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Public Regulation of District Heating Companies in a Smart Energy System

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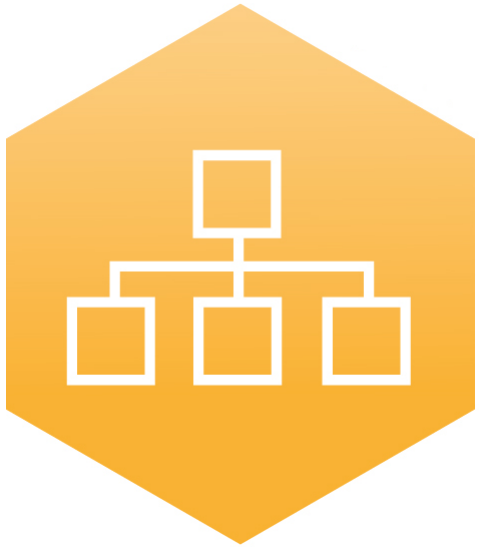

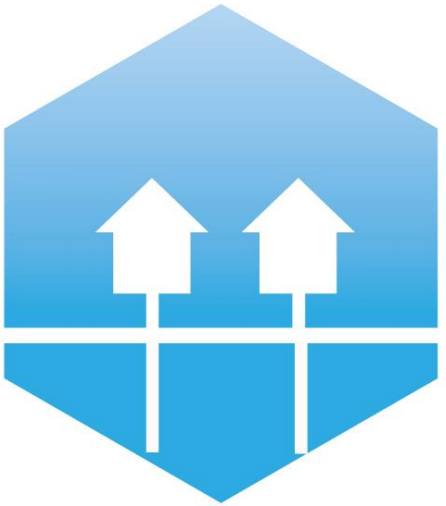

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4DH
4th Generation District Heating
Technologies and Systems

Content

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1) **What kind of regulation do we need?**
2) **What kind of regulation do we have?**
3) **Proposal 1: A general tax relief on electricity**
4) **Proposal 2: A tax relief on 'in-house' electricity**

What kind of regulation do we need?

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The role for DH in a smart energy system includes the tasks of

- **Integrating 'excess wind power'**
- **Deliver flexible back-up capacity to the electricity system**

What kind of regulation do we need?

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We would thus like fourth generation district heating to deliver an infrastructure to the system which consists of

1) **Heat pumps**
2) **CHP units**

What kind of regulation do we need?

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Three main priorities for the public regulation is to deliver

1) **An economic basis for heat pumps**
2) **An economic basis for the CHP units**
3) **Incentivise to flexible operation**

What kind of regulation do we have?

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Through the last 15 years

1) **The use of biomass has doubled**
2) **The use of heat pumps has not increased**

Brændselsforbrug til fjernvarmeproduktion

Direkte energiindhold [TJ]	1980	1990	2000	2005	2010	2011	2012	2013	Ændring '90 - '13
Brændselsforbrug i alt	**75 443**	**69 878**	**73 228**	**78 758**	**95 846**	**83 795**	**89 318**	**88 970**	**27,4%**
Olie	51 304	4 766	3 726	4 322	4 512	2 551	2 466	2 146	-55%
- heraf orimulsion	-	-	646	-	-	-	-	-	•
Naturgas	-	12 131	22 203	22 044	28 454	22 036	23 564	21 407	76,5%
Kul	13 527	30 898	19 459	17 121	18 245	15 576	16 183	16 225	-47,5%
Overskudsvarme	-	-	-	-	-	-	-	-	•
Affald, ikke-bionedbrydeligt	4 492	6 289	7 675	8 138	7 122	7 063	6 871	7 160	13,8%
Vedvarende energi	**6 120**	**15 794**	**20 165**	**27 133**	**37 513**	**36 569**	**40 235**	**42 034**	**167%**
Solenergi	-	6	24	53	143	217	345	474	7 808%
Geotermi	-	96	58	172	212	166	288	229	377%
Biomasse	6 105	15 611	19 425	26 125	36 288	35 210	38 065	40 027	156%
- Halm	290	3 640	5 013	5 934	8 269	7 603	7 151	8 870	144%
- Træ	324	3 541	4 983	9 484	17 365	18 191	21 576	21 577	509%
- Biobrændsler	-	744	49	761	1 949	784	940	829	11%
- Affald, bionedbrydeligt	5 491	7 686	9 380	9 946	8 705	8 632	8 398	8 751	14%
Biogas	15	81	582	707	721	716	847	744	818%
Varmepumper	-	-	75	76	40	24	39	47	•
Elpatroner					110	235	652	513	•

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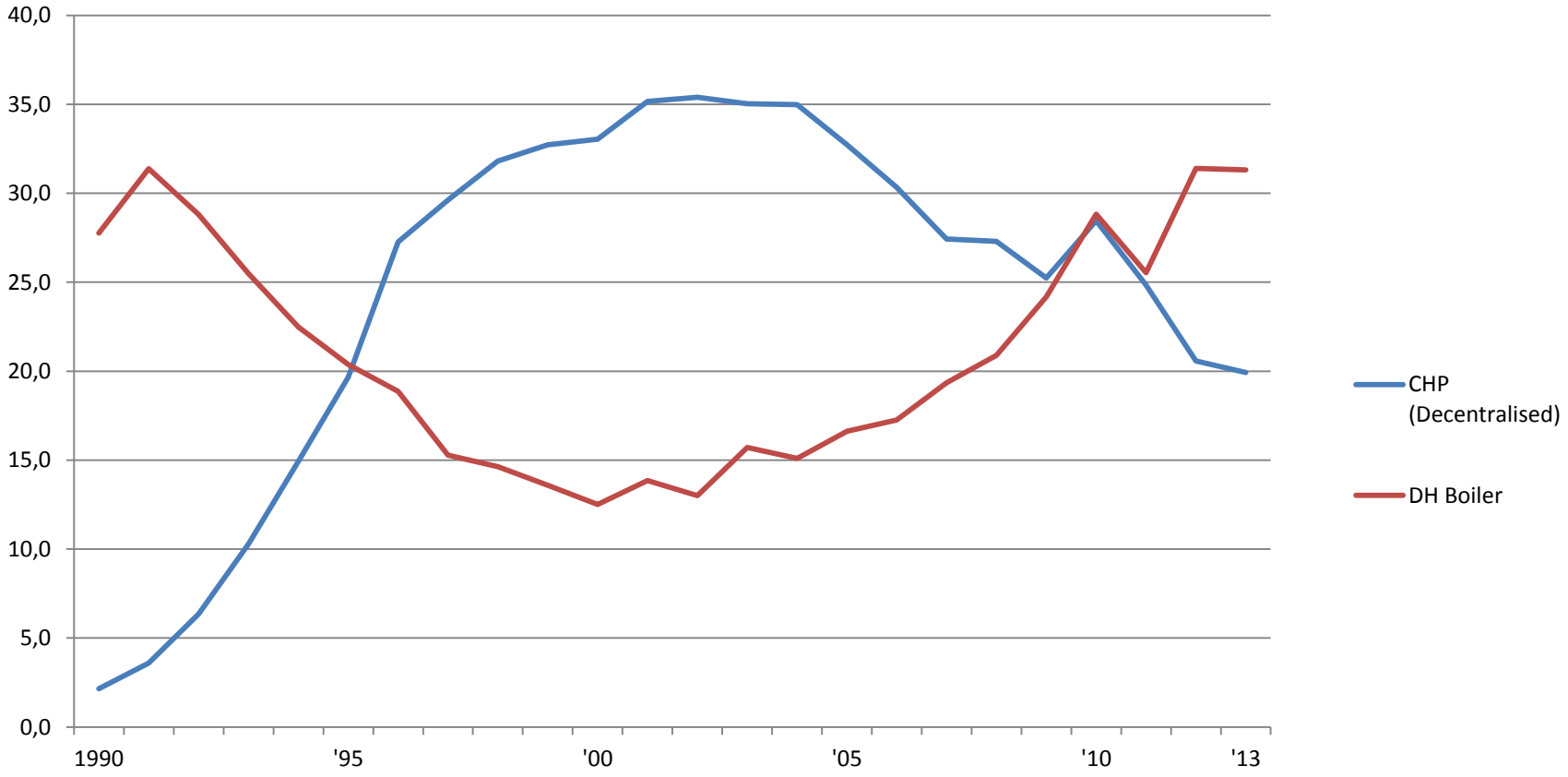
What kind of regulation do we have?



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What kind of regulation do we have?

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Currently we have the situation that

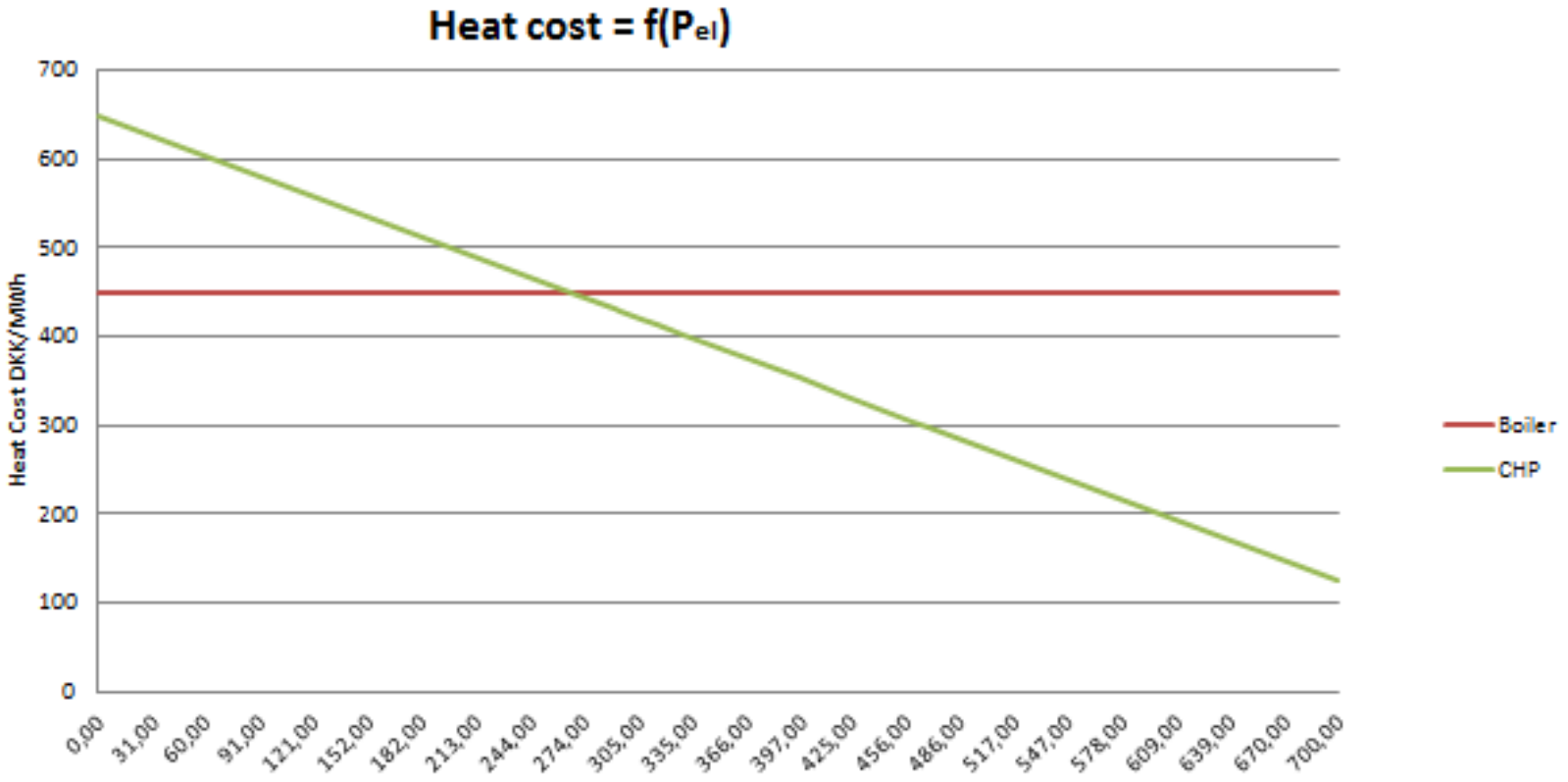
1) **Heat pumps are not being installed** 
2) **CHP units gets less and less hours** 
3) **The flexible operation is lost** 

Proposal 1: Is a general tax relief on electricity the way to go?

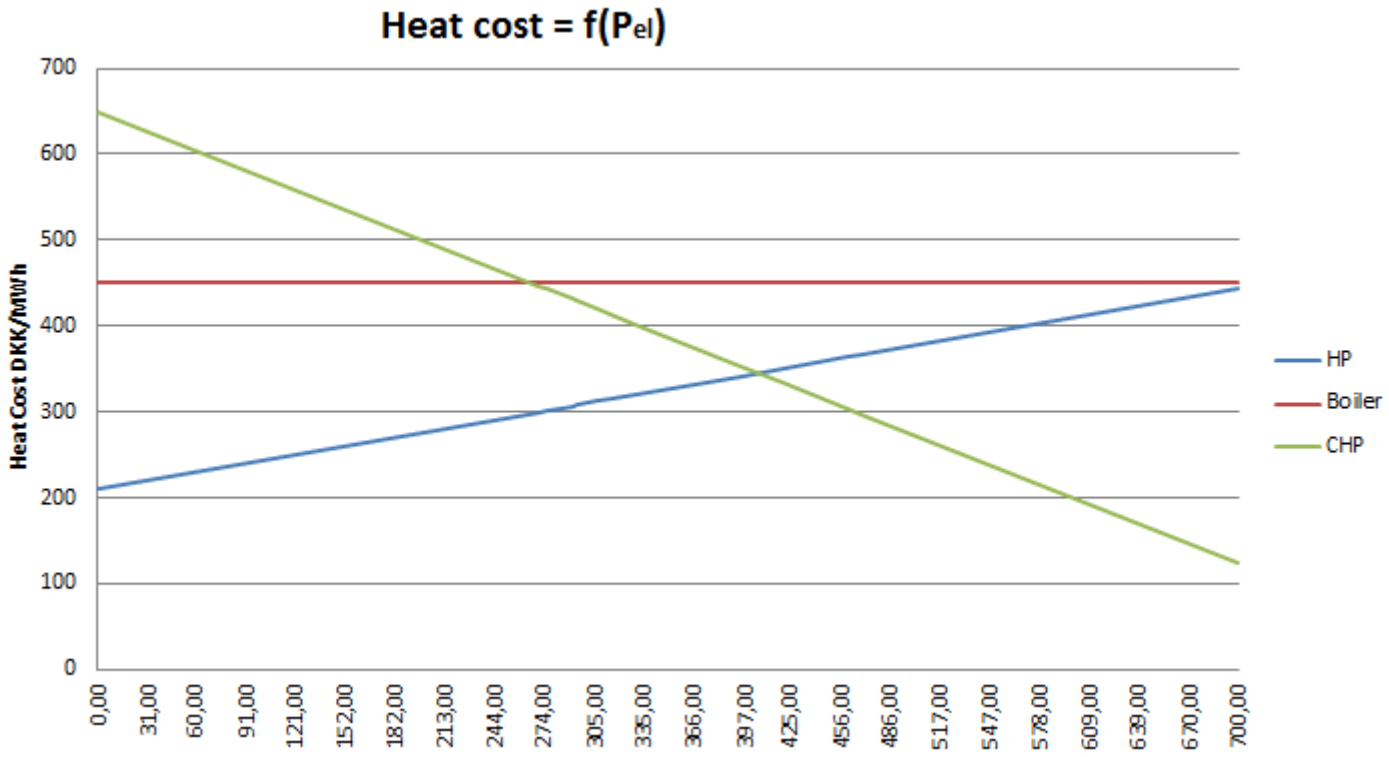
A possible proposal would be to decrease taxes on electricity to boost investments in heat pumps.

But how would that effect the overall system?

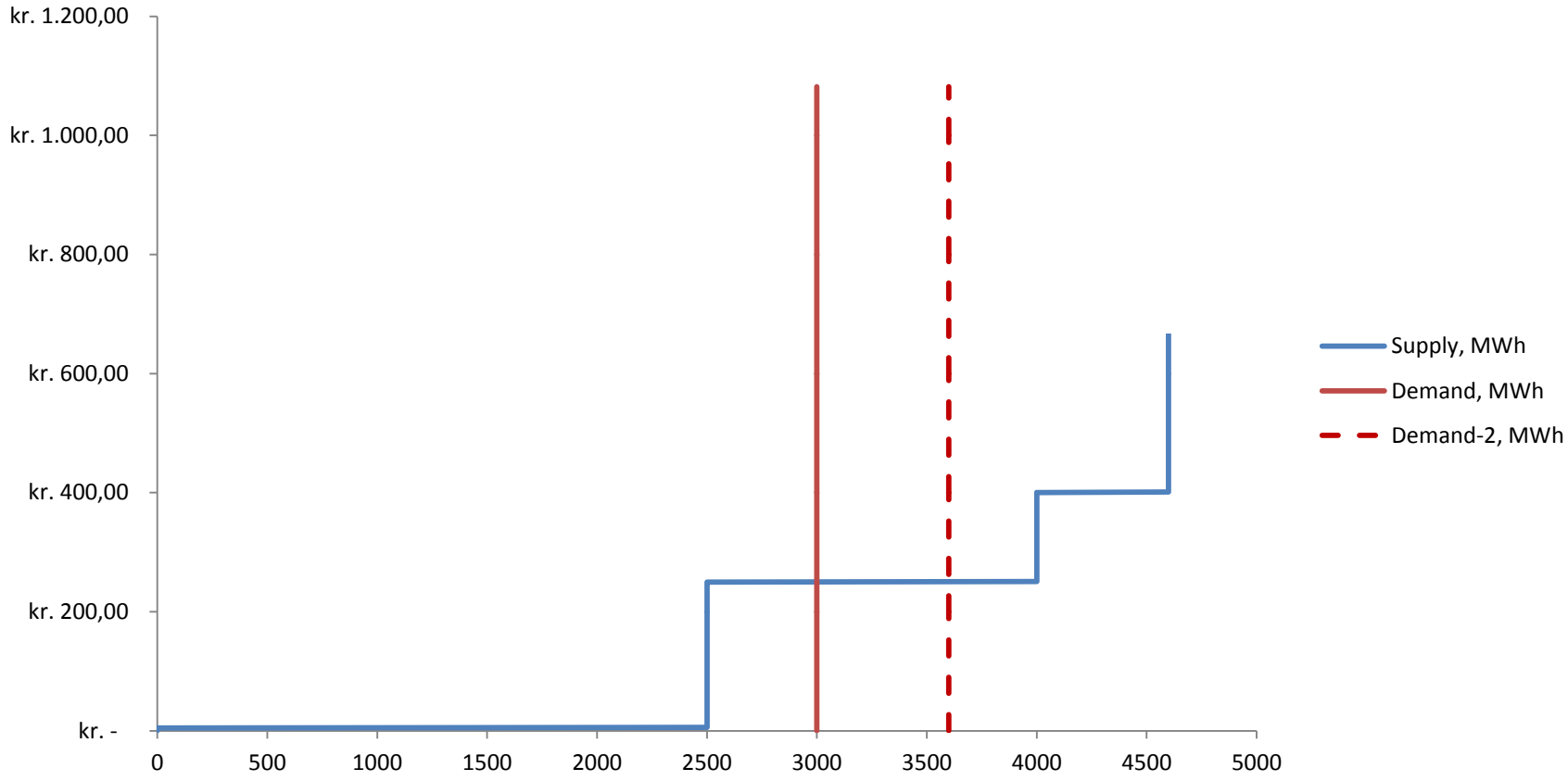
The business economic incentive



The business economic incentive



Spot Market Effect: Increases demand for coal and imported electricity



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Effects of a tax relief on electricity

Thus, we risk that the heat pump would create increased demand for technologies we don't want – and push out the one we want

Effects of a general tax relief on electricity

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The effect of tax relief on electricity will probably be that

1) **Heat pumps will be installed** 
2) **CHP units will get less hours** 
3) **Flexible operation is not achieved** 

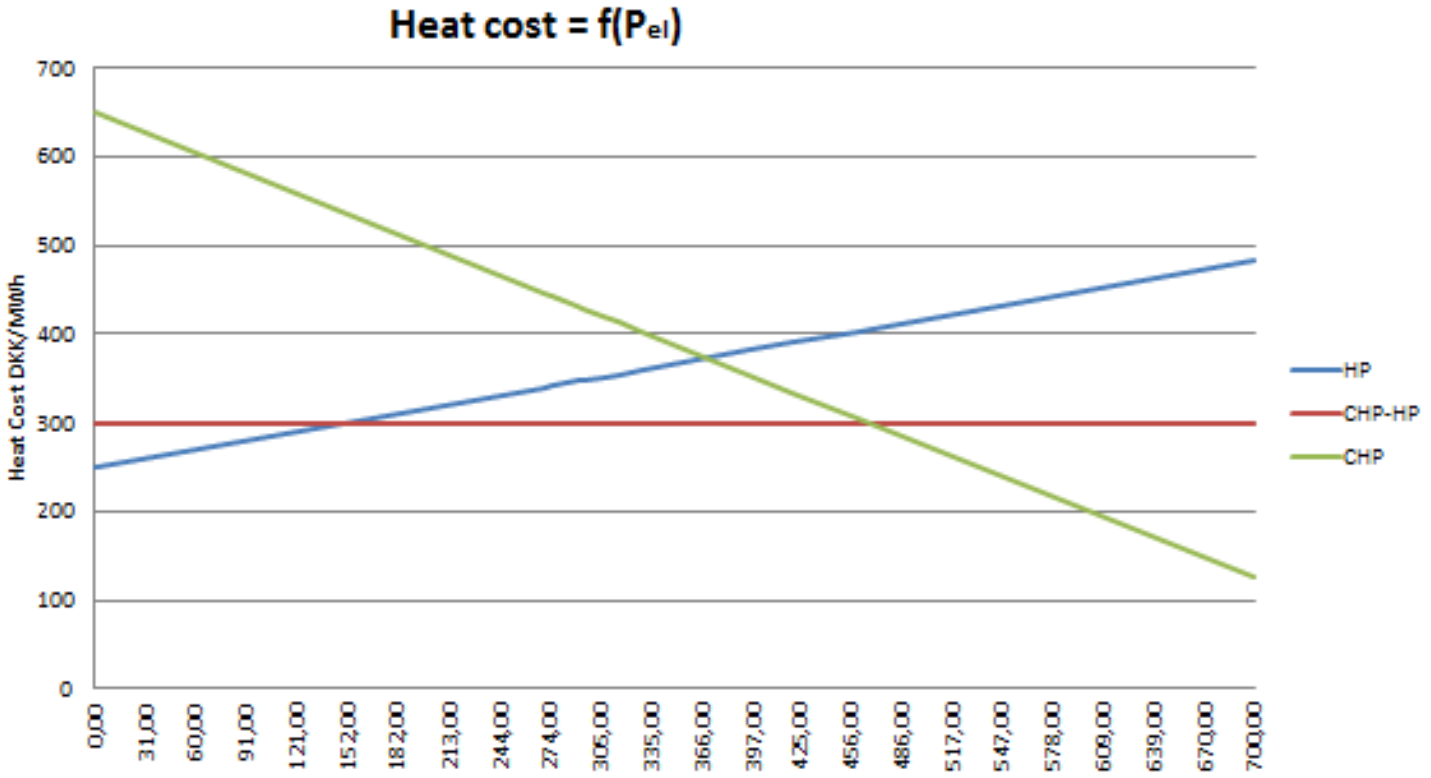
Proposal 2: A tax relief on 'in-house' electricity

Alternative proposal: Differentiate between internal and external electricity sources.

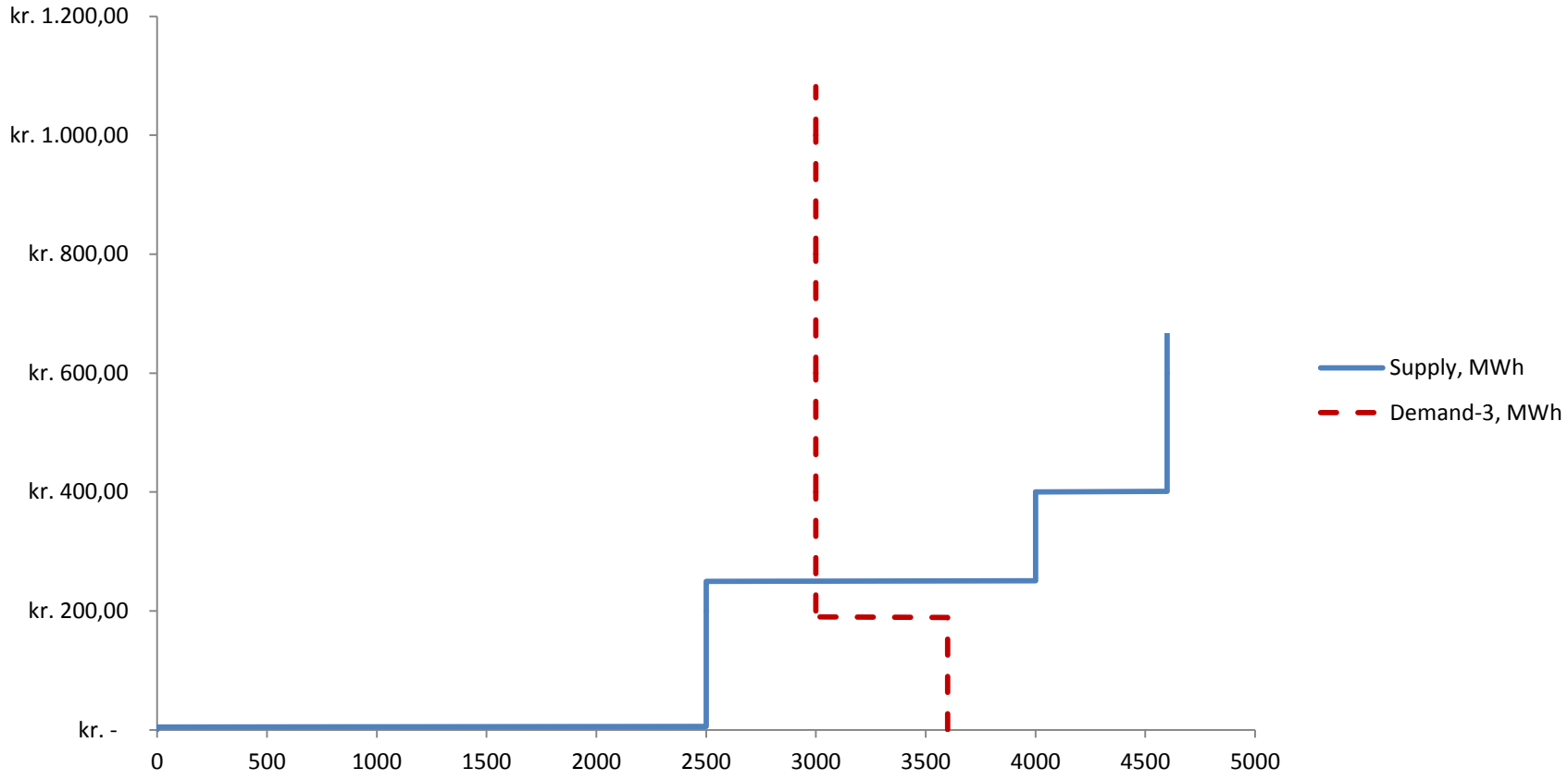
1) Tax relief on in-house produced electricity and

2) Keep taxing electricity demanded from the market

Effect on business economic incentives



Spot Market Effect: Only increases demand for wind power



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The three main priorities

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The in-house tax relief proposal could then

1) Give plenty of hours to the heat pumps 

2) Give plenty of hours to the CHP units 

3) Deliver business economic incentive for flexible operation 

….other considerations

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Advantages:

- Seems like a relatively simple, low-bureaucratic solution
- The CHP-HP combination in the mid-price level is more fuel efficient than the current boiler alternative
- Heat is cheapest when heat demand is highest
- With a heat storage, DH companies will optimise production at low and high electricity price levels

Doubts:

- More detailed calculations at the business economic level should be carried out.
- Any technical difficulties?
- How strong is the relation between wind and price?

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