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Ecodesign Lot 33 Preparatory study Smart appliances*
Task 7 – Policy and scenario analysis

Task 7 – Technical requirements

Project team at stakeholder workshop 14 September 2017:
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*Under multiple framework contract N°ENER/C3/2012-418-Lot N°1

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"Delivering a New Deal for Energy Consumers" Some extracts …

COM(2015) 339 final, 15.7.2015

- *"give consumers **a wide choice** of action"*
- *"the **choice** on participating in demand response must always **stay with the consumer**"*
- *"**standards and interoperability are important** also for the in-home communication between a smart appliance and energy management systems so that demand-response-ready, in-home equipment can be easy to install and operate. **Industry needs to finalise and apply** such standards **quickly** and should be **supported** in this"*

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"Delivering a New Deal for Energy Consumers" Some extracts …

- *"the data collection and processing party in the context of smart metering systems or other services empowering consumers to act should provide direct* ***access to*** *these* ***data to the customer and any third party*** *designated by the consumer"*
- *"for value-added services,* ***only third parties authorised*** *by the consumer must have access to consumer's consumption and billing data"*
- *"making sure smart home appliances and components are fully interoperable and easy to use … **with the recommended functionalities to maximise their benefit to consumers**"*

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7.8.1 The user should have the possibility to enable and disable the energy smart functionality in the user settings - horizontal

7.8.2 The energy smart functionality is disabled by default - horizontal

- Enabling energy smart functionality requires manual interaction or confirmation from the user;
- Also if an energy manager or other service provider is automatically detected

7.8.3 The user always has the possibility to overrule an external energy smart command - horizontal

» However, this is no protection against obligations in a contract with an external party

7.8.4 The smart appliance should fall back to standalone operation when the energy smart functionality fails - horizontal

- Standalone operation = operation as if energy smart functionality is disabled

- Generic horizontal principle, but returns in the specific requirements regarding the appliance behavior i.f.o. the instruction set

7.8.5 A smart appliance should have a minimum amount of flexibility - vertical

- Level playing field and avoidance of free riding
- Guarantee to user regarding minimum added value

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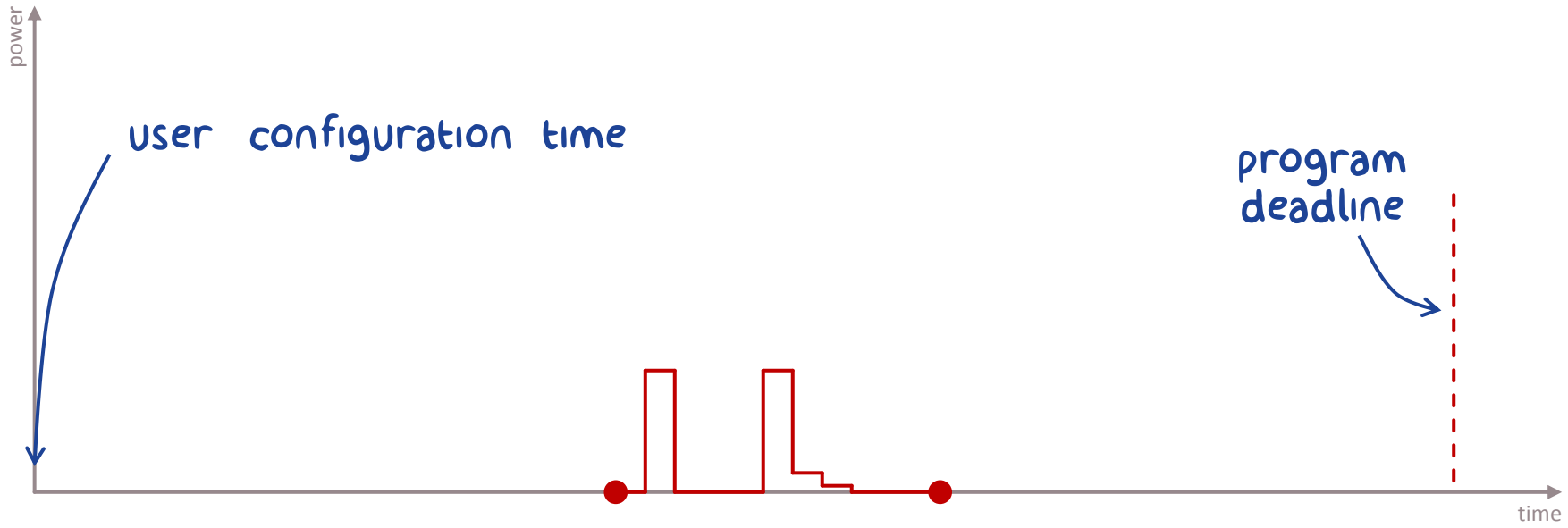
7.8.5 A smart appliance should have a minimum amount of flexibility - vertical

Periodical appliances (cat I):

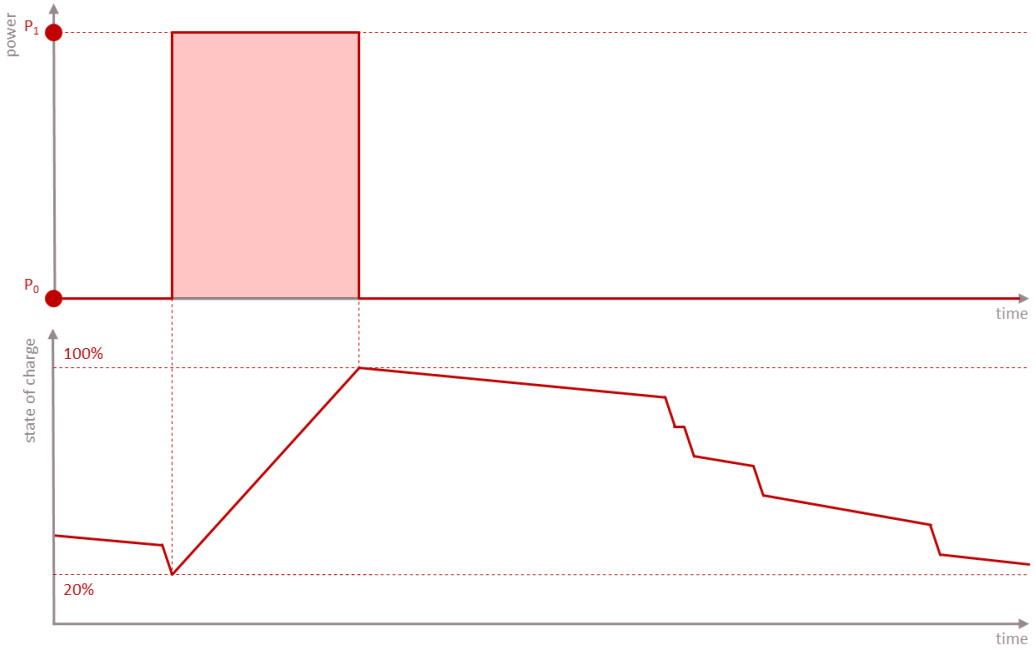
» program deadline of up to **at least 24h** in the future



7.8.5 A smart appliance should have a minimum amount of flexibility - vertical

Thermal appliances with internal flexibility (cat IIa):

- the amount of flexibility can be expressed as the amount of energy between upper and lower comfort limit
- TBD per appliance type (including test procedure)



7.8.5 A smart appliance should have a minimum amount of flexibility - vertical

Thermal appliances without internal flexibility (cat IIb):

- a “reference” setup will be defined per appliance type
- in the “reference” setup the same approach as in category IIa will be used

7.8.6 A smart appliance should have a flexibility quantification functionality - vertical

What?

- indicate current status
- indicate the flexibility in the (near) future

Why?

- planning purposes

Why vertical?

- the type of flexibility is very different in appliance categories

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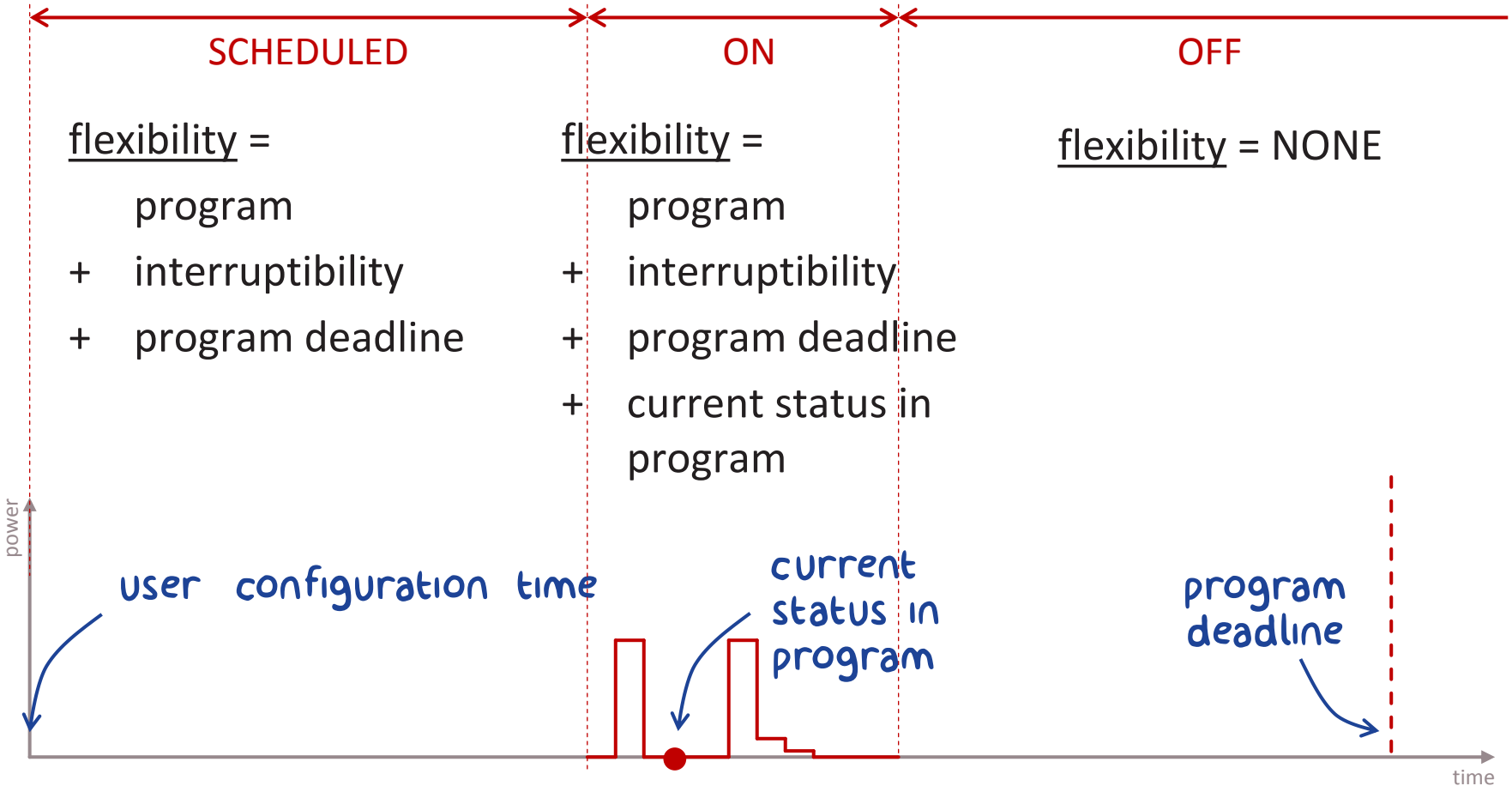
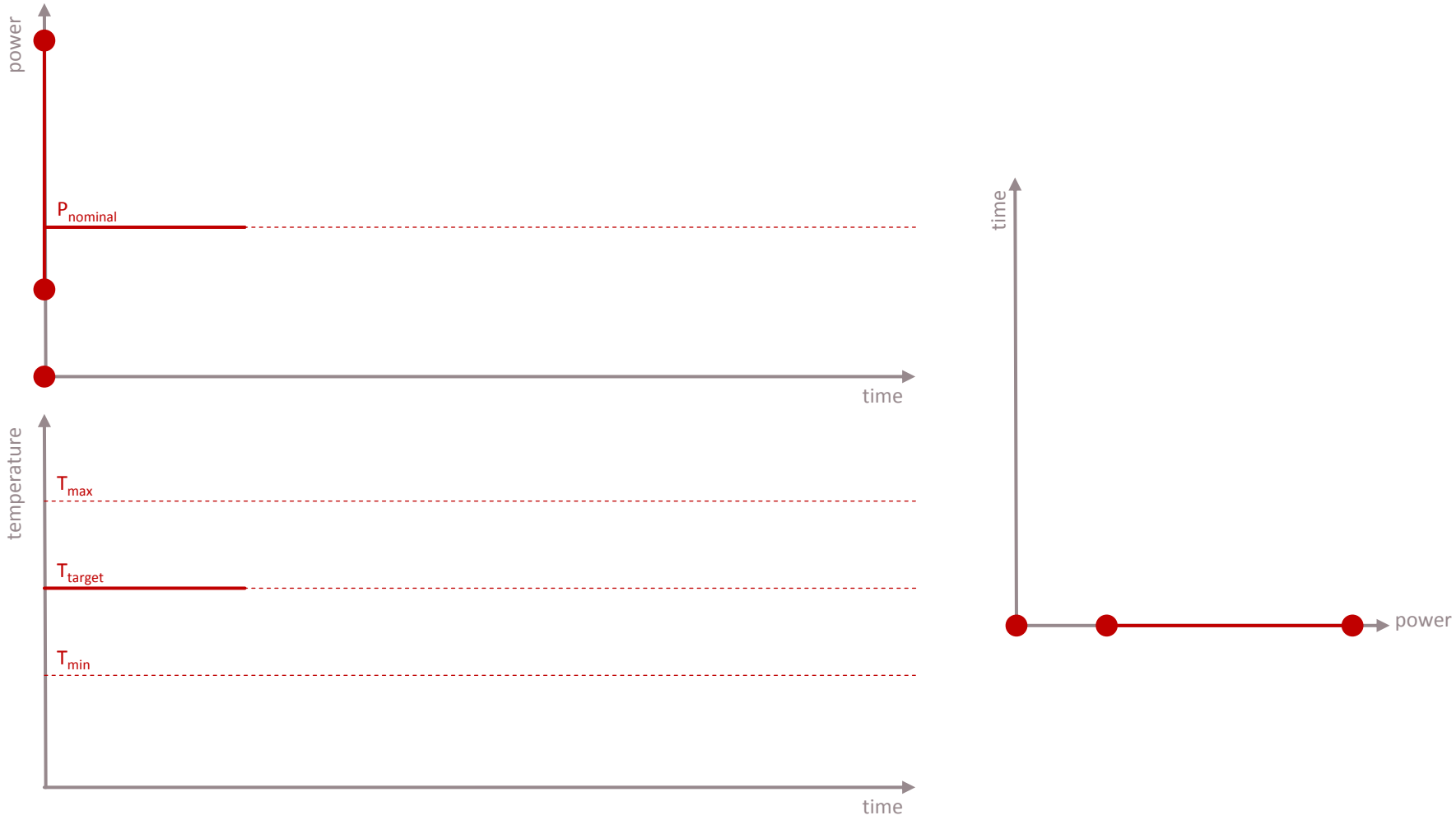
7.8.6 A smart appliance should have a flexibility quantification functionality - vertical

Periodical appliances: 3 situations



7.8.6 A smart appliance should have a flexibility quantification functionality - vertical

Thermal appliances: power flexibility graph



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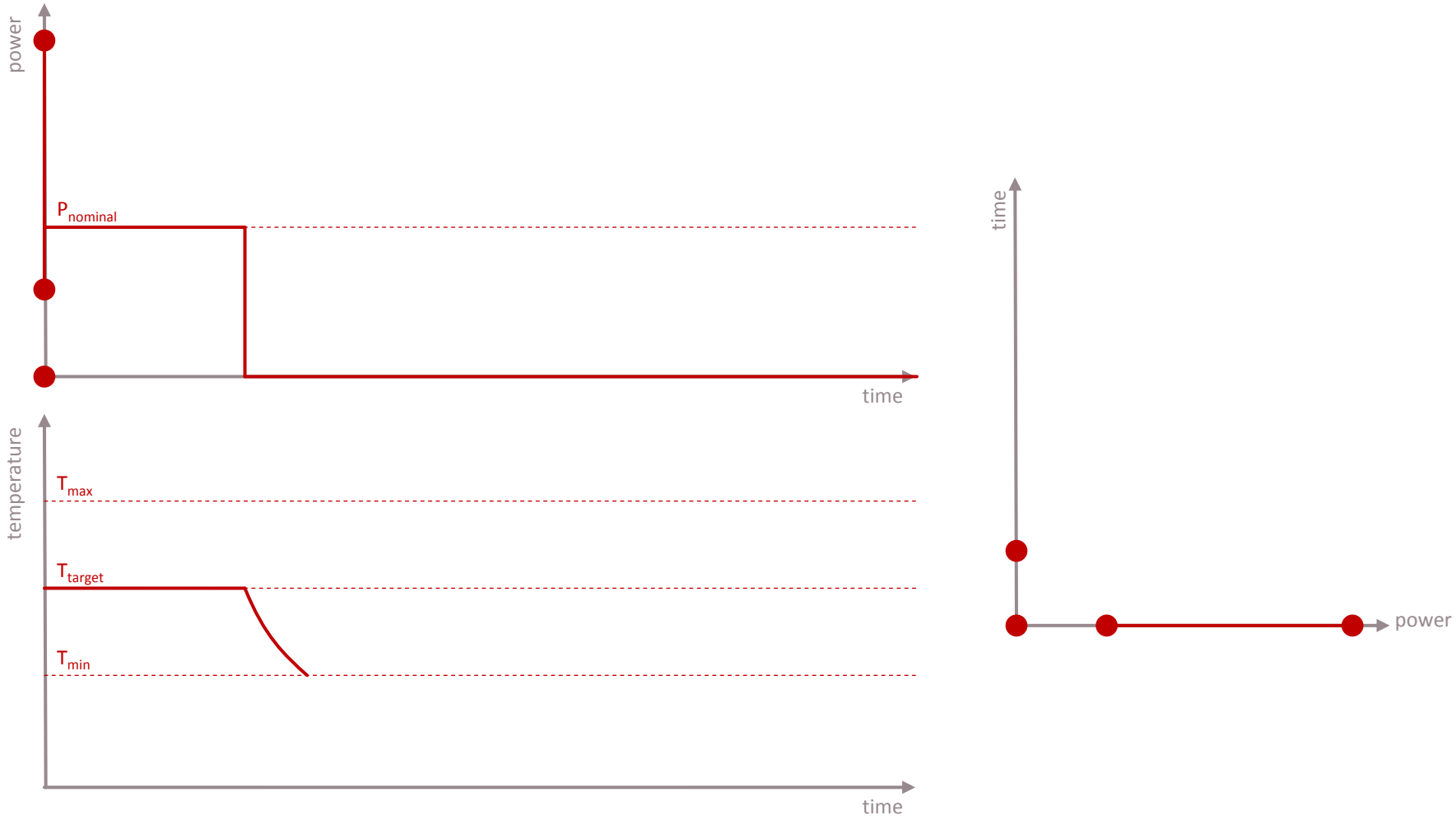
Thermal appliances: power flexibility graph



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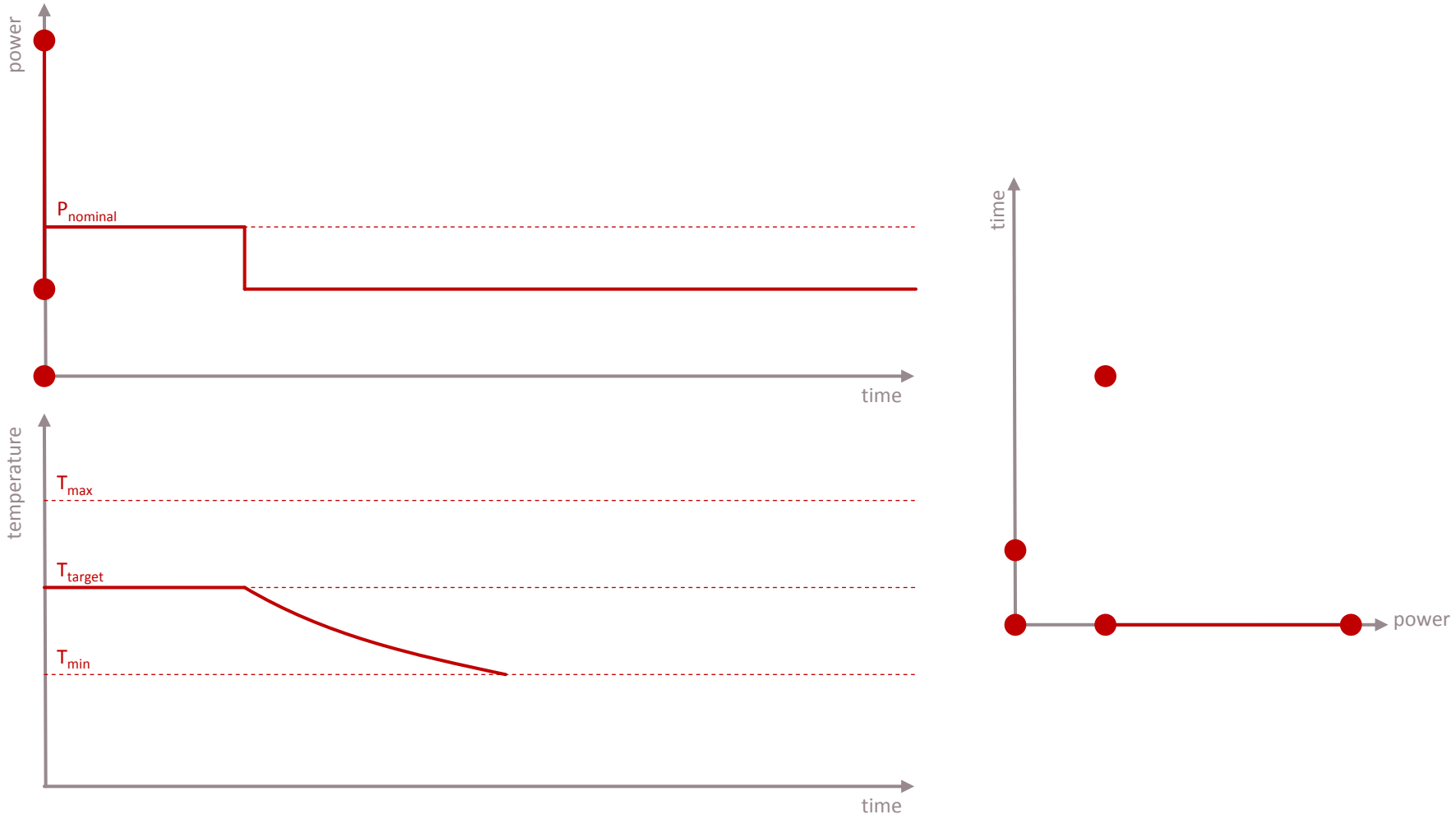
Thermal appliances: power flexibility graph



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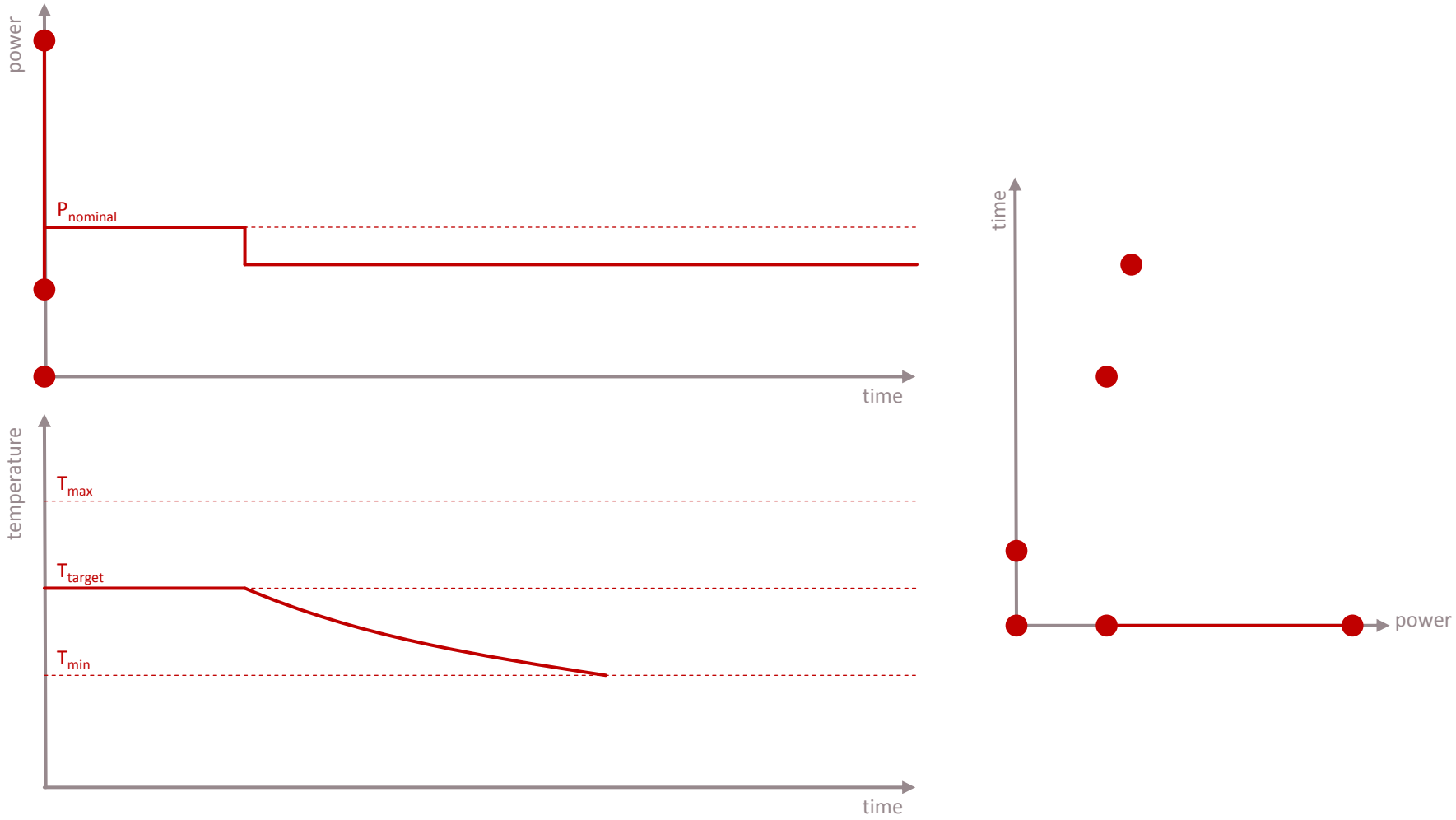

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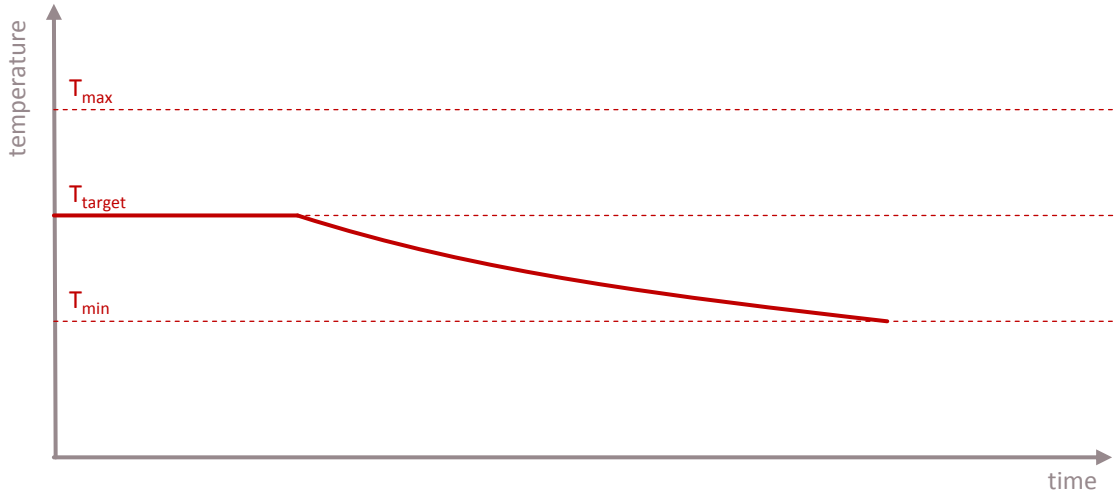

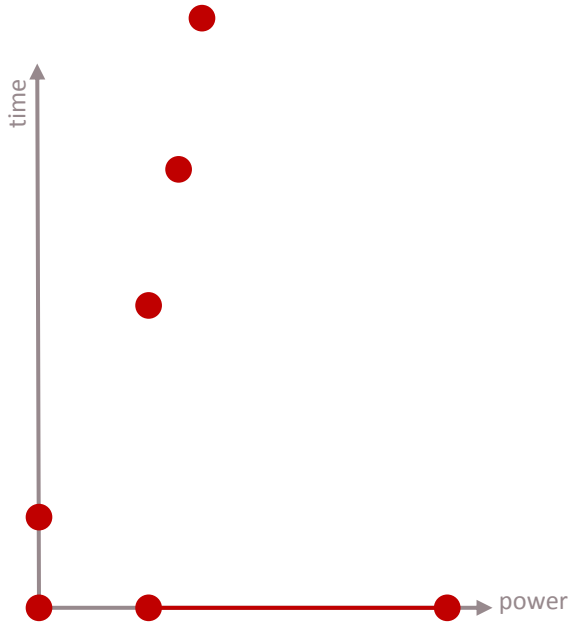

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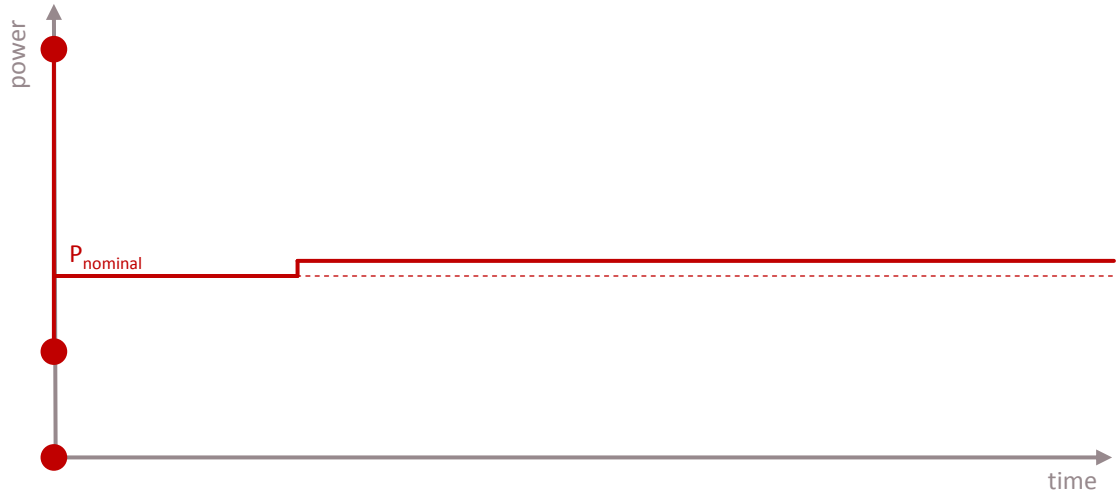

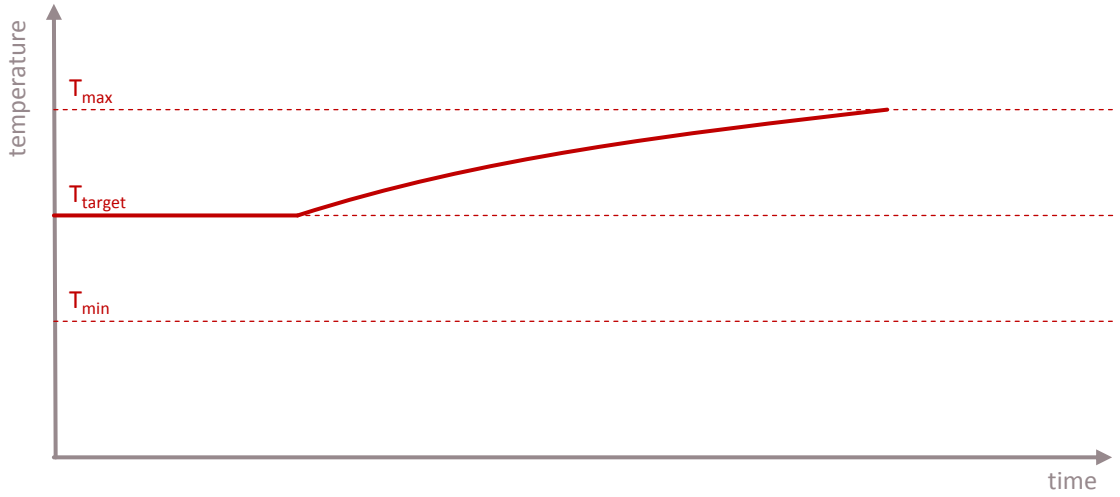

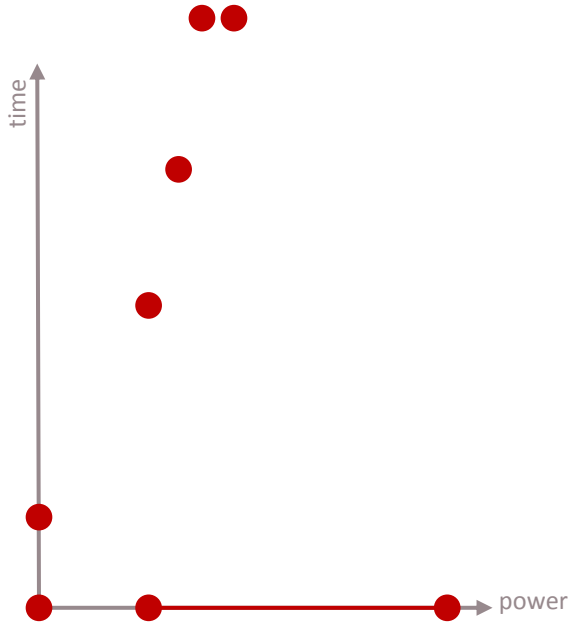

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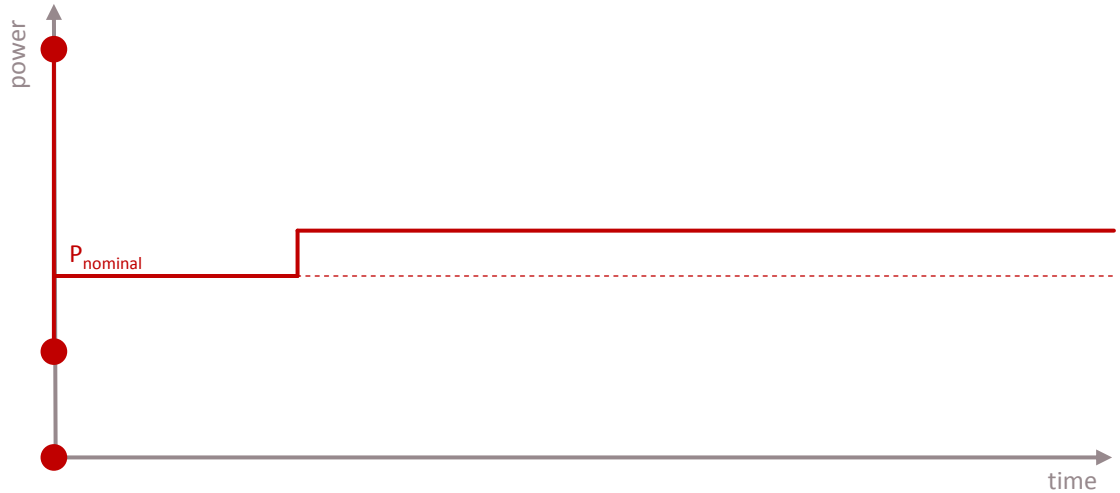

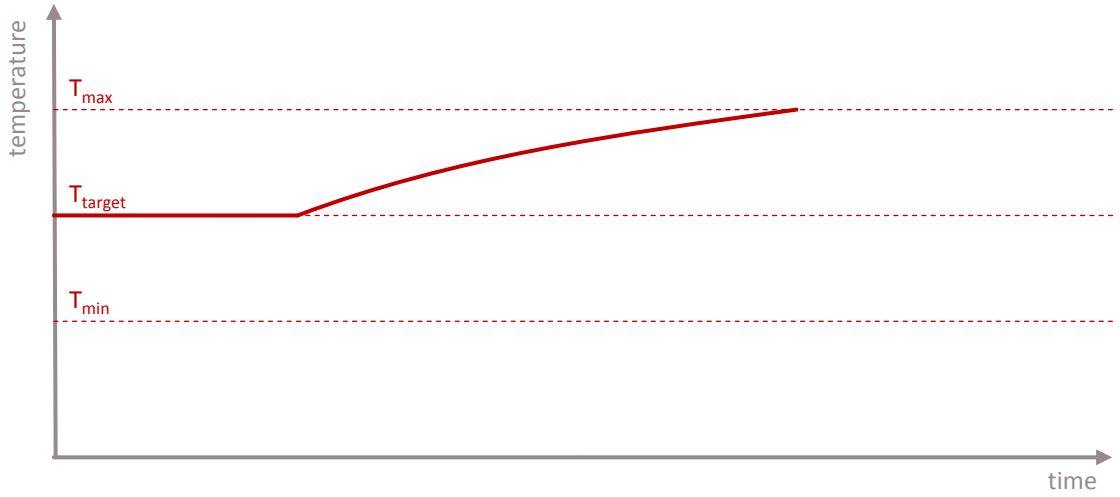

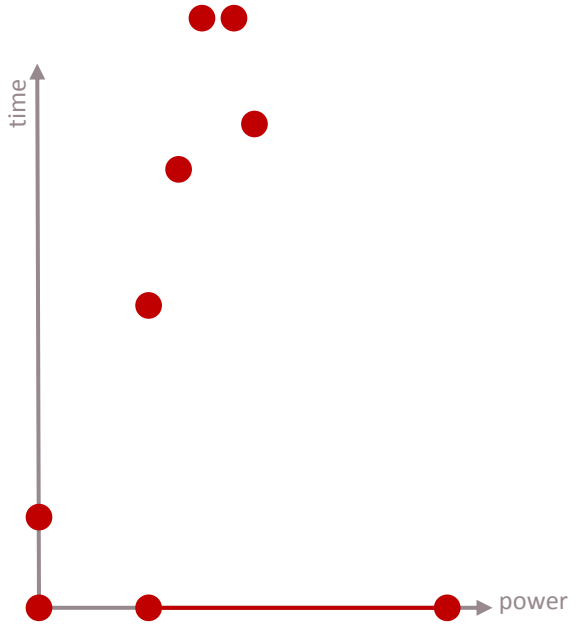

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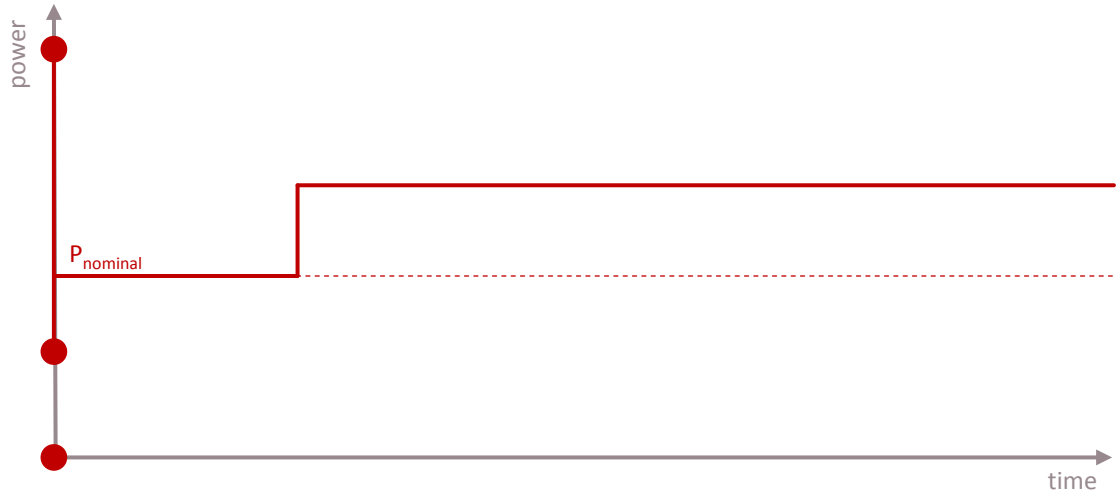

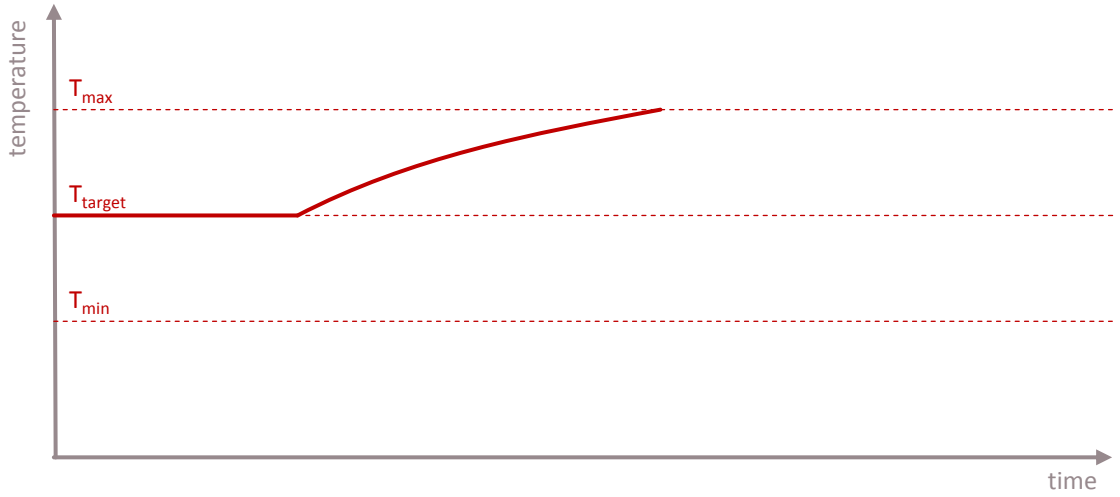

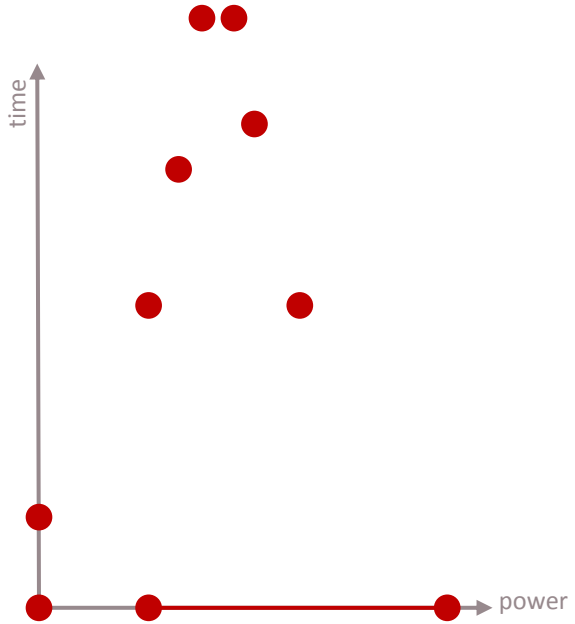

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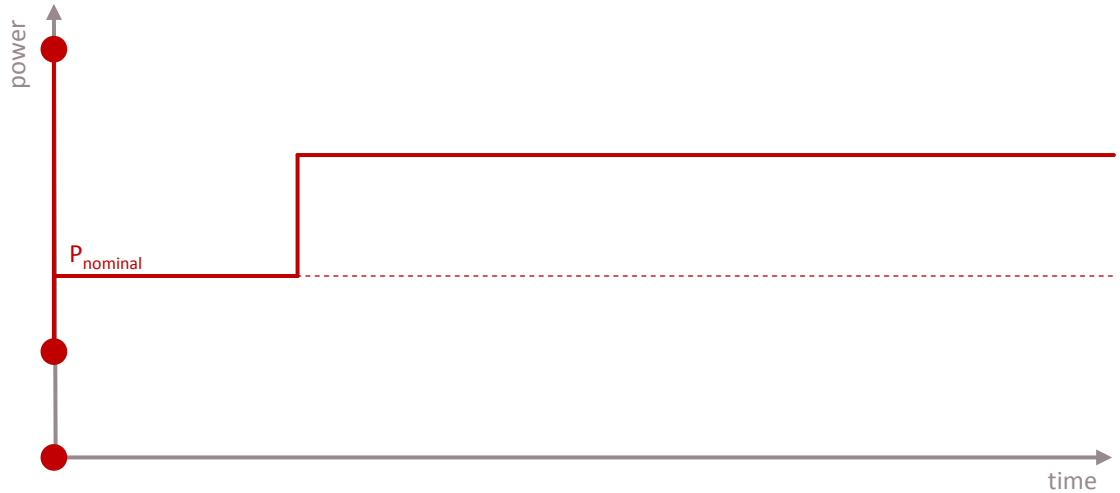
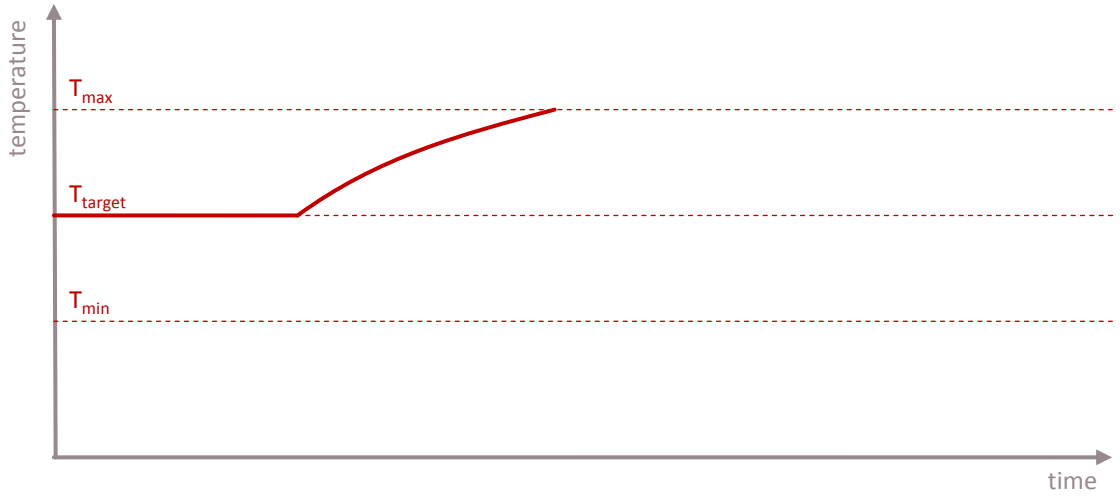
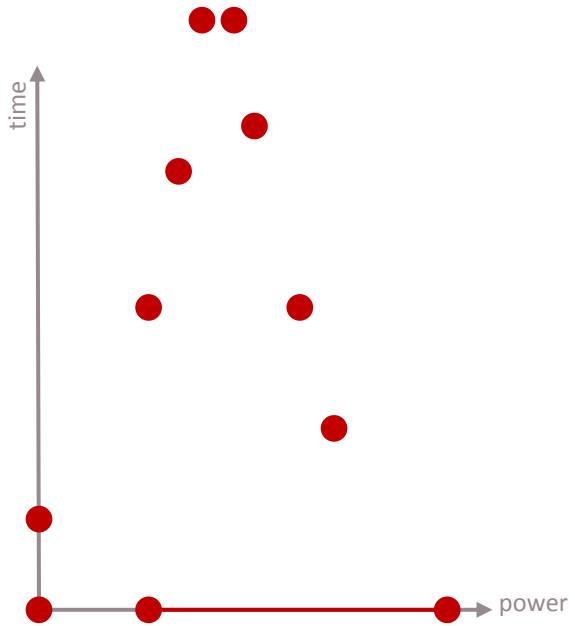
Thermal appliances: power flexibility graph

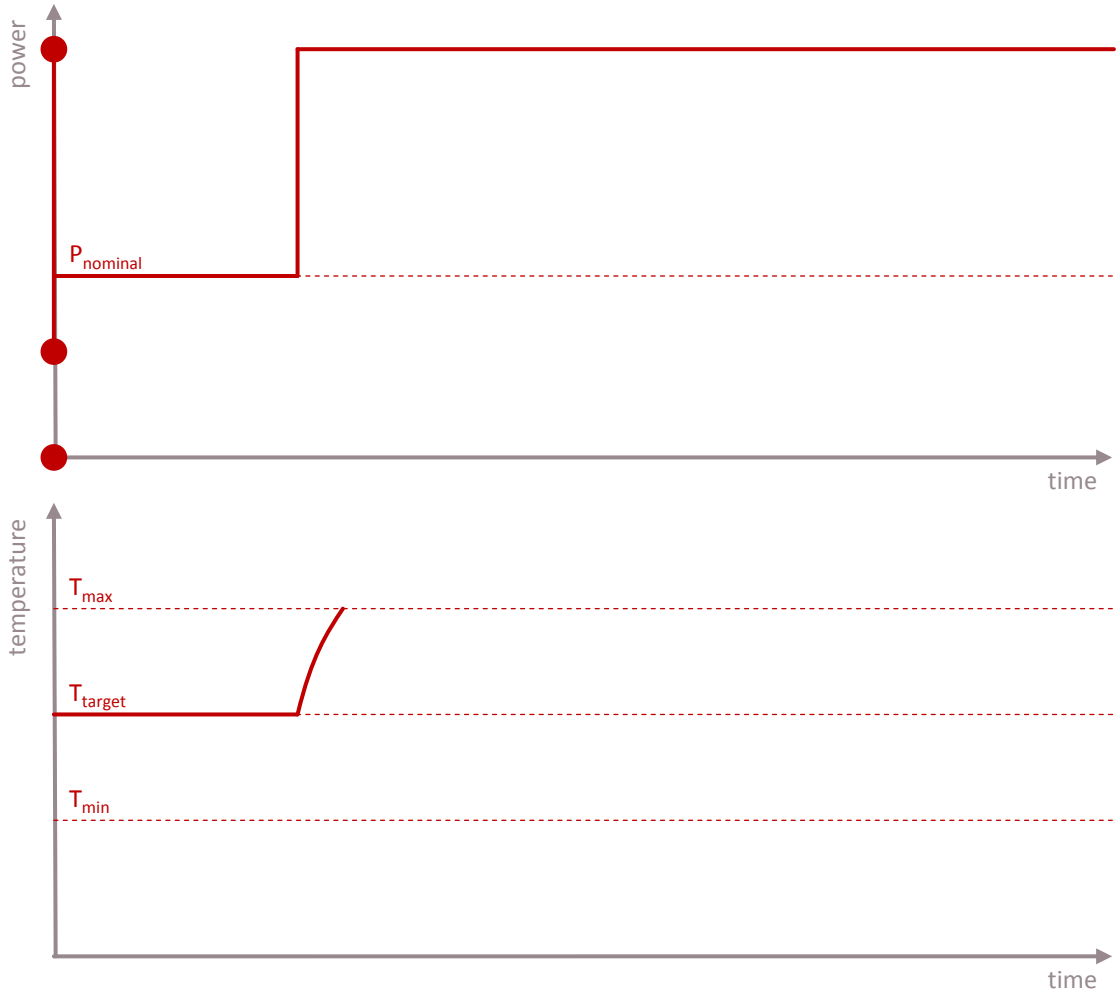


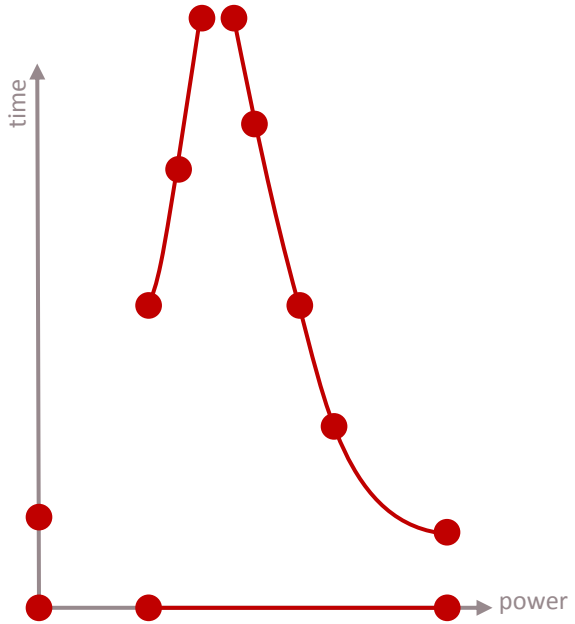




7.8.6 A smart appliance should have a flexibility quantification functionality - vertical

Thermal appliances: power flexibility graph





7.8.7 A smart appliance should have a settlement support functionality - horizontal

What?

» settlement = validation/verification of reaction of an appliance on an external command

Why?

» eases verification of contractual obligations between consumer and external partner

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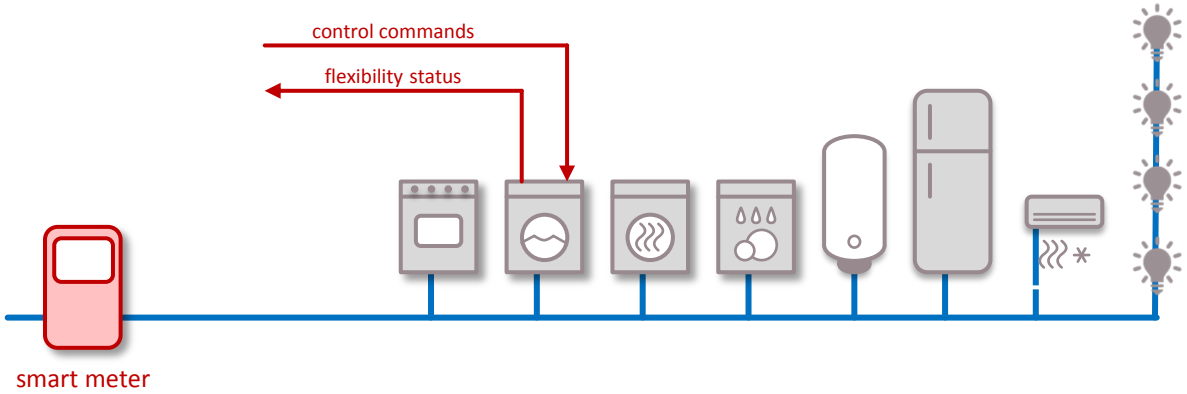
7.8.7 A smart appliance should have a settlement support functionality - horizontal

Why via the smart meter was not the recommendation?



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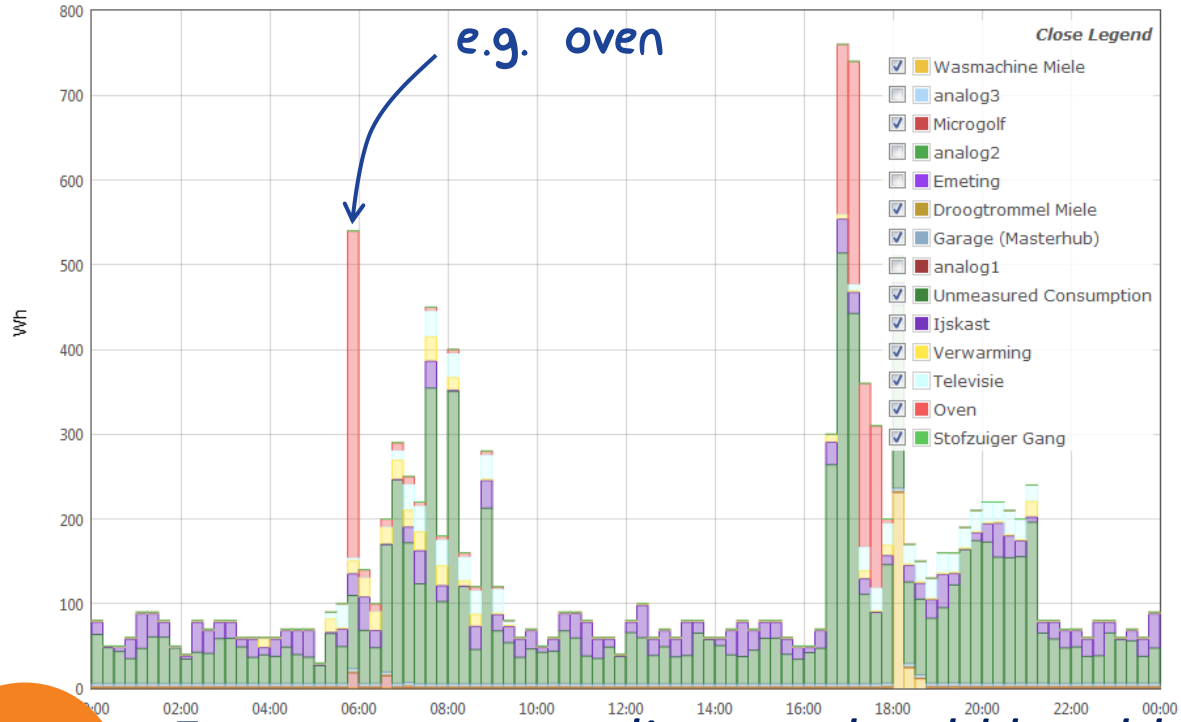
7.8.7 A smart appliance should have a settlement support functionality - horizontal

Why via the smart meter was not the recommendation?



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Energy smart appliances should be able to function ***without*** *the presence of a* ***Smart Meter***

7.8.7 A smart appliance should have a settlement support functionality - horizontal

Recommendation:

- Appliance records its historical power consumption in memory
- Optionally, records received instructions
- Format, resolution, accuracy and time scale TBD
- Based on measurements or based on estimate as long as within specification

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7.8.8 A smart appliance should make energy consumption data available to the user - horizontal

- Energy smart functionality requires the collection of appliance energy consumption data (see, e.g., req. 7.8.7)
- Low cost to make this available to the user
- Can stimulate the user to take energy efficiency measures
- Although not strictly related to energy smartness;
  - energy efficiency is main goal of the Ecodesign Directive;
  - in line with the 'Delivering a New Deal for Energy Consumers' communication;
  - added value even when the appliance is not used smart.

7.8.9 A smart appliance should have a maximum surplus energy consumption - vertical

- Potential surplus energy consumption:
  - Standby losses due to extra communication and processing fall under Ecodesign process dealing with standby losses; not further discussed
  - Shifting energy may result in operating points deviating from the most energy efficient ones
    - From system point justified by increased share RES
    - From user point justified by flexibility revenues
    - But: requirements needed to avoid unjustified and/or unexpected excessive losses

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7.8.9 A smart appliance should have a maximum surplus energy consumption - vertical

- Option 1: information requirement
- Option 2: maximum surplus energy consumption
- Option 3: user configurable maximum surplus energy consumption limit
- Option 4: conservative default value for configurable maximum surplus energy consumption limit

- Recommendation: option 4

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7.9.1 The communication interface should have "resource discovery" functionality - horizontal

- To discover devices in a network providing specific functionality
- E.g., Bonjour/zeroconf, SSDP, DIAL, …

- Requirement: energy smart appliances must support one or several of an agreed on list of resource discovery protocols

- Resource discovery protocols typically operate in local networks
  - Extension to cloud based discovery is a technical gap that should be addressed

7.9.2 The communication interface should support a common data model and application protocol - horizontal

- The communication interface of a smart appliance should support a common data model:
  - i.e., the data model of the appliance's application protocol can be mapped one-to-one to the reference ontology in a standardized way;
  - the common data model must support all actions/instructions and responses/events defined in the requirements;
  - an appliance must support the actions/instructions and responses/events specific for the type of appliance (vertical);
  - the appliance may offer additional data models.

- A candidate for such reference ontology is SAREF/SAREF4ENER

7.9.2 The communication interface should support a common data model and application protocol - horizontal

- Options for the application protocol used over the direct flexibility interface:
  - Option 1: support at least one specific standardized application protocol
  - Option 2: support at least one standardized application protocol selected from list of standardized application protocols
  - Option 3: may use any application protocol
- Option 1 is recommended: best guarantee for the user to achieve interoperability
- The appliance may offer additional application protocols

7.9.2 The communication interface should support a common data model and application protocol - horizontal

- A possible way forward:
  - The adoption of data model and application protocol proposal from the industry itself, within a TBD timeframe
  - In case no consensus can be achieved in the defined timeframe, the data model and application protocol can be subject of a standardization mandate

7.9.3 The communication interface should support cybersecurity and privacy requirements for connected devices - horizontal

- Cyber security and data protection is broader IoT topic
- The E.C. is reviewing the cybersecurity strategy to strengthen Europe's resilience: see actions defined in communication COM(2017) 228 final of 10.5.2017
- Energy smart appliances must therefore comply with the prevailing EU cyber security and data protection legislation

7.9.4 The communication interface should support an upgradability functionality - horizontal

- Appliances have a typical lifetime length that surpasses that of software manifold.
- It is required that the software of those appliances can be remotely updated to prevent avoidable and early decommissioning of appliances due to outdated software.
- Improves cybersecurity: allows patching of security vulnerabilities

7.9.5 The communication interface should support communication with local and external energy management systems - horizontal

- The energy smart appliance can receive instructions from both:
  - local energy management system
  - external party (cloud model)

- Both option must be supported:
  - The appliance must be able to communicate with a local controller without making use of the public internet
  - The direct flexibility interface of the appliance must be accessible from the internet
    - E.g., via the manufacturers cloud platform or via cloud enabled resource discovery

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*Energy smart appliances should be able to receive instructions from a controller **inside and outside** the customer **home network***

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7.10.1 The smart appliance should have a direct flexibility interface - horizontal

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Direct flexibility interface : ***MANDATORY***
Indirect flexibility interface: ***OPTIONAL***
Internal measurement interface: ***OUT of SCOPE***

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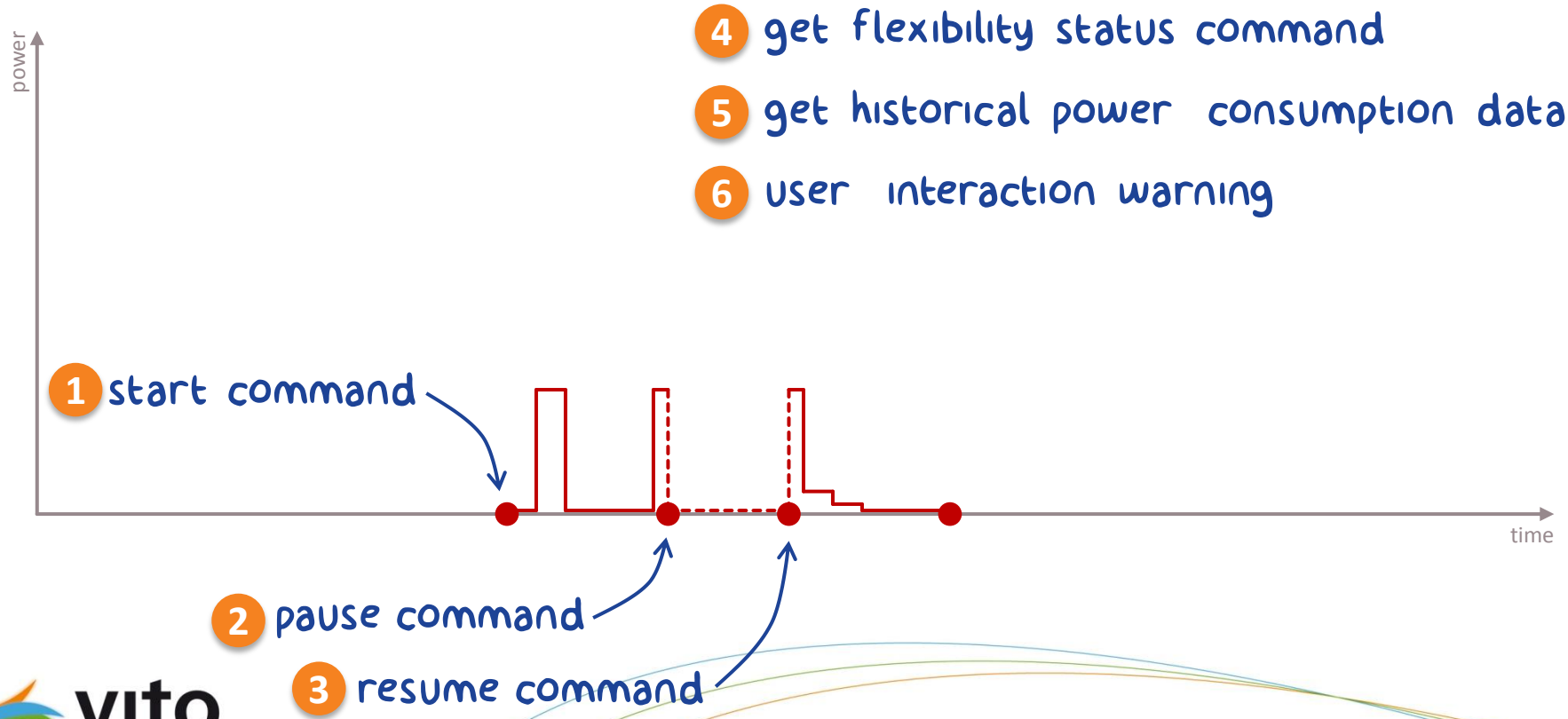
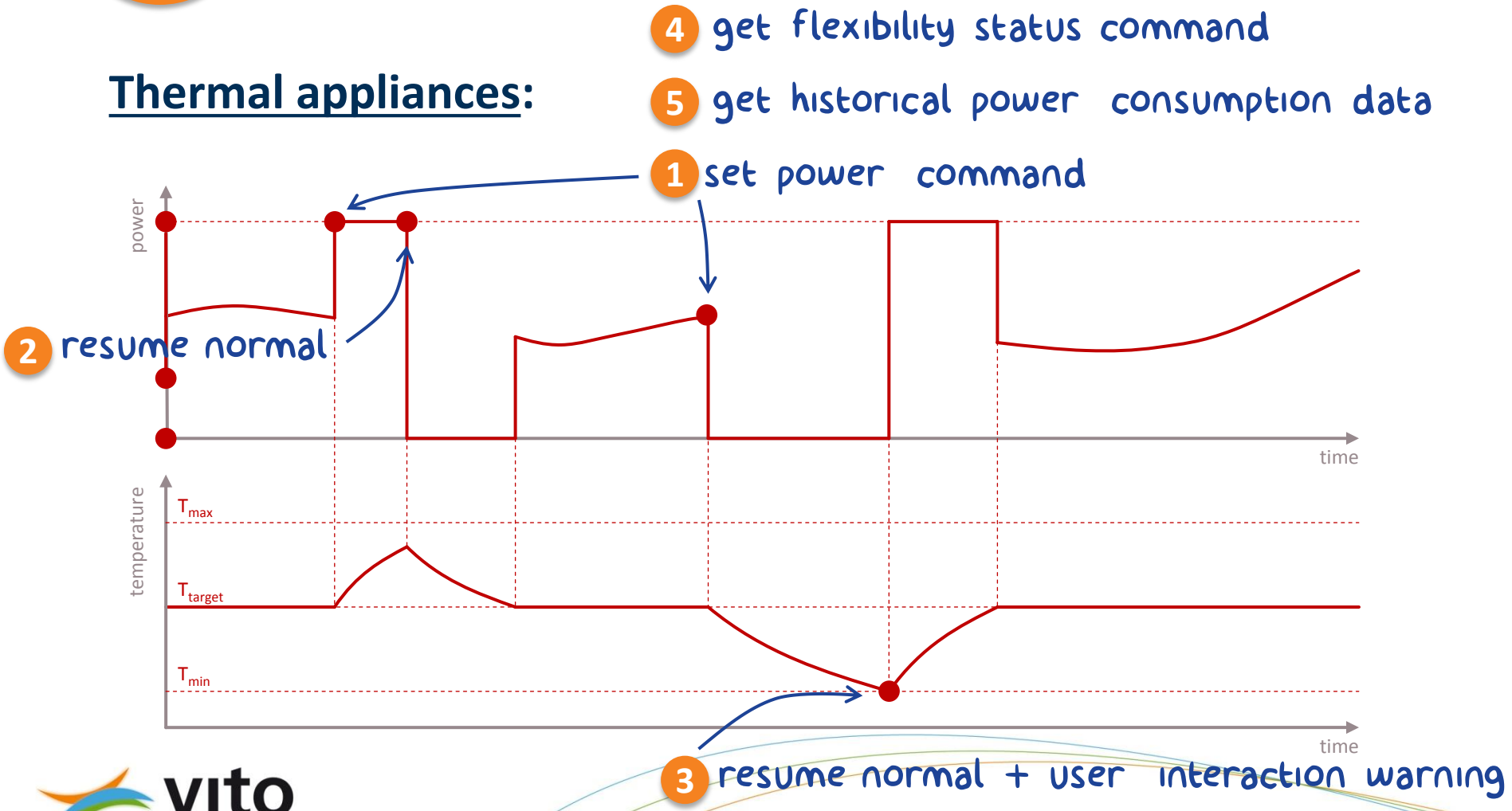
7.10.3 The direct flexibility interface should support a minimum instruction set - vertical

Periodical appliances:



7.10.3 The direct flexibility interface should support a minimum instruction set - vertical

Thermal appliances:



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7.10.4 In case the smart appliance supports an indirect flexibility interface, it should comply with minimum interoperability requirements - vertical

- indirect flexibility interface (variable prices) is optional
- standardized common price format, aligned with smart meter format(s)
- support for variety of tariff structures:
  - hourly day-ahead
  - time-of-use
  - consumption blocks
  - flat rate

1

*Direct flexibility interface : **MANDATORY***
*Indirect flexibility interface: **OPTIONAL***
*Internal measurement interface: **OUT of SCOPE***

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7.10.5 In case the smart appliance supports an indirect flexibility interface, the appliance should make optimal use of price variability - vertical

- Ensure for consumers that the appliance is capable of scheduling the power consumption for lower overall cost
- only possible in vertical approach for different appliance groups
- technical details still TBD

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7.11.1 The energy smart functionality should be explained in the technical documentation - horizontal

- detailed explanation of the implemented functions
- explain impact of energy smart functionality on comfort and energy efficiency

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Conclusion

We would like to hear from you.
Thank you for your input!

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