



# Does energy taxation distort competition among energy carriers? Some political economy in Denmark

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# Questions

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- › What are the basic principles of energy-related taxation ?
- › Is taxation of electricity in line with taxation of other energy carriers ?
- › How may distortions in energy taxation condition support required for renewables ?
- › What are the implications of C-213/96 (Outokumpu Oy) for unilateral schemes of electricity taxation ?



# Question 1

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- › What are the basic principles of energy-related taxation ?

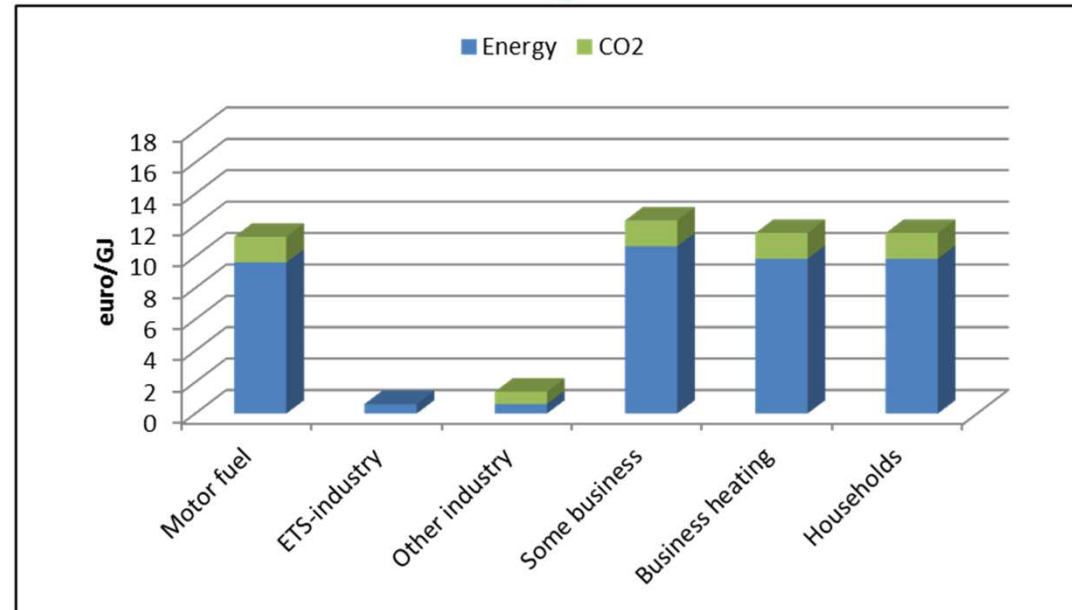


# A Nordic model of energy taxation

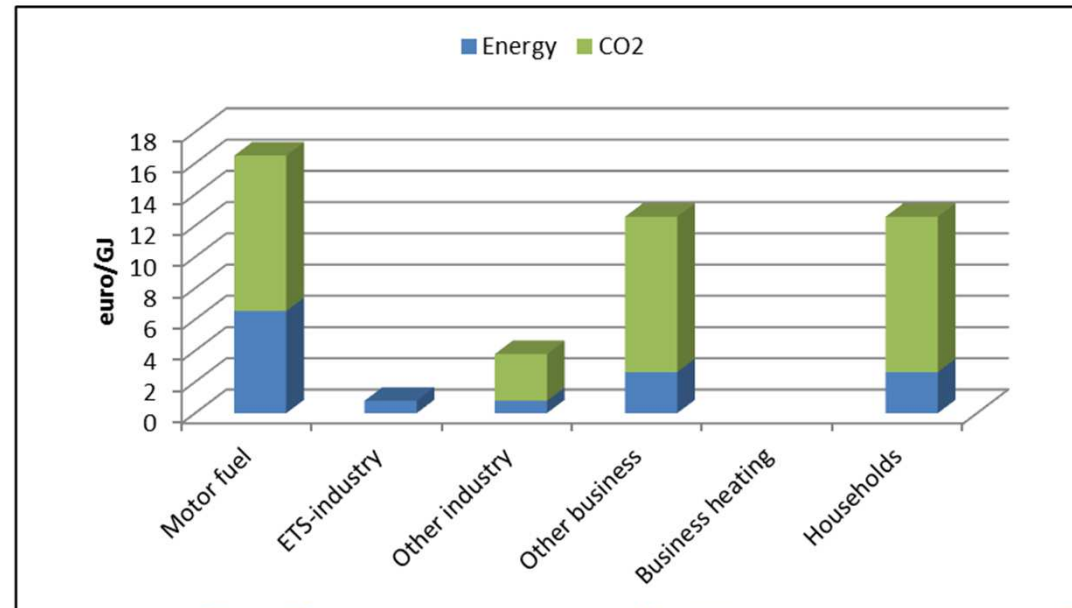
	Denmark	Sweden	Finland	Norway	Iceland
<b>Energy tax:</b>					
Motor fuels	√	√	√	√	√
Heating	√	√	√	√	√
Industry	√	√	√	√	
<b>Carbon tax:</b>					
Motor fuels	√	√	√	√	√ geothermal
Heating	√	√	√	√	
Industry	√	√	√	√	√
<b>Air pollution taxes</b>					
Motor fuels					
Heating	√	√	√	√	
Industry	√	√	√	√	
<b>Electricity tax</b>					
Domestic	√	√	√	√	√
Industry	√	√	√	√	√
<b>ETS - carbon</b>	√	√	√	√	√

# Sum of energy and CO2 taxes € per GJ - mineral oil

> Denmark



> Sweden



# Main principles

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## > Tax base

- 1) Energy tax component – calorific
- 2) CO2 tax component – implicit emissions
- 3) Air pollution taxes - emissions

## > Tax rate differentiation

- 1) Energy tax: Motor fuels/Households/Business/Industry
- 2) CO2 tax: Domestic vs. Manufacturing
- 3) Air pollution taxes: Stationary sources


## > Power and heat sector

- 1) Electricity: end-user tax
- 2) Heat: fuel-specific tax (good split required!)
- 3) CHP & power: no CO2-tax (but ETS)

## > All: Indexation



# How to calculate calorific value and CO2

 European Commission / Taxation and Customs Union

## Calculation of the CO<sub>2</sub> content for petrol

1. Net calorific value (NCV) in GJ per 1000 l of petrol

↓

$$\text{NCV (GJ/t)} \times \text{Density (kg/m}^3\text{)} / 1000$$
$$44,0 \text{ (GJ/t)} \times 745 \text{ (kg/m}^3\text{)} / 1000 = 32,8 \text{ (GJ/1000 l)}$$

↓

2. CO<sub>2</sub> emissions in tonnes per 1000 l of petrol

↓

$$\text{Emissions factor (tCO}_2\text{/TJ)} \times \text{NCV (GJ/1000 l)} / 1000$$
$$69,2 \text{ (tCO}_2\text{/TJ)} \times 32,8 \text{ (GJ/1000 l)} / 1000 = 2,27 \text{ (tCO}_2\text{/1000 l)}$$

Fossil fuels:  
Directive  
2006/32/EC  
(Annex II)

Commission Decision  
2007/589/EC,  
(Annex I, point 11, table 4)

7 June 2011 Council - WPTQ 4 20/9-2016 7

## Question 2

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> Is taxation of electricity in line with taxation of other energy carriers ?





# Energy taxation in Denmark: Implicit tax rates according to calorific value, July 2016.

Implicit tax rate ENERGY €/GJ	Motor fuels <sup>1)</sup>	ETS- industry	Business & industry <sub>net</sub>	Business nec <sup>2)</sup> (liberal prof.)	Business heating	Non-business
<b>Petrol</b>	17.0					
<b>Gas oil/diesel</b>	10.3	0.60	0.60	7.51	7.51	7.51
<b>Heavy fuel oil</b>		0.60	0.60	-	7.48	7.48
<b>Gas/CNG</b>	11.5	0.60	0.60	7.36	7.36	7.36
<b>Coal &amp; coke</b>		0.60	0.60	-	7.36	7.36
<b>Electricity</b>	0	0.15	0.15	32.95	14.26	32.95

1) Excluding railways, shipping, aviation and agriculture/forestry. 2) Excluding forestry, agriculture and greenhouses.

**Excl. CO2-tax and air pollution taxes etc.**



# Electricity taxation in Denmark

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- › Tax rate for households is more than four times higher than the tax burden for fuels per GJ
- › Tax rate for business heating is about twice the tax burden for fuels per GJ
- › Tax rate for manufacturing processes is four times less than tax burden for fuels per GJ



# Why should electricity be taxed differently ?

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- › Electricity tax was up to 1.8.2013 higher than fuel taxes per GJ for all purposes
- › Reason for higher electricity tax: conversion losses when fuels are transformed into electricity
- › Conversion loss factor applied by Tax Ministry: 2.4
- › Political deal on economic stimulus package lowered business electricity tax to EU minimum requirement and merged some previous surcharges into household electricity tax



# Input versus output taxation of energy

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## > The coal tax law in DK (Kulafgiftsloven):

- § 5. Stk. 20. For virksomheder registreret efter § 2, stk. 4, er den afgiftspligtige mængde for en afgiftsperiode den mængde afgiftspligtige kul, der er indeholdt i leverancen af varme fra et registreret kraft-varme-værk omfattet af bilag 1 til denne lov, et decentralt eller industrielt kraft-varme-værk registreret efter § 2, stk. 5, i det omfang afgiften indeholdt i varmeleverancen ikke opfylder betingelserne for tilbagebetaling efter § 8 og § 8 a.

## > Implication:

- Coal used for supply of heat is subject to input energy tax; the share of coal used for production of electricity is subject to output energy tax
- Same for natural gas and mineral oil



# Advantages conferred on fossil fuels

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- › No conversion losses with renewables, yet subject to same tax rates as conventional electricity
- › End-user electricity tax distorts energy taxation based on calorific contents and favours fossil fuels



# Getting the conversion loss right

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- › Actual conversion loss factor in 2014 (average of central and decentral units): 1.54
- › When adjusted according to split with heat effect method: 1.85
- › Even the 'official' conversion loss factor of 2.4 cannot justify high end user electricity tax rate for households

	<i>1.54</i>	<i>1.85</i>	<i>2.4</i>	<i>Rate is</i>
<i>Household €7.5/GJ</i>	<i>€11.55/GJ</i>	<i>€13.88/GJ</i>	<i>€18.00/GJ</i>	<i>€32.95/GJ</i>
	<i>DKK0.20/kWh</i>	<i>DKK0.37/kWh</i>	<i>DKK0.48/kWh</i>	<i>DKK0.88/kWh</i>

# Question 3

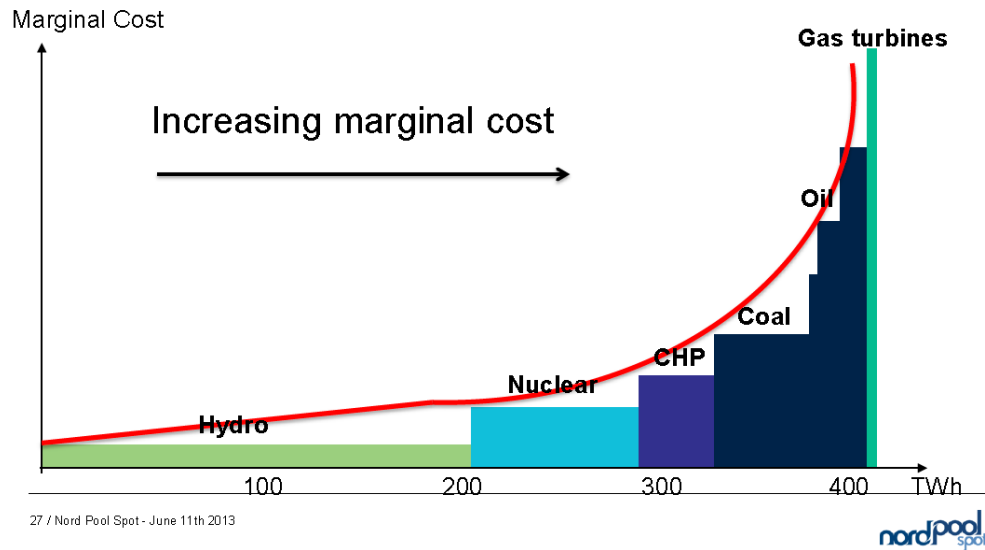
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- › How may distortions in energy taxation condition support required for renewables ?

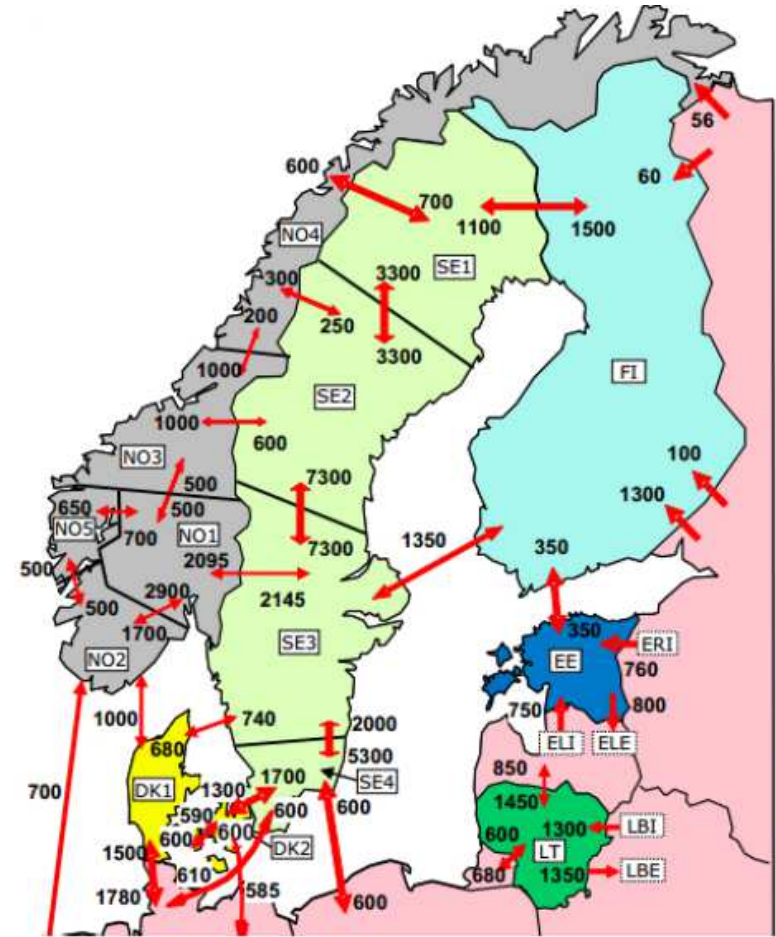


# Nordpool

## The supply curve in the Nordic

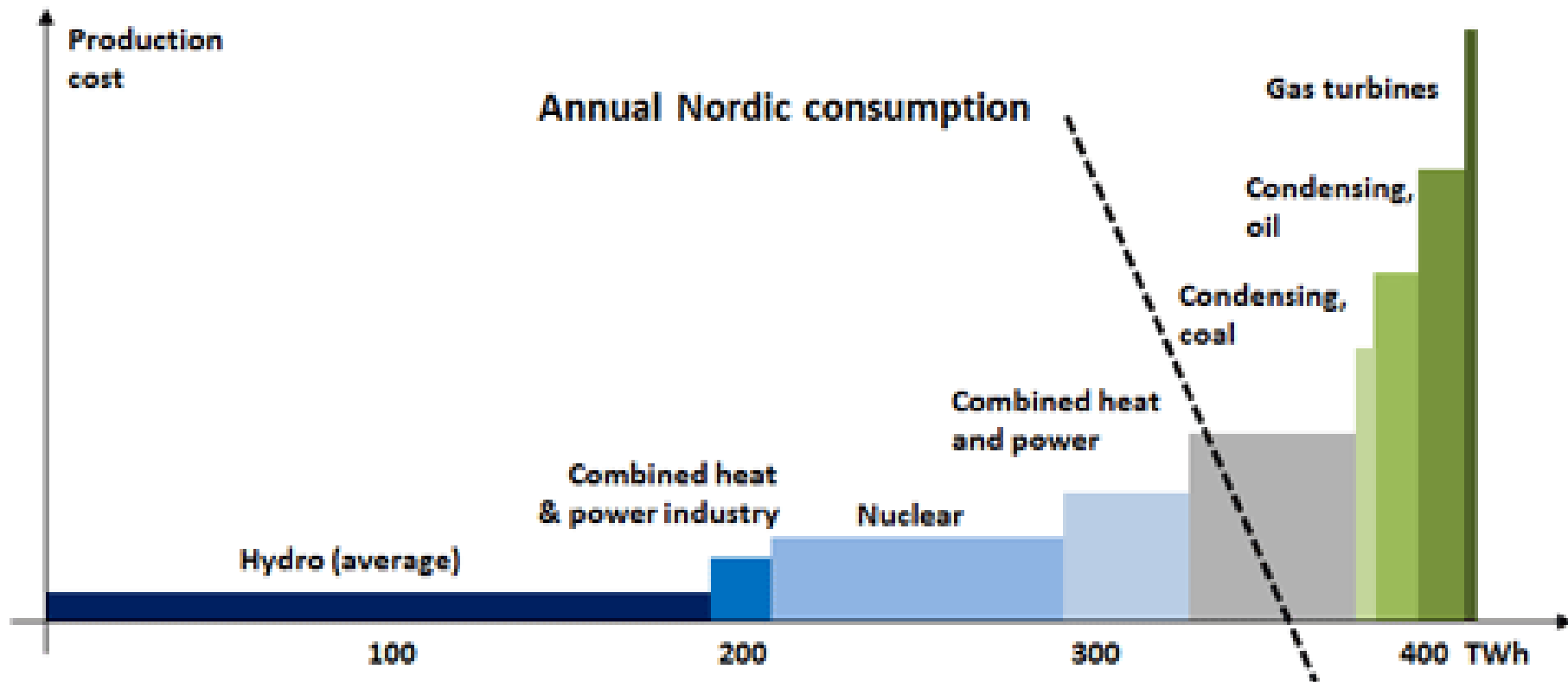


27 / Nord Pool Spot - June 11th 2013





# Nordpool pricesetter: fossil fuels



Increasing marginal cost



# Tax reliefs affect market prices

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- › Most of the time it is a condensing unit that sets the electricity price in the Nordic market
- › Denmark's feed-in-premium tops up the market price with support for renewables to a guaranteed level
- › Low prices in the electricity market have over the past 2-3 years increased the price gap and the need for support (PSO)
- › The tax exemption to fuels for electricity production influences the market clearing price



# Impacts on electricity prices considered

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- › If energy taxes applied for input of fossil fuels for electricity production, the costs would be passed over into electricity prices
- › As fossil fuel plants are pricesetters on Nordpool in more than half the time periods, this could serve to increase electricity prices
- › Unless taxes are refunded for exported electricity and applying only to domestic and imported electricity



# An alternative approach

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- › Energy taxation related to input of fuels for electricity production would increase costs of electricity production based on fossil fuels
- › In turn, electricity based on renewable energy without conversion losses would benefit from its true properties of energy efficiency
- › The change in relative prices would provide relief to the need for expensive subsidy schemes for renewable energy and hence to tax payers



# Question 4

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› What are the implications of C-213/96 (Outokumpu Oy) for unilateral schemes of electricity taxation ?



# Judgement of European Court C-213/96 "Outokumpu Oy"

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JUDGMENT OF 2. 4. 1998 — CASE C-213/96

- 31 Article 95 of the Treaty therefore does not preclude the rate of an internal tax on electricity from varying according to the manner in which the electricity is produced and the raw materials used for its production, in so far as that differentiation is based, as is clear from the actual wording of the national court's questions, on environmental considerations.
- 39 While the characteristics of electricity may indeed make it extremely difficult to determine precisely the method of production of imported electricity and hence the primary energy sources used for that purpose, the Finnish legislation at issue does not even give the importer the opportunity of demonstrating that the electricity imported by him has been produced by a particular method in order to qualify for the rate applicable to electricity of domestic origin produced by the same method.



# Implications of C-213/96

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- › An electricity tax can be differentiated according to how electricity is produced
  
- › For imported electricity a tax scheme must allow for declaration of origin



# Conclusions and final remarks

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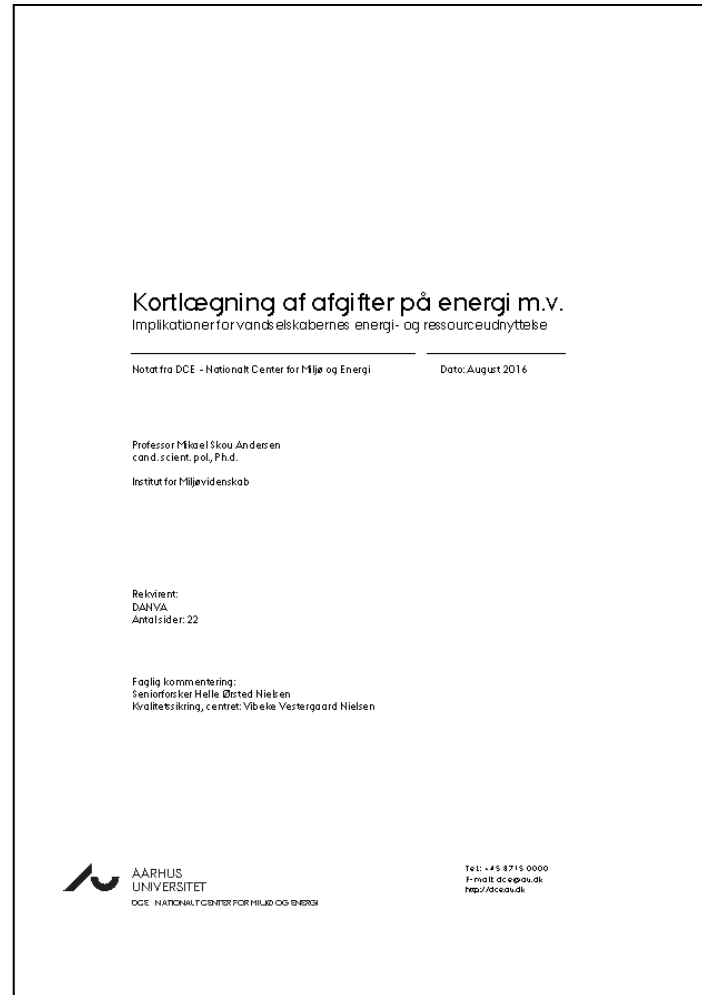
- › The need for massive subsidies to renewables is inflated by distortions in energy taxation related to electricity, protecting fossil fuels
- › Although EU ETD defines an end-user electricity tax minimum, it does not rule out input-related energy taxation for fuels
- › The main argument in Denmark for the present scheme is the need to protect domestic producers from competition, as Nordic hydropower producers would gain advantage from input taxation
- › Deserves more attention in a state aid context





# DCE memo on energy taxes coming soon

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› Thank you for your attention

