What future should we count on?

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Introduction

- Socio-economic analysis is becoming an increasingly important appraisal tool in relation to large scale infrastructural investments in Denmark

- Are socio-economic analysis supportive of societal transitions?

Socio-economic calculations are simple in theory …

(a) Calculate costs and benefits over the lifetime of hte investments

(b) Discount future cost and benefit to present value

Socio-economic calculations are much more complex in practice

- because the value of a componet in a societal system dependent on the overall architecture of the system.

- In order to calculate the future value of one system component the future development of the entire system need to be known

- The choice of ‘’system future’ is critical

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Case: Socio-economic analysis of wind turbines

Virkemiddel	Reduktion, ton CO_2-ækv. 2020	Skyggepris, inkl. sideeffekter Kr./ton CO_2-ækv.
200 MW kystnær havmøllepark	500.000	489

Virkemiddel	Reduktion, ton CO_2-ækv. 2020	Skyggepris, inkl. sideeffekter Kr./ton CO_2-ækv.
200 MW landmøller	450.000	55

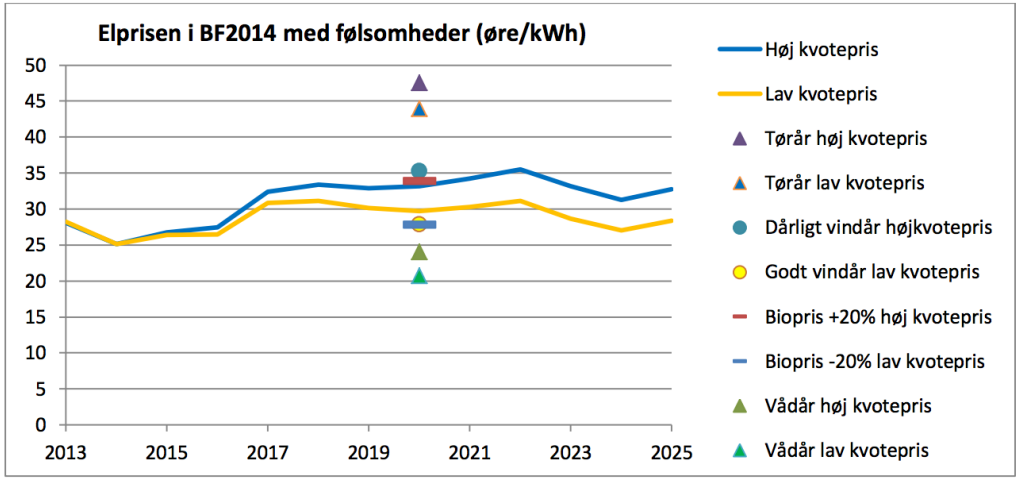
The energy system future of the Energy Agency's

The baseline scenario

- Uses external input from IEAs "new policy scenario"
- Based on 'frozen policy' assumption

Electricity prices in the baseline scenario

The electricity price in the baseline scenario



Figur 2.7. Nordpool spotpris beregnet i BF2014, herunder ved forskellige kvotepriser og følsomheder

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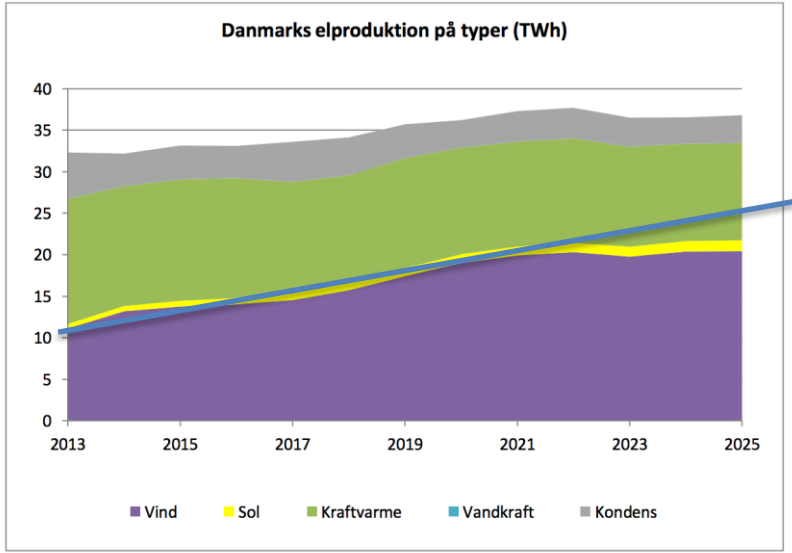
A relevant energy system future?

Supply and demand in the baseline scenario



Electrification of transport
-6000 eclectic vehicles in 2030

Electrification of heating
- 3 pct district heating produced by heatpumps in 2030

Gas/Electrofuels
??

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A relevant energy system future?

Global temperature rise in the IEA’s ”new policy scenario”

“Energy-related CO2 emissions rise from an estimated 31.2 Gt in 2011 to 37.0 Gt in 2035, pointing to a long-term average temperature increase of 3.6 °C. A lower rate of global economic growth in the short term would make only a marginal difference to longer-term energy and climate trends (IEA, Factsheet, 2012) ”.

A relevant energy system future?

The baseline scenario is a catastrophic energy system future

- The Danish low carbon transition stalls after 2020
- The increase in global emissions produce a temperature rise of 3,6 degrees
- Political goals (national, international) are not fulfilled

<u>Yet, the baseline scenario continues to be used as a relevant energy system future in socio-economic calculations</u>

Are there no better energy system futures around?

Transition pathways developed by the Energy Agency

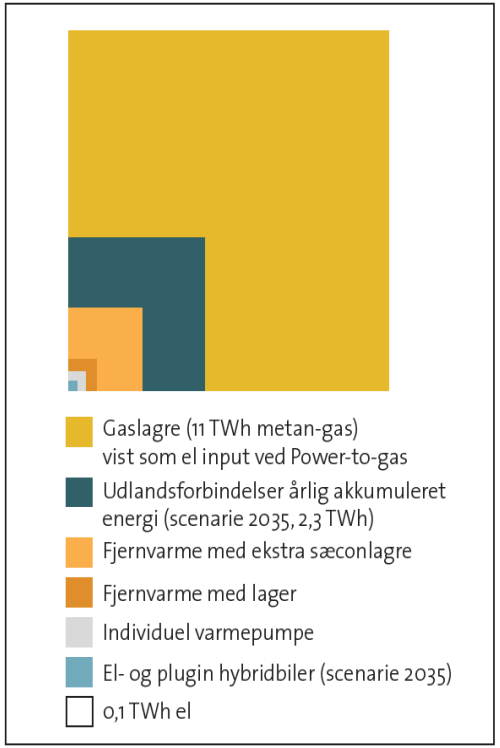
- Biomass
- Windpower
- Hydrogen (windpower)

Scenarie	Vind	Biomasse	Bio+	Brint	Fossil
Biomasse	171	308	393 (*)	108 (*)	31
Imp. biobrændstof	0	50(*)	231(*)	0	0
Biogas	42	42	42	42	17
Affald	42	43	43	41	44
Fossile brændsler	0	0	0	0	391(*)
Vindkraft	246	113	76	295	113

Are there no better energy system futures around?

The energy system concept of the Danish TSO

- Build more wind windturbies
- Increasing demand for electricity (transport, heating, gas/ eletrofuels)
- Strategic adaption of grid infrastructure



Figur 11: Lagerkapaciteter i energisystemet 2035

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Are there no better energy system futures around

Price effects of different “wind power integration measures” on wind power generated electricity

	Ændret indtægt fra elsalg ift. referencen (mio.kr./år)		Ændret indtægt fra elsalg ift. referencen (% af årlig indtægt)	
Tiltag	2020	2035	2020	2035
700 MW kabel til Holland (COBRA)	157	549	3.7%	7.9%
Øget fleksibilitet på kraftværker (500 MW elpatroner på store kraftværker)	84	80	2.0%	1.1%
500 MW varmepumper i Vestdanmark (eksisterende tariffer og afgifter)	50	109	1.2%	1.6%
500 MW varmepumper i Vestdanmark (uden tariffer og afgifter)	264	261	6.2%	3.8%
Fleksibelt elforbrug ved lave priser (eksisterende tariffer og afgifter)	9	6	0.2%	0.1%
Fleksibelt elforbrug ved lave priser	13	133	0.3%	1.9%

Conclusions

We should not base socio-economic calculation on system futures we don’t want to realise!

Conclusions

- Socio-economic analysis of system component (e.g. wind turbines) relies on in-built system futures.
- Periods of transition is often characterised by the co-existence of multiple system futures
- The choice of system future can have significant implications for the outcome of the analysis

Conclusions

- Socio-economic calculation should be based on several energy system futures to open up democratic debate