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Demand side management in industry- implications on energy efficiency?

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DEMAND SIDE MANAGEMENT IN INDUSTRY – INTRODUCTORY THOUGHTS (I)

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- **Demand Side Management in industry – well-known but still innovative concept, again gaining of attention in recent years**

- **In the framework of the transformation of the energy system (fluctuating energy sources), there is a demand of service to the grid(s); but how much is needed? What are the alternatives?**

- **As well to be considered: efficiency goal of 20 % until 2020: already good results, big efforts from industry**

➔(How) does it fit together?

➔ DSM: Necessary for for a sustainable energy system or a backward step in terms of improving efficiency?

DEMAND SIDE MANAGEMENT IN INDUSTRY – INTRODUCTORY THOUGHTS (II)

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- Lot of literature / potential studies on the market, but not all reflect the industry (sometimes due to data security)

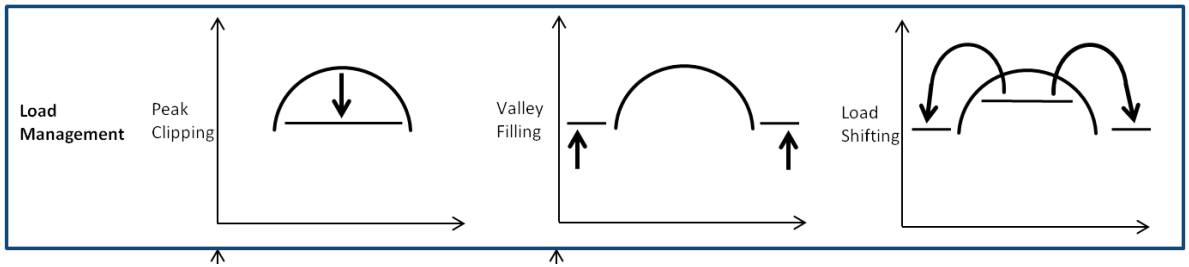
- So far, not a lot of accurate data exists regarding the implications on efficiency.
- Despite this, it is assumed to be a conflict and often highlighted as a significant challenge.

➔Technical topic? Or topic of (low) acceptance and knowledge & understanding?

➔ Aim of the presentation: clarify some uncertainties in order to obtain a clearer picture

For clarification: terminology and definition
Different terms and types of load management

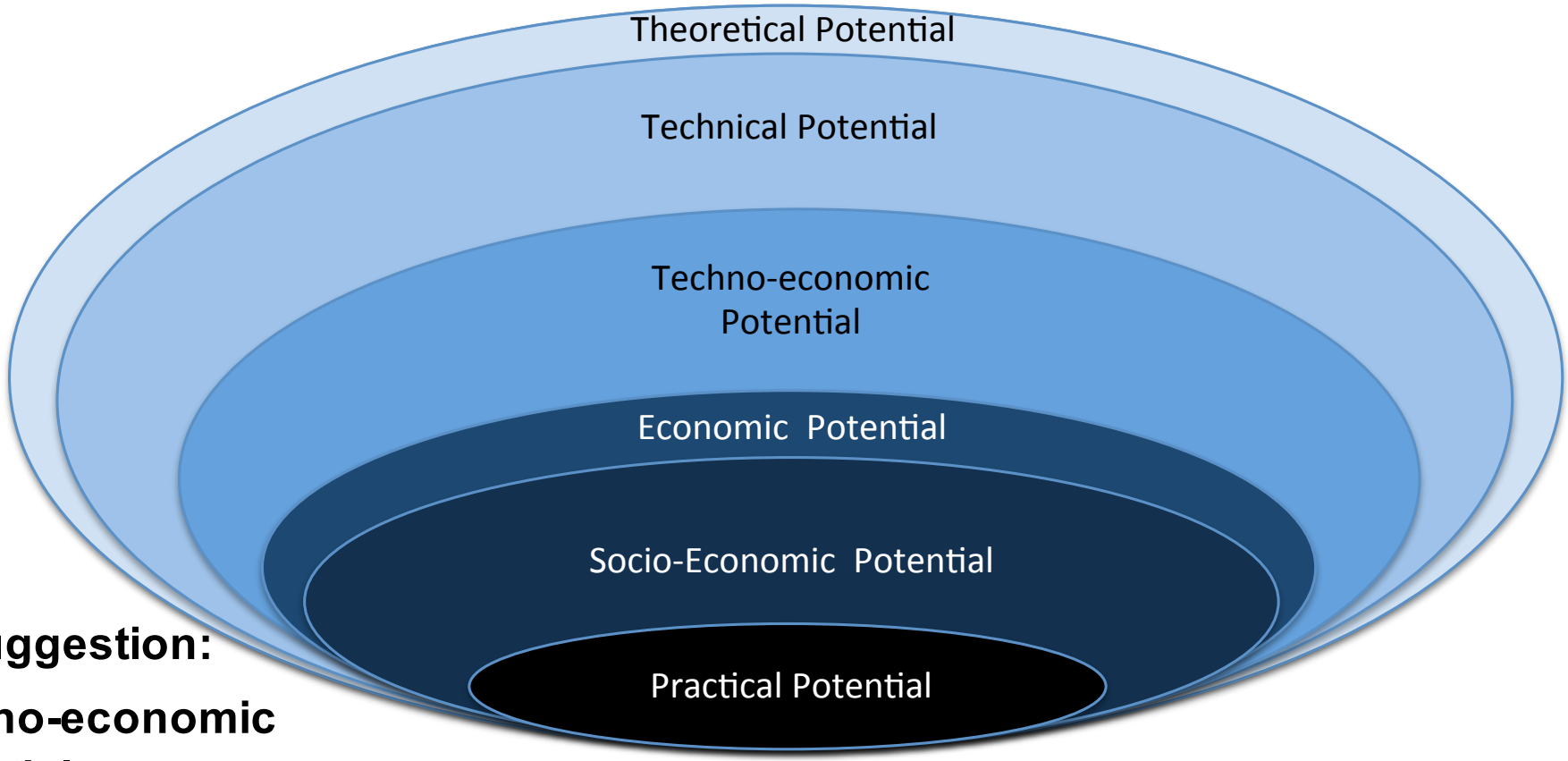
- **Uncertainties in the scientific debate**
- Operational and superordinated load management
- Superordinated: Direct and / or indirect (by TSO or via monetary incentives)
- Strategies of DSM:
  - Sheddable, shiftable load (among others)



- **Essential distinction in discussion:**
- From a **company's point of view**, flexibility needs to be marketable, productivity needs to be maintained ➔ no load shedding
- From a **national economic point of view** even load shedding can cause costs that are acceptable in order to secure the system

Clarification of potential categories
New suggestion

- **Common categories:**
- Theoretical, technical, economic potential
- Gap between technical and economic potential rather big



New suggestion:

- **Techno-economic potential**

Demand Side Management
Implications for efficiency

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- **Possible causes of decreased efficiency:**
- processes operating at non-optimal levels in terms of load and extent of use;
- fewer full-load operating hours;
- more frequent modification of cycles;
- and less capacity planning in terms of the plant and plant dimensions.

- **Intuitively, one assumes (major) efficiency losses due to DSM, but…**
- Currently no in-depth studies examining the effect
- limited experience and R&D data,
- based on specific plants and processes.
- **Still no accurate data quantifying the losses for individual companies or industry sectors.**

Examples for DSM in industry processes and their implications for efficiency (I)

- **"Relocation of energy": pumping water**
- Tasks: maintaining a certain water level in different basins

➔Easily to be adjusted to grid services

➔Most probable no energy intensive industry; no big amounts of load

- **Pure thermal processes: heating and cooling**
- E.g. cooling of food, heating and maintaining melts etc.
- Processes are normally operated in cycles

➔ adjustment to grid service *possible* (consider rules of thermodynamics and specification of products)

- **Thermo-chemical processes: e.g. aluminium electrolysis**
- Electricity and heat trigger chemical reaction; conductivity is crucial aspect

➔ adjustment to grid service *possible* in strictly observed boundaries

Examples for DSM in industry processes and their implications for efficiency (II)

- **Shifting of the operation mode**
- Process is operated outside the optimal operation point
- Internal optimisation: capacity, utilisation rate, operation point
- in order to realise DSM: leave this optimal conditions, e.g. decrease from 80% to 60 % utilisation rate

➔Rather easily to be adjusted to grid services

➔Certainly effects on efficiency; those are not measured so far

- **Make use of modular structure of sites**
- In case of reduced utilisation rate: keep e.g. four plants stable and reduce the fifth as far as needed
- Fifth plants only for cases of higher utilisation rate ("spare one" / redundant)

➔Rather easily to be adjusted to grid services

➔ "Stranded investment" of the fifth plant; doubtable if DSM services pays off

Summary

- For the transformation of the energy system, DMS is a mayor building block – as well for / from industry.

- BUT: how much and at what point of time DSM from industry is needed is not know at the moment. So: prepare for what exactly?

- Costs for DSM are not known, because many side-effects cannot be quantified at the moment, as e.g. implications on efficiency. So, comparison to alternatives is not simple.

➔ Wide field of (practical) research…

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Thank you for your attention!