Ministry of Taxation

The Economic influence of Carbon Taxes

The Danish Experience and Future Models

Tallinn, 4. November 2003

The presentation is about

- The Danish experience with energy taxes
- The new Community Energy Taxation Directive
- The new Community Directive for greenhouse gas emission allowance trading

A Historical Overview - I

- The tax on petrol was introduced in 1917
- The tax on other mineral oils was introduced i 1977
- The tax on electricity was introduced in 1977
- The tax on coal was introduced in 1982
  - The tax was balanced according to the level of the tax on mineral oils according to the energy content
- In 1986 the tax on mineral oils was increased due to a drop in world market prices of crude oil
  - Consumer prices were constant/the balance between the taxes was lost
- In 1992 Denmark introduced a tax on carbon dioxide based on the carbon content in the different energy products

A Historical Overview - II

- In 1994 Denmark adopted a green tax reform shifting the tax burden from income to evironmentally harmful behaviour and the use of resources during 1994-1998
  - Households pay lower income taxes and higher green taxes
  - A number of new green taxes was introduced: water, wastewater, plastic and paper bags
  - The burden of business and industry is almost unchanged
- In 1996 a reform of the system of taxing energy is adopted to increase energy savings by trade and industry during 1996-2000
  - The tax on carbon dioxide is increased
  - The energy taxes for space heating is increased to the level of the households
  - A new tax on the emissions of sulphur is introduced
  - A new tax on natural gas is introduced
- The energy taxes on households and the tax on petrol are increased by 15-25 per cent during 1998-2002

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Taxes on Energy

The Danish Experience

The Energy Tax System

The Danish Energy Tax System consists of 3 different parts:

- The energy taxes balanced after the energy content of each product
- The carbon tax balanced after the carbon content of each product
- The sulphur tax on the actual emissions of sulphur

The Energy Taxes

- A tax on electricity
  - Heating:
    - Rate of 0,501 DKK/kWh in 2003
  - Other than heating:
    - Rate of 0,566 DKK/kWh in 2003
  - Fuels for generation of electricity are exempt from the taxes on energy. The rate on electricity for heating corresponds to the price increase which would have been incurred if the fuels had been taxed
- A tax on coal
  - Rate of 51,00 DKK/GJ in 2003 and
- A tax on natural gas
  - Rate of 20,2 DKK/Nm^3 in 2003
- A tax on mineral oils
  - Heating gas oil/kerosine:
    - Rate of 1,83 DKK/l i 2003
  - Heavy fuel oil:
    - Rate of 2,06 DKK/kg i 2003

Energy Taxes

The Tax Base and Refunds

- The energy taxes are payed by the suppliers of the different energy products - the registered firms
- The registered firms shift the energy taxes to all consumers, i.e. both households and enterprises
- VAT registered firms obtain a full refund (except for electricity) of the energy taxes for energy used in production processes. However, there is no refund of taxes on energy used for space heating or for operation of motors
- The energy taxes fully burden all non-VAT registered sectors, i.e. households, the financial sector etc.

The Carbon Tax

- The carbon tax is likewise payed by the suppliers of the different energy products - the registered firms
- The registered firms shift the carbon tax to all consumers, i.e. both households and enterprises
- VAT registered firms obtain a partial refund of the carbon tax for energy used in production processes conditional of the energy intensity of the process
  - A list of the most energy intensive processes - “heavy processes” - is specified in the law
- The carbon tax fully burdens all non-VAT registered sectors, i.e. households, the financial sector etc.
- There is no refund of carbon tax on energy used for space heating or for operation of motors

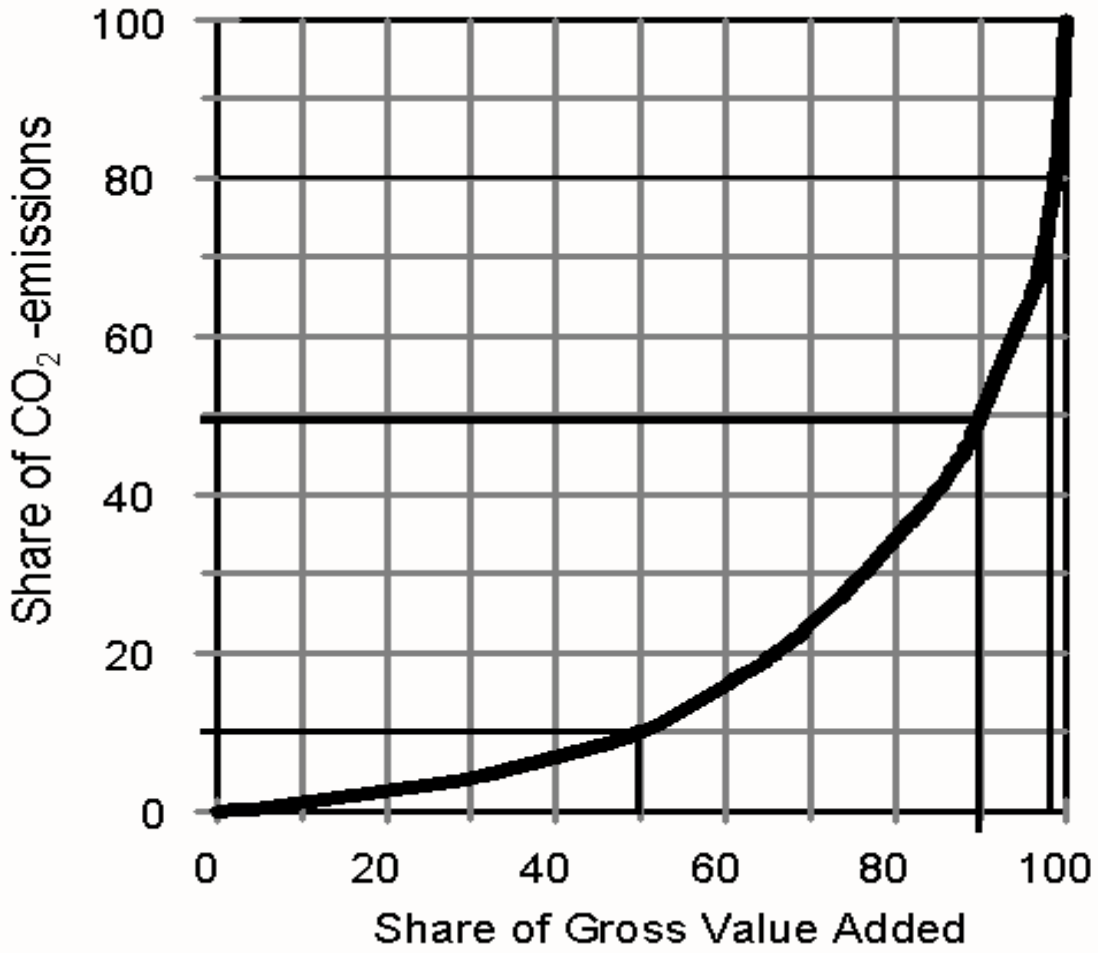
Carbon Tax Rates

1996-2000

DKK per (ton) carbon dioxide	1996	1997	1998	1999	2000
Space heating	100	100	100	100	100
Light process	50	60	70	80	90
Light process w/agreement	50	50	50	58	68
Heavy process	5	10	15	20	25
Heavy process w/agreement	3	3	3	3	3

The Distribution of the Carbon Tax

The Distribution of CO2-emissions from Trade and Industry



Indication for a Heavy Process

- The tax burden of a carbon tax of 50 DKK per tonne CO2 should amount to
  - at least 3 percent of the value added to the relevant production unit
  - at least 1 percent of the sales value

- Other considerations behind the process list
  - International competitiveness
  - Competitiveness in relation to domestic non-energy-intensive companies
  - No branches or companies should have a net benefit after the general retransfer of the tax revenue
  - Control and administrative aspects

The Sulphur Tax

- The sulphur tax is based on the emissions of SO_2 from all use of energy in Denmark
- The sulphur tax is payed by the suppliers of the different energy products. However, other firms measuring actual emissions can also choose to register
- The suppliers shifts the sulphur tax to all consumers, i.e. both households and enterprises
- The tax rate is 20 DKK/kg sulphur or 10 DKK/kg SO_2. The rate is gradually increased during the period 1996 to 2000
- For electricity the sulphur tax was payed per kWh until 1999. From 2000 the power plants pay according to emissions

Recycling of Revenue

1996 reform

- The revenue from the taxes on energy is recycled to trade and industry through 4 different channels:
  - Employers' contributions to social security are reduced (pay-roll tax)
  - Employers' contributions to pensions are reduced (ATP)
  - Subsidies for investments in new energy efficient technology
  - Special funds for small enterprises

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Evaluation of Green Taxes on Trade and Industry in 1999

Estimated reduction in CO_2 and SO_2 emissions in 2005

	CO_2 per cent		SO_2 1000 tonnes	
	Estimate 1995	Estimate 1999	Estimate 1995	Estimate 1999
From taxes	2,1	2,0	32	34
From agreements and subsidies	1,8	1,8	-	-
Total	3,9	3,8	32	34

Revenue Effects of the Sulphur Tax

	Revenue estimate in 1995* mill. dkk	Accounting figures mill. dkk
1996	420	296
1997	425	396
1998	450	375
1999	640	481
2000	715	198

2004 110 (estimate)

- The tax rate has been unchanged, but a tax-free allowance has been reduced during the period
  The revenue has been estimated after quantity adjustments

The Economic Effects of the Taxes

- The macroeconomic effects of the energy package are limited because of recycling and differentiation of the tax rates.
- Balance between additional taxes and recycling in the period 1996-2000. After 2000 the recycling will be somewhat greater than additional taxes because the wage bill is assessed to grow faster than CO_2 emissions
- The tax burden is more evenly distributed than the energy consumption because of the differentiation of the tax rates
  - 50 percent of the CO_2 emission is caused by the most energy intensive companies who contribute 10 per cent of the total value added, but only 20 per cent of the total energy taxes
- It has been assessed necessary to maintain the differentiation of the tax rates to ensure the international competitiveness in the energy intensive companies

The Administrative Effect of the Energy Taxes

- The division of the energy consumption according to application is simple for most companies
- The total number of VAT registrered companies is 421.000.
  - For 5.000 companies the division between space heating and processing is more complicated
  - Of these 5.000 companies 4-500 manufacturing companies and 1.000 greenhouse gardens have to devide process energy into light and heavy processing, and installation of meters is necessary. The cost is estimated to be 5.000 DKK in average per year to installation and reading of meters
- Administrative costs for companies amount to 1-2 per cent of the tax revenue

The Administrative Effects of Subsidies and Agreements

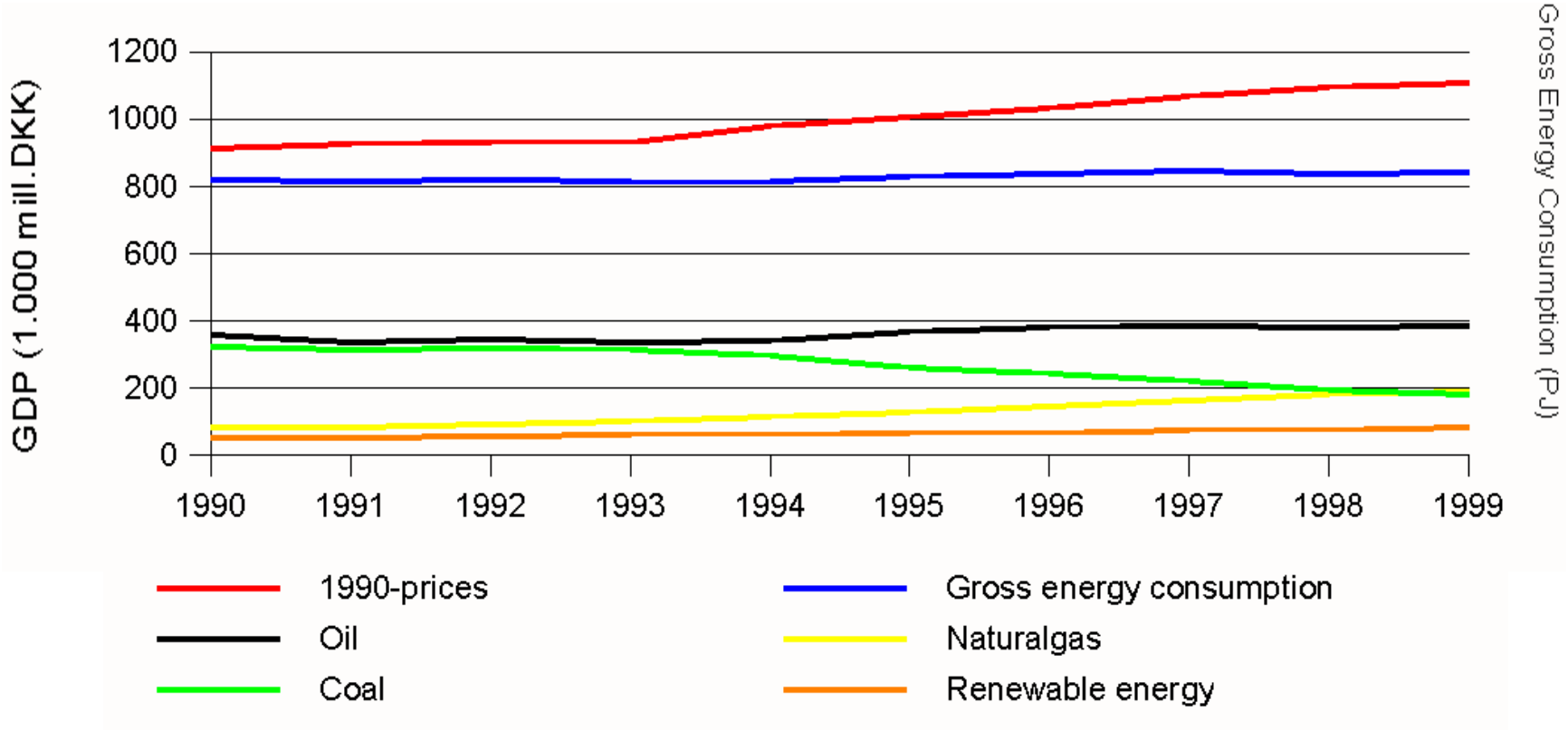
- The administrative cost of applying for subsidies are estimated to about 3-9 percent of the amount of the subsidies.
- The administrative cost of entering into agreements are estimated to amount to 5-12 percent of the expected subsidies for the reduction of the CO_2 tax in 2000.

Recommendations and Follow-up on the Evaluation

- It is recommended that the general lines of the present structure and real rate levels of the taxation system are retained

- The tax system will be taken up to renewed consideration in 2005 at the latest when it has been clarified internationally what measures are relevant in climate policy in international terms
- Adjustment of the energy package
  - Simplification in the energy tax system for certain processes
  - The energy audit that was used previunsly for identification of the energy saving projects has been replaced by an energy management system which is checked when the agreement is being entered
  - Special inspections that are to focus on central process equipment and processes are used for identification of the most energy saving projects which the company are obliged to implement
  - Obligation to implement energy efficient measures with a payback time of less than four years
  - The companies are checked by means of spot check and a compulsory inspection whether they comply with the concept of energy management
- A fund of 175 mill. DKK for subsidies for energy saving investment in industrial companies is continued. Only support of investments which the companies would not have carried out without the support. The subsidy is 30 per cent of the investment cost

GDP and Gross energy Consumption



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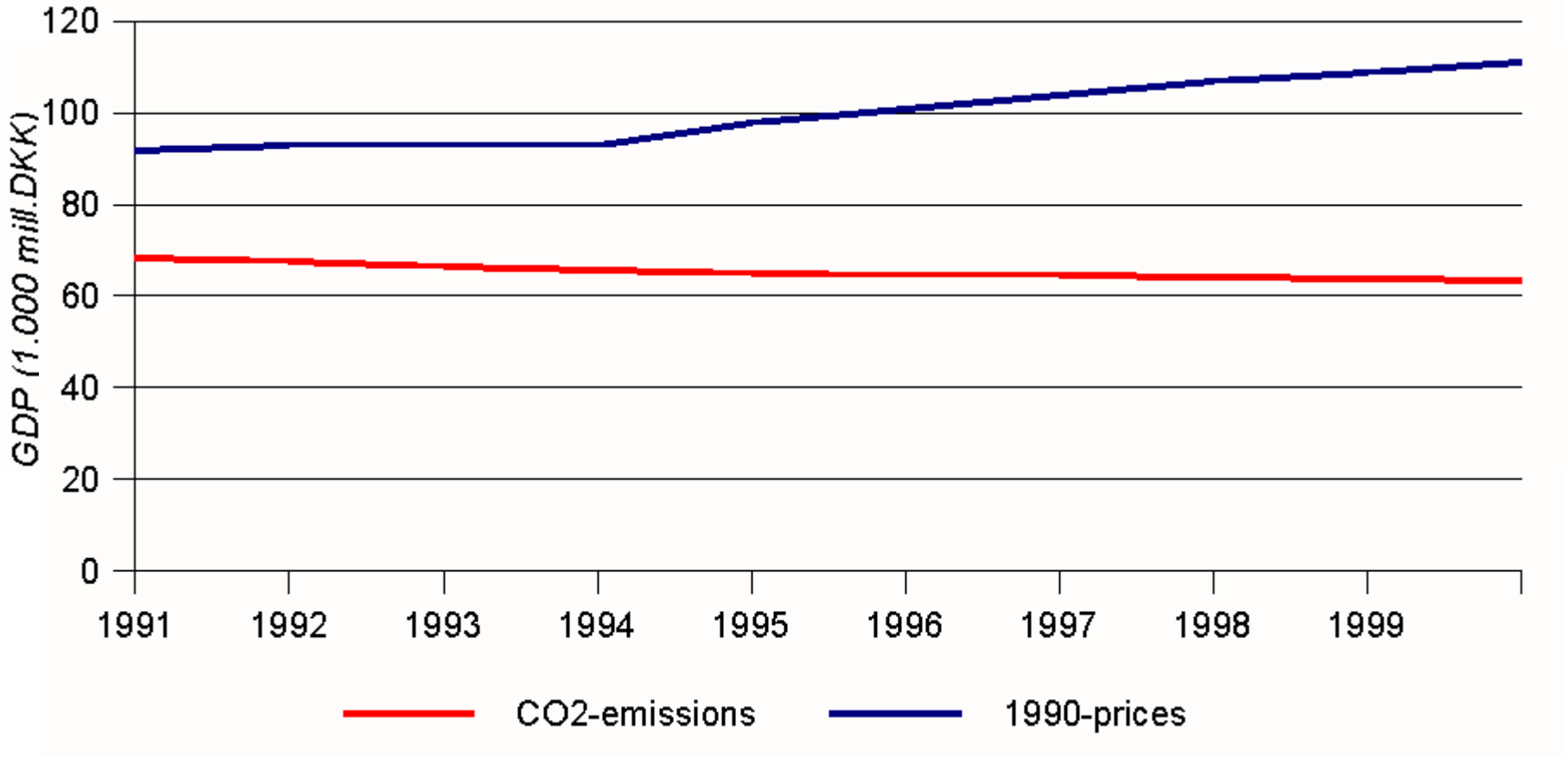
GDP and CO2-emission (corrected)



Electricity Reform 1999

- National quotas for CO2 emissions from the electricity sector
  - 40 per cent of the CO2 emissions come from the electricity sector. The average emissions from the electricity sector was 30 mill. tons in 1994-1998
  - the CO2 quotas are

    23 mill. tons in 2000

    22 mill. tons in 2001

    21 mill. tons in 2002

    20 mill. tons in 2003
- A tax on 40 DDK is charged if the quotas are exceeded
- Quotas are distributed according to the producers emissions in 1994-1998
- The quotas are tradable
- Producers with emissions below 100 000 tons CO2 are not covered by the quota system on condition that the emissions are exclusively due to CHP where the main activity is production of heat

The Community Energy Taxation Directive

Main reasons for the energy taxation directive

- The framework directive for energy taxation should open the possibility for a restructuring and modernisation of national taxation schemes with a view to fulfil targets about employment, environment, energy and transport policies
- The proper functioning of the internal market requires a framework for taxation of energy products and electricity with a minimum taxation of all energy products and electricity
- The taxation of energy products and electricity is one of the instruments available for achieving the Kyoto objectives

The energy taxation directive replaces the existing minerals oil directive and

- covers all energy products (minerals oils, natural gas, coal, bio fuels and biomass) and electricity
- establishes a structure for taxation of energy products and electricity
- establishes minimum rates for the energy products and electricity and increases the present minimum rates for mineral oil with 15-25 per cent and with the greatest increase for gas oil used as propellant

Tax structure

Member States may apply differentiated rates

- where the rates are directly linked to product quality
- when the rates depend on quantitative consumption levels
- uses in local public passenger transport (including Taxis) waste collection, armed forces and public administration, disabled people, and ambulances
- between business and non business use
- between commercial and non commercial diesel used as propellant and the rate for commercial diesel does not fall below the rate in force 1.1.03

Member States may also (1)

- reduce the rates for energy intensive business provided they respect the minimum rates on average for each business
- may reduce the rates for non energy-intensive business who enters agreements with the State or where tradable permits schemes or equivalent arrangements are implemented provided they respect the minimum rates on average for each business
- (an energy intensity is defined as a business entity where the purchase of energy products and electricity amounts to at least 3 % of the production value or the national tax payable amounts to at least 0,5 % of the value added. More restrictive concepts like sales value, process and sector definitions may be applied)

Member States may also (2)

- reduce the rates down to zero when used by energy-intensive business provided they enter into agreements about energy savings, tradable permits schemes or equivalent arrangements. These arrangements must lead to the achievement of environmental objectives or increased energy intensity broadly equivalent to what would have been achieved if the minimum rates had been used
- reduce the rates down to 50% of the minimum levels for non-energy-intensive businesses who enters agreements or are covered by tradable permits schemes

Member States may apply exemptions or reductions in taxation for

- Member States may apply exemptions or reductions in taxation for
- bio fuels or products produced from biomass
- electricity of solar, wind or generated biomass or products produced from biomass
- energy products and electricity used for combined heat and power
- electricity produced from combined heat and power generation provided that the combined heat and power generators are environmental friendly.
- natural gas for 10 years if the national share of natural gas in final consumption is less than 15 %

The following uses of energy and electricity are outside the scope of the directive

- Output taxation of heat, wood and peat
- energy products used for purposes other than as motor fuel or as heating fuels
- dual use of energy products which means that they are used both for heating fuel and for purposes other than as motor fuel and heating fuel. Energy products used for chemical reduction and in electrolytic and metallurgical processes shall be regarded as dual use
- electricity used principally for the purposes of chemical reduction and in electrolytic and metallurgical processes
- electricity when it accounts for more than 50% of a product
- electricity when it accounts for more than 50% of a product
- Refineries are exempted from taxes on the consumption of energy products produced within the curtilage of the refinery

The minimum rates for some energy products and electricity are as follows

	euro
• leaded petrol (1000 l)	421
• unleaded petrol (1000 l)	359
• gas oil used as propellant (1000 l)	302 (330 from 1.1.10)
• gas oil used as motor fuel for some industrial purposes (1000 l)	21
• gas oil for heating purposes (1000 l)	21
• heavy fuel oil (1000 kg)	15
• natural gas(GJ)	0,15 (business)/0,3 (non business)
• coal (GJ)	0,15 (business)/0,3 (non business)
• electricity(MWh)	0,5 (business)/1,0 (non business)

Reduced rates or exemptions

- Reduced rates or exemptions may be carried out either
- directly,
- by means of a differentiated rate or
- by refunding all or part of an amount of taxation

The Community scheme for greenhouse gas emission allowance trading

The aim of the scheme for emission allowance trading is

- to establish a market-based instrument which can contribute to fulfilment of the commitments of the European Community and its Member States to reduce their aggregate emissions of greenhouse gases by 8 % compared to 1990 levels in the period 2008 to 2012. Pursuant to the Kyoto Protocol (the Danish reduction is 21 %)
- to establish a scheme in order to promote reductions of greenhouse gas emissions in a cost-effective and economically efficient manner with the least possible influence of economic development and employment
- to lay down community provisions relating to allocation of allowances which are necessary to contribute to preserving the integrity of the internal market and to avoid distortions of competition

Method of allocation

- in the first period of the scheme of allowances from 2005-2007 which is a transitional period at least 95 % of the allowances shall be allocated free of charge and each Member State has to decide on the total quantity of allowances it will allocate and to the allocation to each operator
- in the second period from 2008-2012 at least 90 % of the allowances shall be allocated free of charge and each Member State has to decide on the total quantity of allowances it will allocate and to the allocation to each operator.

Criteria for the national allocation plans

- The total quantity of allowances to be allocated for the relevant period shall be consistent with the Member State's obligation to limit its obligations pursuant to the Kyoto Protocol taking into account emissions from sources not covered by the scheme of allowances
- The total quantities to be allocated has to be consistent with the potential to reduce emissions, including the technological potential
- The plan shall be consistent with other Community legislation and policy
- The plan shall not discriminate between companies or sectors in such a way that certain undertakings are favoured unduly
- The plan shall contain information on the manner in which new entrants will be able to participate in the allowance scheme
- The plan shall take early action into account
- The plan shall inform on the manner in which clean and energy efficient technologies are taken into account
- The plan may contain information on the manner in which the existence of competition from countries or entities outside the Union will be taken into account

Activities covered by the allowance scheme

Energy activities

- Combustion installations (thermal input exceeding 20 MW)
- Mineral oil refineries
- Coke ovens

Production and processing of ferrous metals

Mineral industry

- Production of cement and lime
- Manufacture of glass including glass fibre
- Manufacture of ceramic products (in particular roofing tiles, bricks, refractory bricks, tiles, stoneware or porcelain)

Other activities

- Pulp from paper or other fibrous materials
- Paper and board

Differences and similarities between the Energy Taxation Directive and the Scheme of Allowance trading

CO2 taxes and emissions allowances schemes are market-based instruments

- Taxes has a known price effect but an unknown quantitative effect
- Allowances has a known quantitative effect but an unknown price effect
- If the allowances are allocated free of charge the effect is similar to a tax where the revenue is recycled to each individual taxpayer
- - If the allowances are allocated according to an auctioning scheme the effect is similar to a tax where the revenue goes to the treasury

The problem is that the energy taxation directive and the allowance scheme does not cover the same field of activities and has different economic impact on activities concerned

- The allowances cover a limited number of activities while the tax directive cover all uses of energy products and electricity

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- The allowances cover not all the energy-intensive activities covered by the tax directive
- Generation of electricity is covered by allowances in relation to the fuels applied (input side) while fuels for generation of electricity is exempted in the tax directive and electricity is taxed (output taxation)
- Electricity used in industries outside the power plants are not covered by the allowances when it is purchased from power stations but it is loaded with the electricity tax
- If the electricity is generated for an industry's own use it is covered by the allowances and loaded with electricity tax
- Dual use of energy products and electricity is covered by the allowances but is outside the scope of the energy taxation directive

- Refineries is covered by the allowances but use of own produced mineral oils products are exempted from energy taxation
- Process emissions (from e.g. cement) is covered by the allowances but not by the energy taxation directive
- The allowances are allocated free of charge (at least 95 % in the first period and at least 90 %in the second period) while all energy products and electricity is covered by taxation. (Only uses exceeding the allowances will be burdened by the cost of purchasing extra allowances which in a certain way is comparable with a tax system with a tax-free basis allowance)

How to implement both schemes in Denmark

The challenge is to establish an appropriate interaction between the tax system and the allowance scheme

A possibility could be to exempt activities covered by allowances from taxes but

- this will result in a considerable loss of revenue and
- it will favour activities covered by allowances which will make them better off than activities outside the allowance scheme

Because of the uncertainty of the final allowance scheme and because it is likely that it will not get real effect for the energy intensive industry until the second period it seems rather likely that the main part of the Danish CO2 tax should be maintained

In the shorter sight it seems to be a possibility to abolish the agreement scheme for activities covered by allowances and to apply the lowest CO2 rate for these activities

In the longer run the aim is to establish a system where the incentive to reduce CO2 emissions should be the same for all enterprises and with the same economic burden on enterprises not only on the marginal emission