IEA DSM Task XXIII

The role of Demand Side in Delivering Effective Smart Grids

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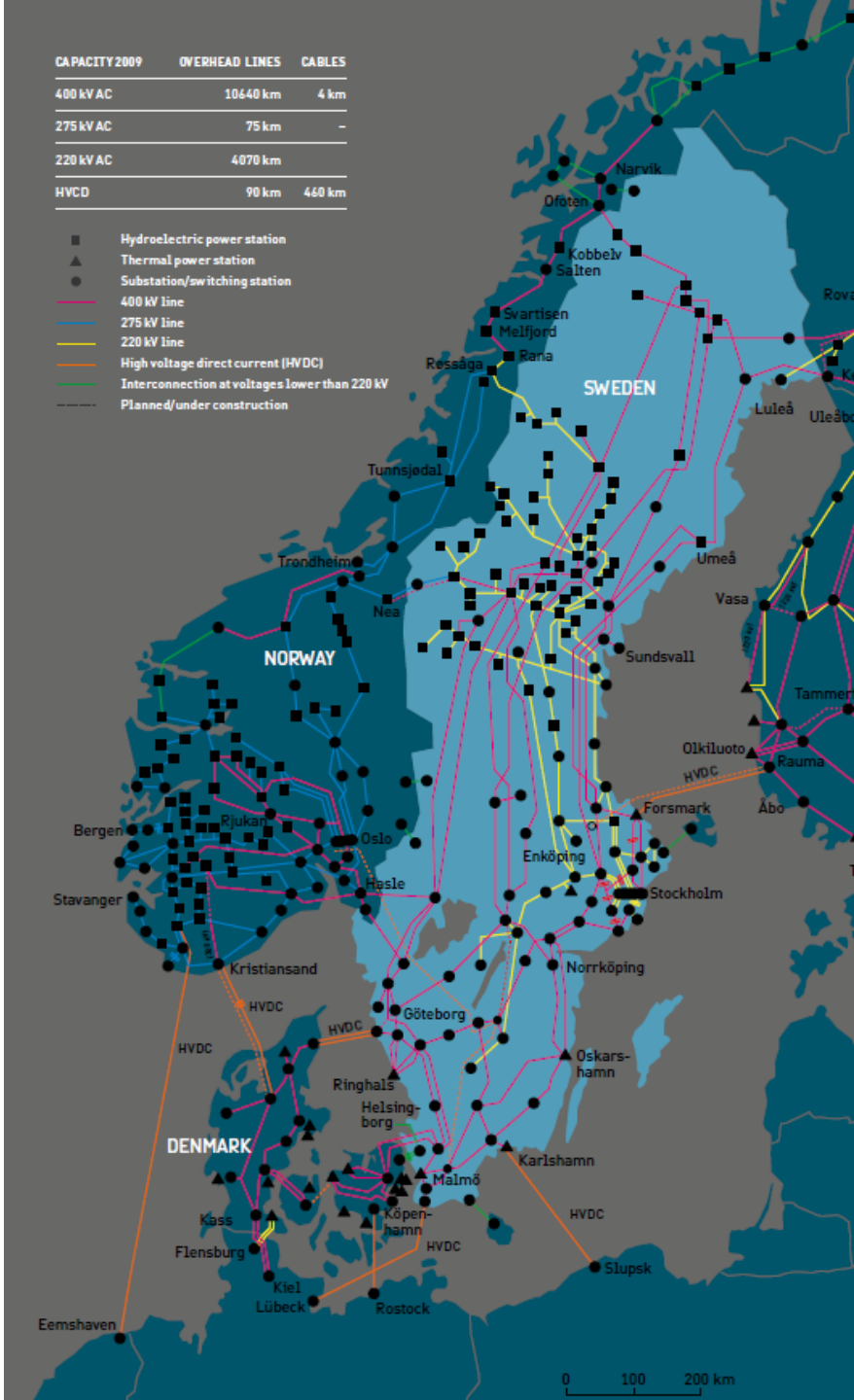
Swedish power system

- Hydropower 45%, nuclear power 45%, CHP, wind
- Variations between years in production.
- Consumption have seasonal, weekly and daily variations.
- Consumption 60% households, 40% industry.
- Small load increse, more heatpumps etc...



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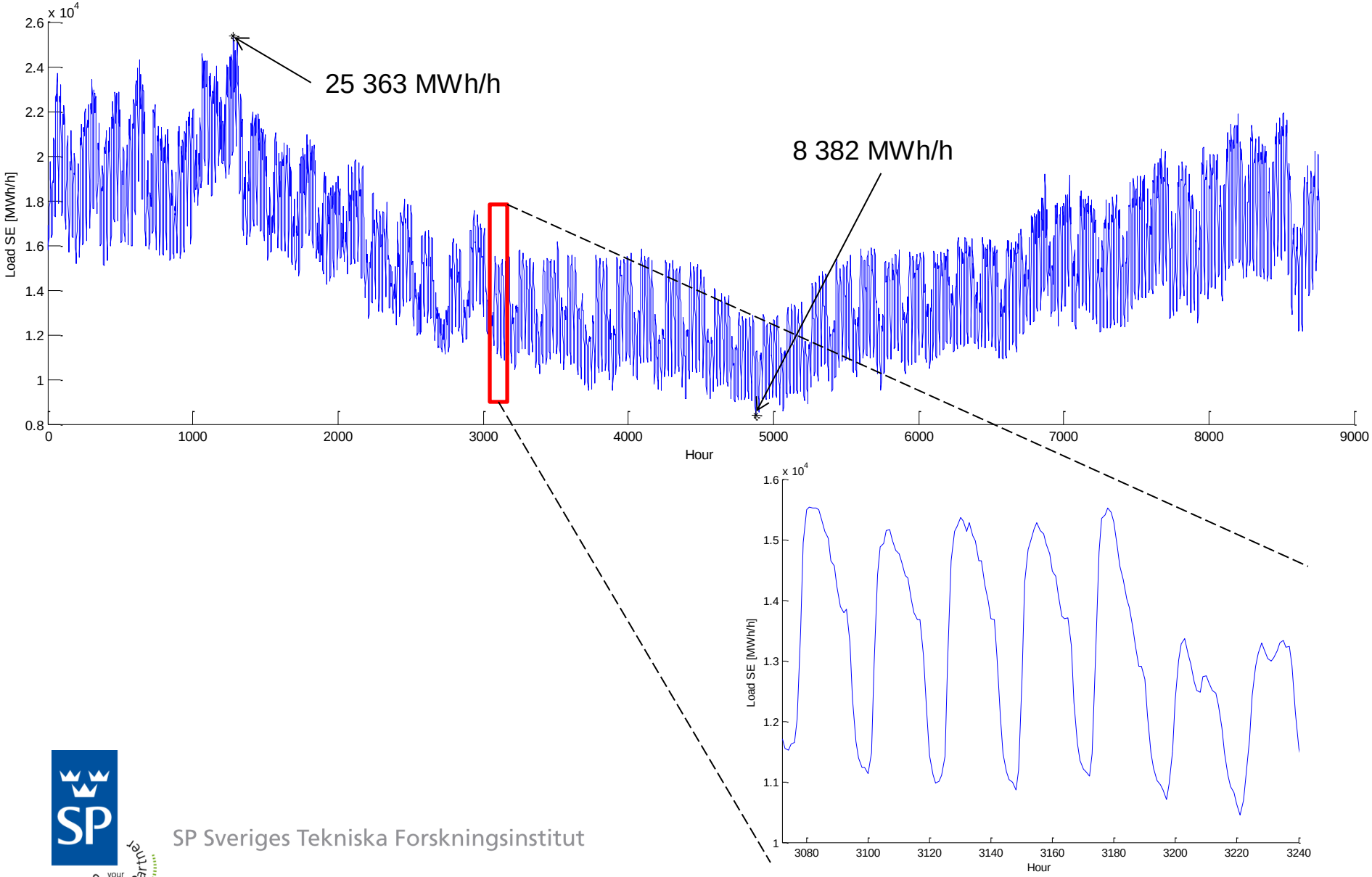
Hourly load levels



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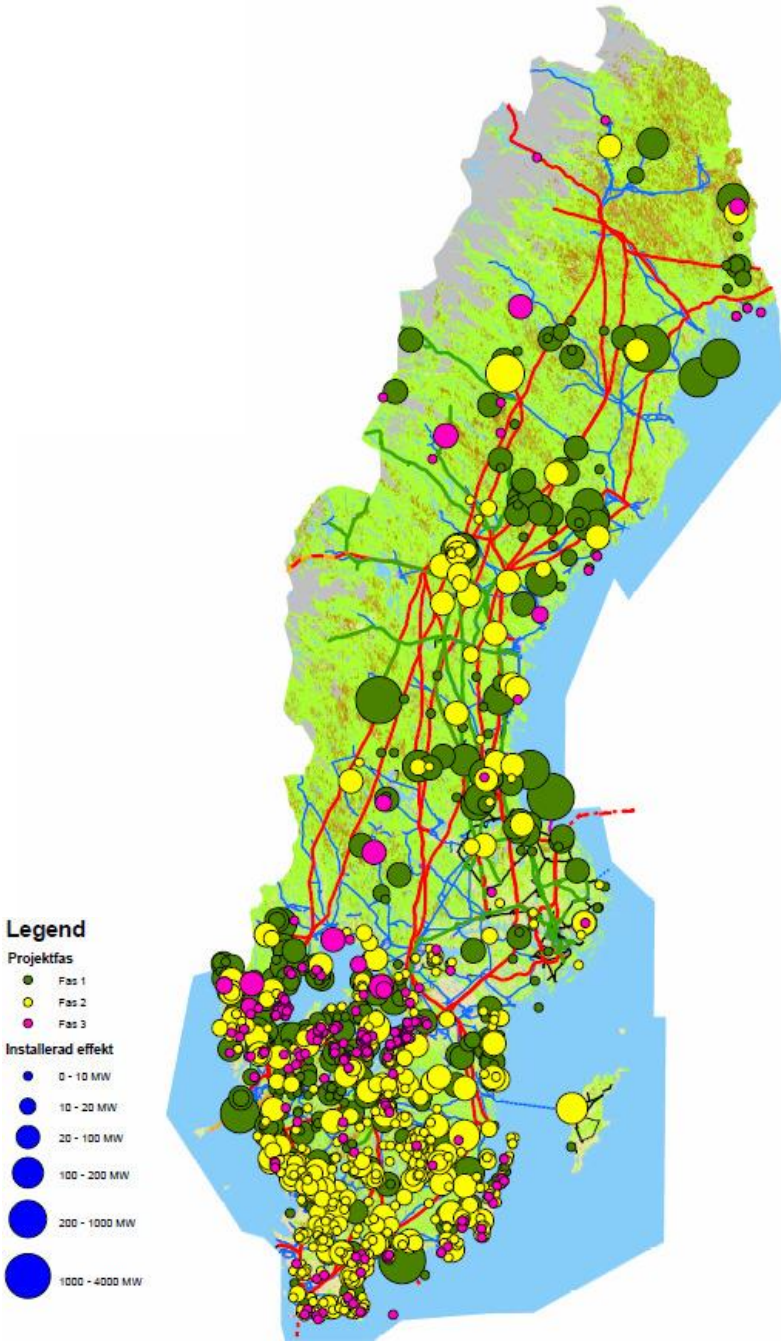
Wind power in Sweden

- Sum identified projects:
  36 000 MW
- To 2020:
  Levels of 12-15 TWh reasonable
- Planning target:
  30 TWh / 12 000 MW by 2020
- As reference, installed capactity:
  Vattenkraft 16 000 MW
  Kärnkraft 9 000 MW

Source: SvK 2010



Swedish projects

	Title	End use load	Intervention			
			T	C	F	A
SE1	Control of direct electric heating and boilers	Direct electric heating	x	x		
SE2	Consumer reactions to peak prices.	Direct electric heating	x			x
SE3a	To follow the electricity price: Direct control	Waterborne el. heating	x	x	x	
SE3b	To follow the electricity price: Indirect control	Direct electric heating	x		x	x
SE4	Sala-Heby	Various	x		x	
SE5	Pilot trial in Vallentuna	Heat pumps	x	x		
SE6	Continuation project of "SE2"	Direct el. heating / HP	x			
SE7	Information through digital channels...	Not specified			x	
SE8	Clockwise	Not specified			x	
SE9	Power Agent	Not specified		x	x	
SE10	Profiles of electricity demand in low outdoor temp. situations	Not specified				

Swedish projects

- Focus on households.
- Projects are small in terms of number of participants.
- Explore the potential under ”ideal” situations.

Technically oriented projects

	Title	End use load	Intervention			
			T	C	F	A
SE1	Control of direct electric heating and boilers	Direct electric heating	x	x		
SE3a	To follow the electricity price: Direct control	Waterborne el. heating	x	x	x	
SE5	Pilot trial in Vallentuna	Heat pumps	x	x		

- Possibilities related to the heating system (direct electric heating, waterborne electric heating, heat pumps)
- There is a pretty large potential for load shifting. Depends on the outside temperature and the condition of the house
- The smart solutions also results in energy savings due to a more efficient use of the heating system.

Economically oriented projects

	Title	End use load	Intervention			
			T	C	F	A
SE2	Consumer reactions to peak prices.	Direct electric heating	x			x
SE3b	To follow the electricity price: Indirect control	Direct electric heating	x		x	x
SE4	Sala-Heby	Various	x		x	
SE6	Continuation project of "SE2"	Direct el. heating / HP	x			

- Economic incentives through hourly trading and demand based power tariffs.
- Mainly based on load shifting related to the heating system.
- Customers are willing to become more active if given the right tools.
- But the econimic incentives are low for load shifting.
- Investments can be justified by energy consumption reductions.

Feedback related projects

	Title	End use load	Intervention			
			T	C	F	A
SE7	Information through digital channels...	Not specified			x	
SE8	Clockwise	Not specified			x	
SE9	Power Agent	Not specified		x	x	

- Visualization of energy consumption (SE7, SE8) and a game approach (SE9).
- Just having a visulatization of consumption is not enough.
  - Must have a more user oriented apporach with different feedback approaches for different consumers.
  - Must combine with other information, such as historical comparisons and costs.

Conclusions

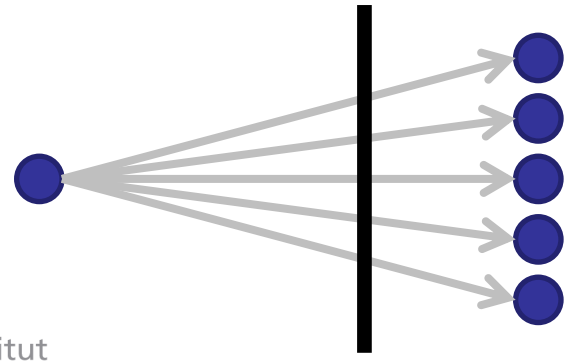
- People care and are willing to change their consumption.
- There is a technical potential for load shifting.
- There are no significant economical incentives.

Impact of new law?

- Since October 1, customers have the possiblity of getting hourly metered and billed according to hourly consumption levels and prices.
- Very few have requested this.
  - Lack of information?
  - Lack of interest?
  - Lack of economical incentives?

Barriers?

- Sweden has good technogical conditions for smart grids and demand side management (strong grid, well developed ICT infrastructure).
- In discussions, it is usually pointed out that customer flexibility constitutes a great ”system benefit”. But the ”consumer benefit” is low. How come?
  - Is there a problem with the market structure, rules and/or policy so that the system benefit is not transferred to the the consumers?
  - Is there a lack of business models for services such as aggregators? If so, is there a problem with the market structure, rules and/or policy to make this happen?



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