

Consumption [W]

Residual
Space heating
Other
Lighting
Hot water

Hour

Shares of annual energy consumption

- Residual 19 %
- Hot Water 12 %
- Lighting 5 %
- Appliances 19 %
- Space heat 45 %

Consumption [Wh/day]

- Residual
- Hot water
- Other
- Lighting
- Space heating

1/1   1/7   31/12

Heat [kW]

Bioheating

Electric heating

Need for heating

No need for heating

- 15   0   + 15   Temperature [⁰C]

Challenge
- Measurement of end-uses on appliance level is very time consuming and expensive
- Segmentation of customer load time series into end-uses is essential to achieve cost effective production and distribution:
  - Information for customers to reduce load in peak hours
  - Explore TOU tariffs: Load shifting
  - Decide on energy carrier for heating and air conditioning
  - Energy efficiency actions: Insulation-automation-temperature reduction schemes
- New method also impacts on distribution issues:
  - Voltage reduction can reduce the peak load during extreme cold weather?
- During production or distribution overload:
  - Demand response/ reduce which appliance?

Solution
Implementation of smart metering in Europe creates new opportunities
- Hourly time series are available for all customers from 2019
- New method can automatically segment the customer load into the main components:
  - Heating: 60% in Norway
  - Air conditioning
  - Appliances
- Results from earlier research can be used to segment the load further:
  - End-uses metered under "Remodece" EU project
  - Segment "appliances" in to Water heating, Lighting, Tv, Pc, Refridgerator, Freezers, Cooking, Washing etc.
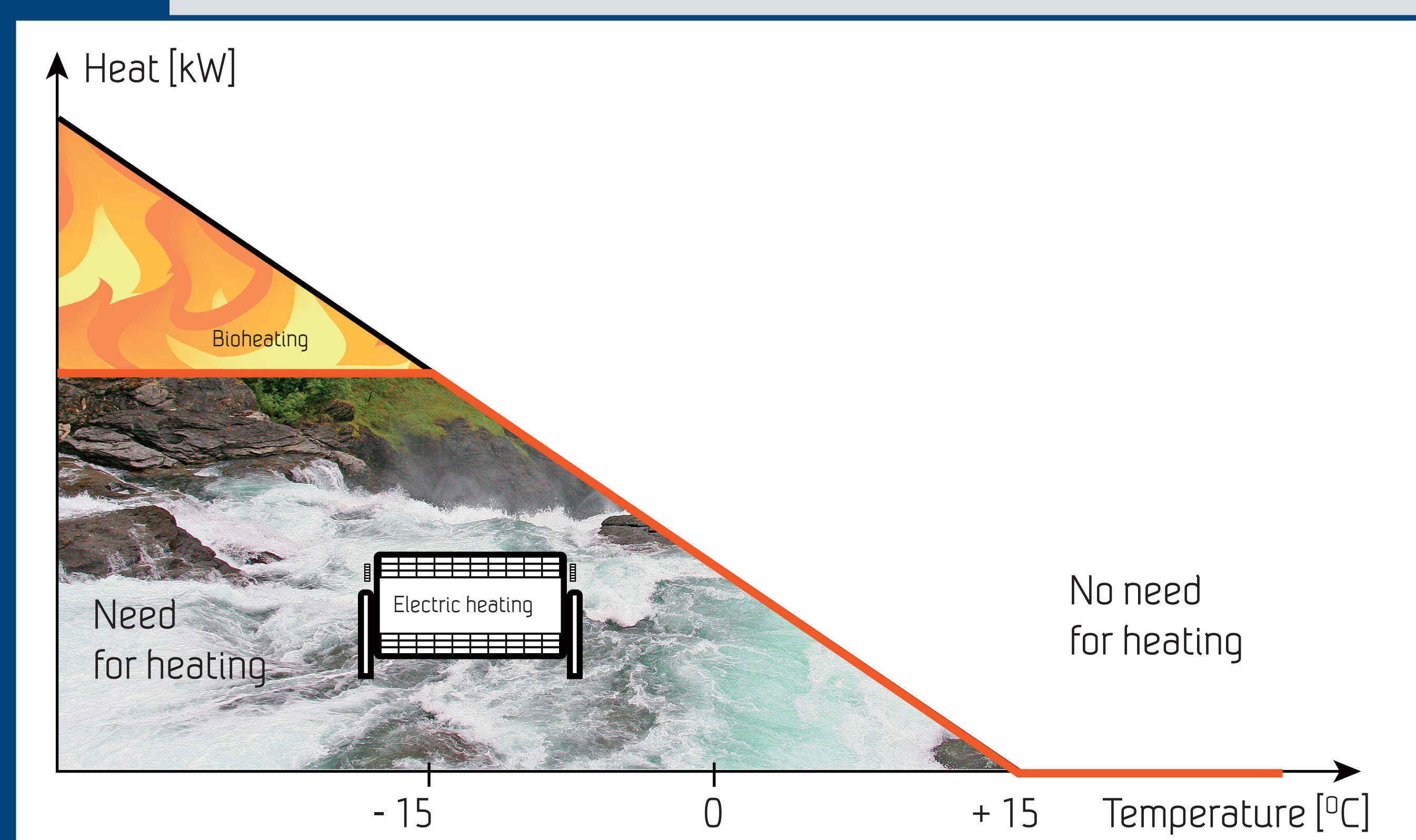
Issues of Weather dependency detection
- Separate detection for each hour and day-type
- Temperature setting, thermostat
  - "Free" heating is part of the space heat: 15 degrees thermostat
- Saturation temperature
  - Heating peaks at circa -15 degrees, other energy carriers (bio, oil) are taken into use when the temperature is colder.
- Time constant
  - Circa 0.5: temperature of yesterday is as important as today's temperature

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