The Tax Distortion Loss and Its Structural Influence in the Danish Energy Sector

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Søren Djørup, PhD Fellow, djoerup@plan.aau.dk

AALBORG UNIVERSITY
DENMARK

My PhD Project

The economic problems of a renewable energy system:

Basically were are dealing with a fluctuating energy supply.

- Supply problems (the issue of back-up capacity)
- Demand problems (the issues of heat pumps, electric boiler, network expansion, storage etc.)

If the technological infrastructure is in place the supply and demand issues can be coordinated through short term price signals (markets).

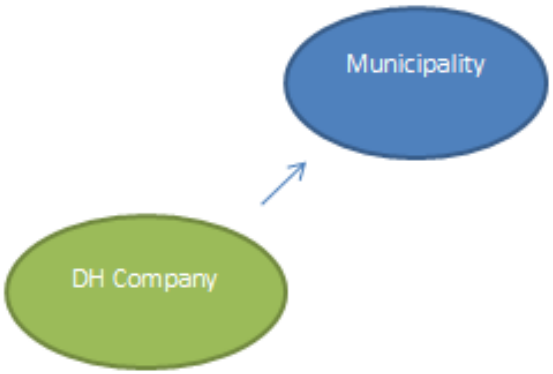
But what guides the *investments* that shapes this infrastructure?

Do we have the right conditions for the needed investments?

Institutional Regime for Investments in the DH Sector

- The Danish heat sector is regulated by the Heat Supply Act ("Varmeforsyningsloven")
- Requirement of **socioeconomic viability** of any investment (difficult to disagree)

"§ 1. LOVENS FORMÅL ER AT FREMME DEN MEST SAMFUNDSØKONOMISKE, HERUNDER MILJØVENLIGE, ANVENDELSE AF ENERGI TIL BYGNINGERS OPVARMNING OG FORSYNING MED VARMT VAND OG INDEN FOR DISSE RAMMER AT FORMINDSKE ENERGIFORSYNINGENS AFHÆNGIGHED AF FOSSILE BRÆNDSLER."



The interesting questions:

What do we mean by socioeconomic viability?

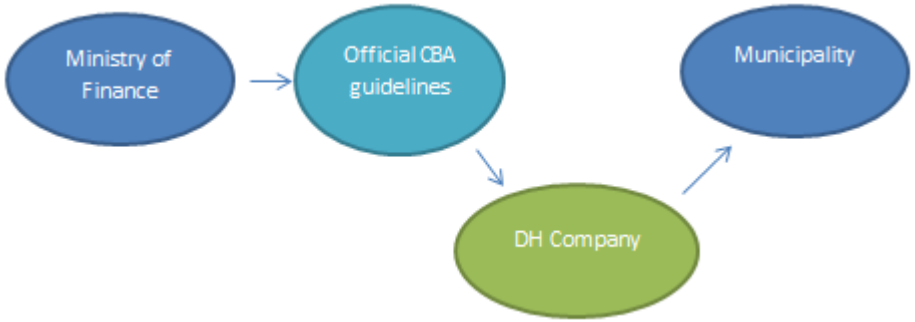
How do we calculate socioeconomics?

The National Guidelines for Economic Assessment in Denmark

In Denmark we have national guidelines for socioeconomic calculation within the energy sector. These guidelines are outlined by the Ministry of Finance (1999)

Advantages:

- Can provide transparency
- A common standard fascilitate coordination
- Easier to compare different projects



Official Guidelines as Regulation

Seems to be two elements in the guidelines which are experienced as barriers for the investment projects:

1) Discount rate
2) Tax Distortion Loss (”Skatteforvridningstab”)
3) Net Tax Factor (”Nettoafgiftsfaktor”)

What is the Tax Distortion Loss?

- According to the principle, 20 percent of the net-effect on public finances should be added as an additional cost in the CB-analysis

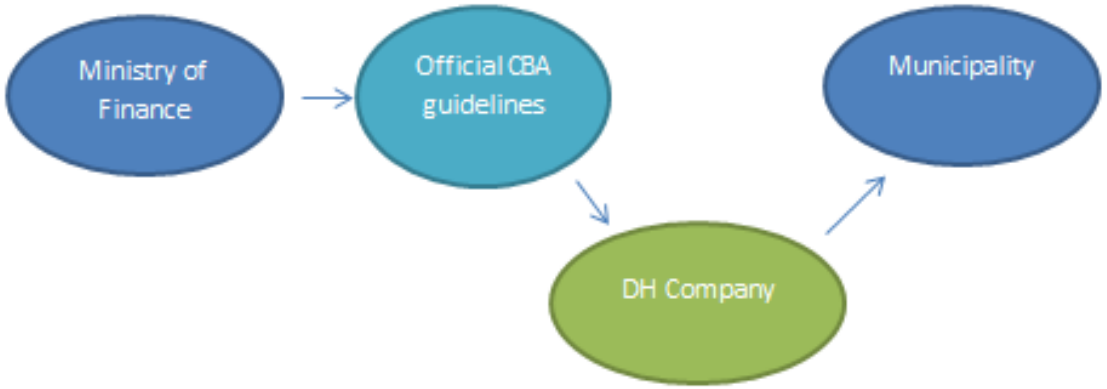
Example: A loss of 1.000.000 DKK in state budget means that a cost of 200.000 DKK should be added in the DH company's cost-benefit analysis.

- Why? Assumes that a negative impact on the state budget is financed by increasing taxes elsewhere in the economy
- It is assumed that any marginal increase in taxes is always decreasing economic welfare

Is This a Problem?

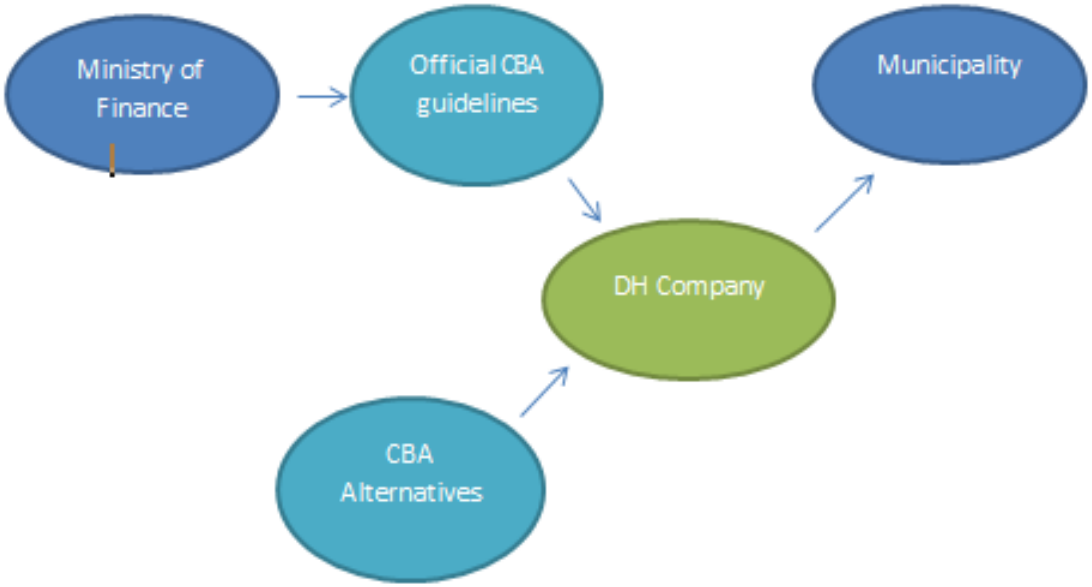
- Can possibly act as a barrier for a project if fx a (non-taxed) renewable technology is replacing a heavily taxed fossil fuel
- For example solar thermal replacing natural gas

Institutional Regime for Investments in the DH Sector



Institutional Regime for Investments in the DH Sector

Are we free to choose?



Institutional Regime for Investments in the DH Sector

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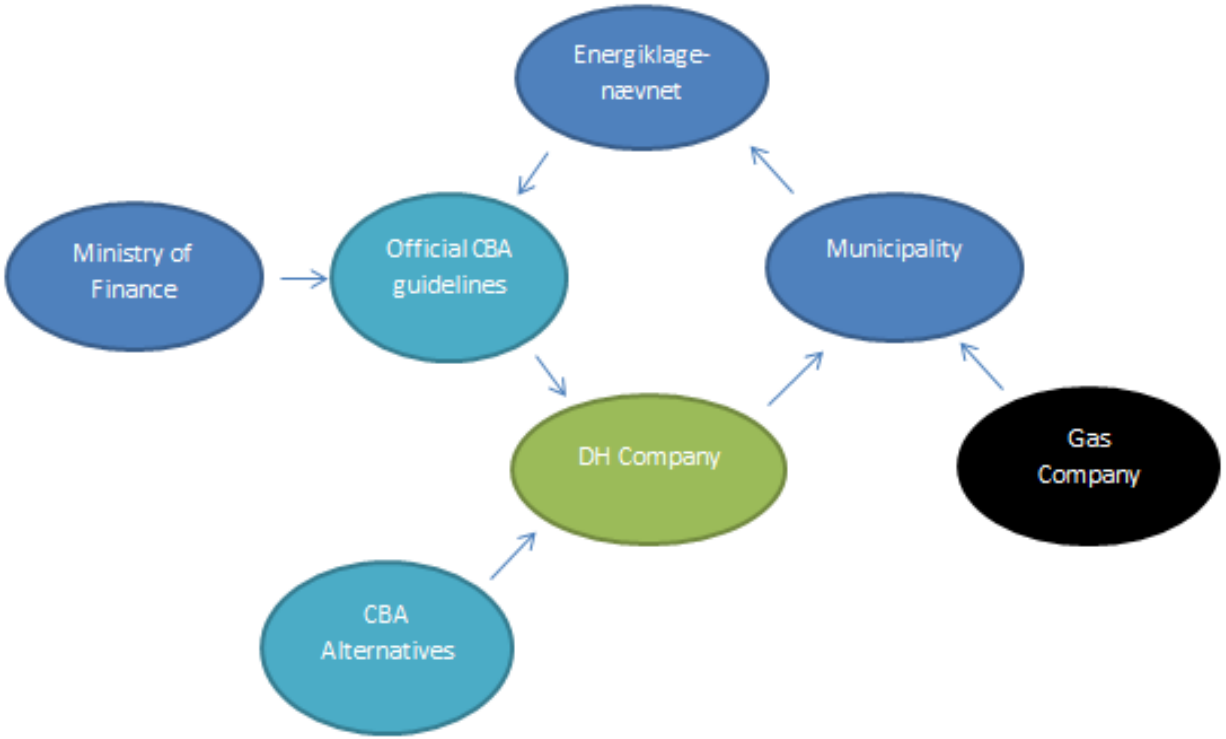

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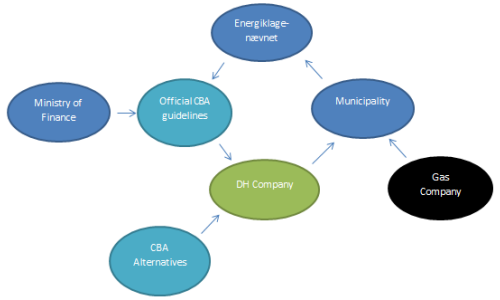


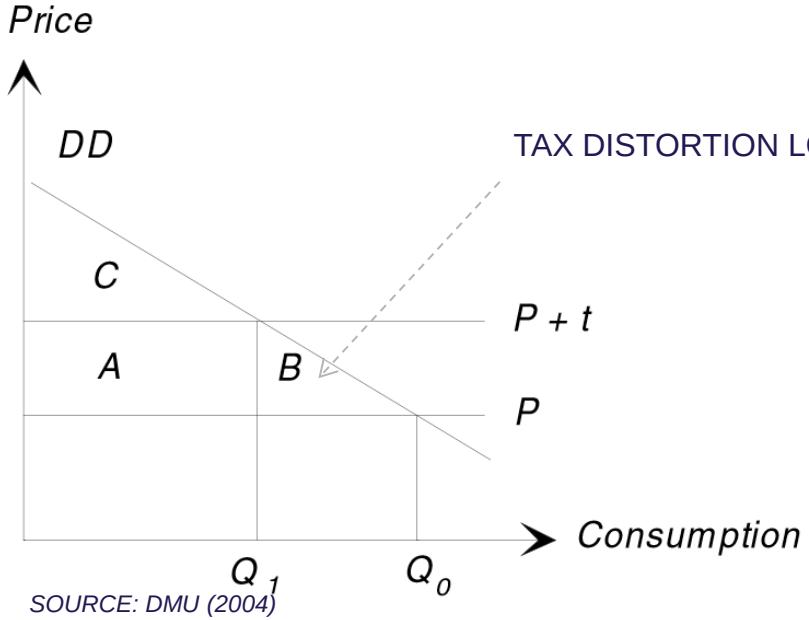
- Value adding is moving from fuel to infrastructure and production capital (same happens in the electricity sector)
- When a case is brought to Energiklagenævnet, a judgement is likely to be made with the official guidelines as reference (16. Maj, 2013).
- Even though there seems to be a formal freedom in the CBA calculation, it might not exist in reality

WHAT IS THE PROBLEM?

Tax Distortion Loss

”Skattekilen mellem forbruger- og producentpriser medfører forvridning af aktiviteten i økonomien.” (Finansministeriet, 1999)

- Taxes change the relative prices
- Thus, ressources are misallocated - compared to the perfect market reference.



SOURCE: DMU (2004)

Tax Distortion Loss

Is founded upon an assumption of the initial situation as being a perfect market

- Firstly, this assumption is problematic because the tax structure is a product of a historical and political process – no reason to expect this to optimal
- Secondly, the presence of **externalities** means that prices are not 'right' at the outset

The Problems of Tax Distortion Loss

Problem: 'Tax distortion loss' bias the economic assessment towards fossil fuels

<u>3 potential sources for bias:</u>

1) Incentive problems in the market prevent the provision of public goods from private investors. At the same time, TDL reduces public investments due to the 20 percent 'punishment' of using public funds.
2) Due to TDL, monetary factors effectively weights higher than environmental factors – even though we put a price on environmental qualtities in the CBA.
3) TDL apparently protects existing energy sources if these are heavily taxed (which happens to be the case for fossil fuels)

Bias 3: Protecting Taxed Ressources

- In the DH sector public funds are often not directly involved in the investment
- But the public finances can indirectly be affected through changes in tax income when a technological change appears
- For example, if production is moving from a heavily taxed fuel to a less taxed ressource
- *Ceteris paribus*, this results in a net-change on public tax income.
- Apparently, this is understood as a use of public funds which generates a tax burden on the rest of society

Bias 3: Protecting Taxed Ressources

- The ‘socioeconomy’ of an investment then becomes dependent on the tax rate of the existing alternative.
- Example: For an investment in a solar thermal plant, the loss of tax income will be a function of the tax rate on natural gas.
- This has the implication that if the tax on natural gas is increased then the **socioeconomic competitiveness of solar thermal is worsened**
- In an odd way, taxes on fossil fuels then seem to potentially function as a protective institution that slows down investments in technological change - given the way we calculate socioeconomy
- Is the political system aware of this mechanism?

Is the calculation procedure consistent with *the aim* of Heat Supply Act?

"§ 1. Lovens formål er at fremme den mest samfundsøkonomiske, herunder miljøvenlige, anvendelse af energi til bygningers opvarmning og forsyning med varmt vand og inden for disse rammer at formindske energiforsyningens afhængighed af fossile brændsler."

- 'Black bias' in the calculation procedure conflicts with the aim of promoting the most environmental solution
- 'Black bias' in the calculation procedure conflicts with the aim of reducing dependence on fossil fuels

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