Some economic aspects of climate change Instruments and statistics

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- Instruments and statistics
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Introduction

- The Stern report (Stern, 2008)
  - Climate change and economic consequences Cost of mitigation, cost of adaptation, Cost efficient approach to mitigate
- Eurostat/OECD definition of environmental related taxes
- Combating climate change is about instruments – classification issues.
- A range of instruments,
  - Economic instruments, technology instruments, regulatory instruments etc.
  - All instruments create shadow prices in the market –i.e. economic instruments
  - To understand effects are important when deciding upon what statistics we need
- We produce a comprehensive number of consistent statistical tables
  - that allows us to perform consistent analyses both of driving forces,
  - and the impact of the instruments on emissions
  - Where does the statistics come from
- We exemplify some interesting aspects
  - by combining actual figures for Norway from a set of such consistent tables.
- Concludes

Environmental taxes - classification

- (Eurostat 2001/OECD):
  - A tax whose tax base is a physical unit (or a proxy of it) of something that has a proven, specific negative impact on the environment
    - *It was decided to include all taxes on energy and transport, to include resource taxes but to exclude resource taxes on the petroleum sector, and to exclude VAT.*
    - *It seems random and not principal?*
- Pigou (1920) – *The economics of welfare*:
  - A tax that corrects for negative externalities related to economic activity (cf. the environment)
- Bye and Bruvoll (2008) – *Multiple instruments to change energy behaviour – the emperors new clothes?*
    - Resource rent (Ricardo, Hotelling), monopoly rent
    - Capture Infrastructure cost – Ramsey (1927) ?
    - Income generation – Ramsey (1927)
    - Externalities (Pigou (1920)
- Problem OECD: Value added tax, labour tax?
- Example: less than 20 percent of OECD/Eurostat env.taxes for Norway are really environmental taxes – cf. Bruvoll, Næss and Smith (2009) - forthcoming

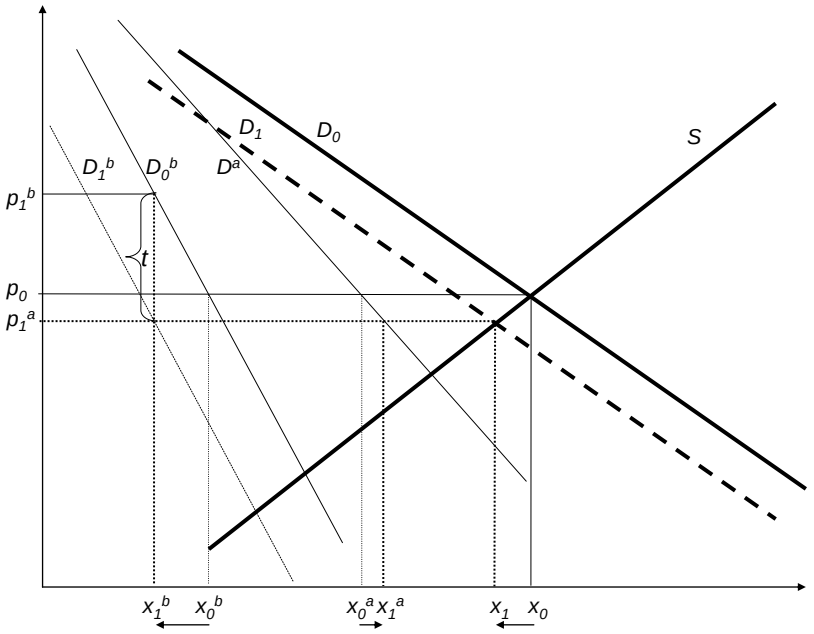
Taxes and subsidies

Negative externality

Positive externality

Discrimination

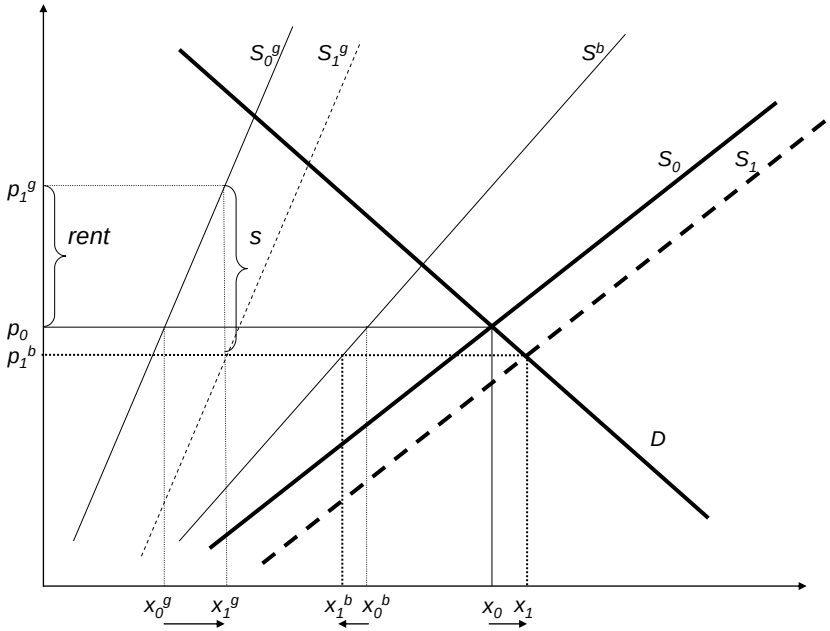
Discriminatory taxes



Bye and Bruvoll (2008):*Multiple instruments to change energy behaviour*

– the emperor new clothes

Discriminatory subsidies



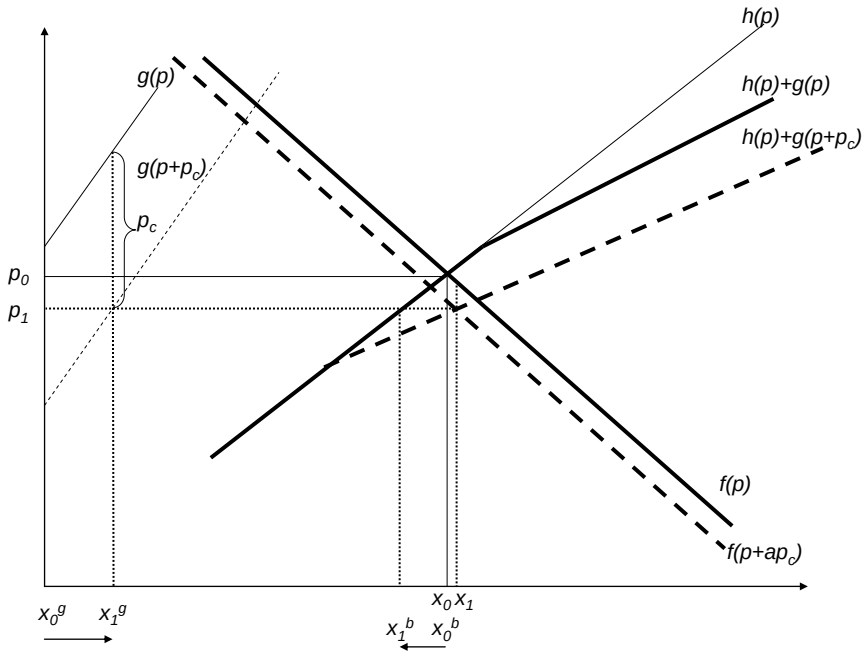
Green and White certificates

Taxes are bad – subsidies are bad – I do not want to pay

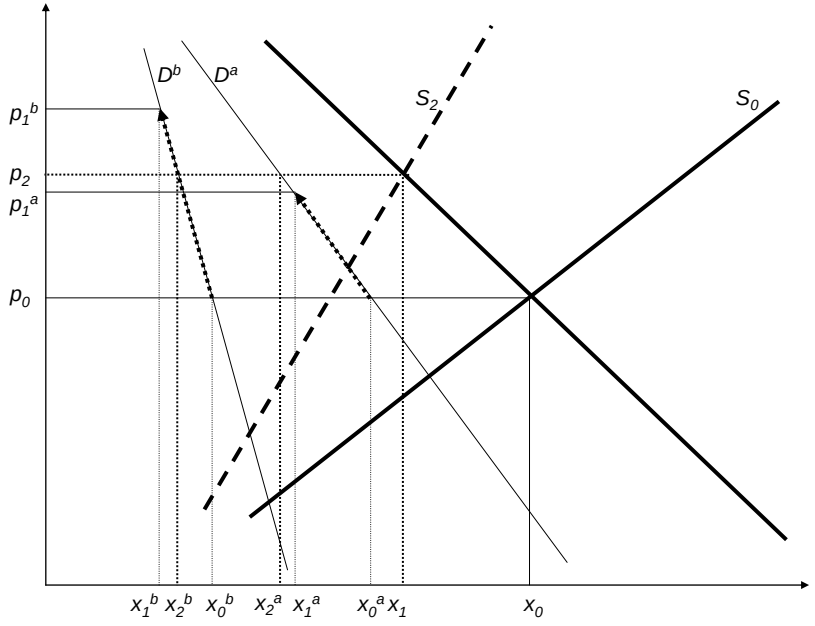
GC: Free certificate on supply – purchaser obligation

WC: Obligation to save – trade for supplier

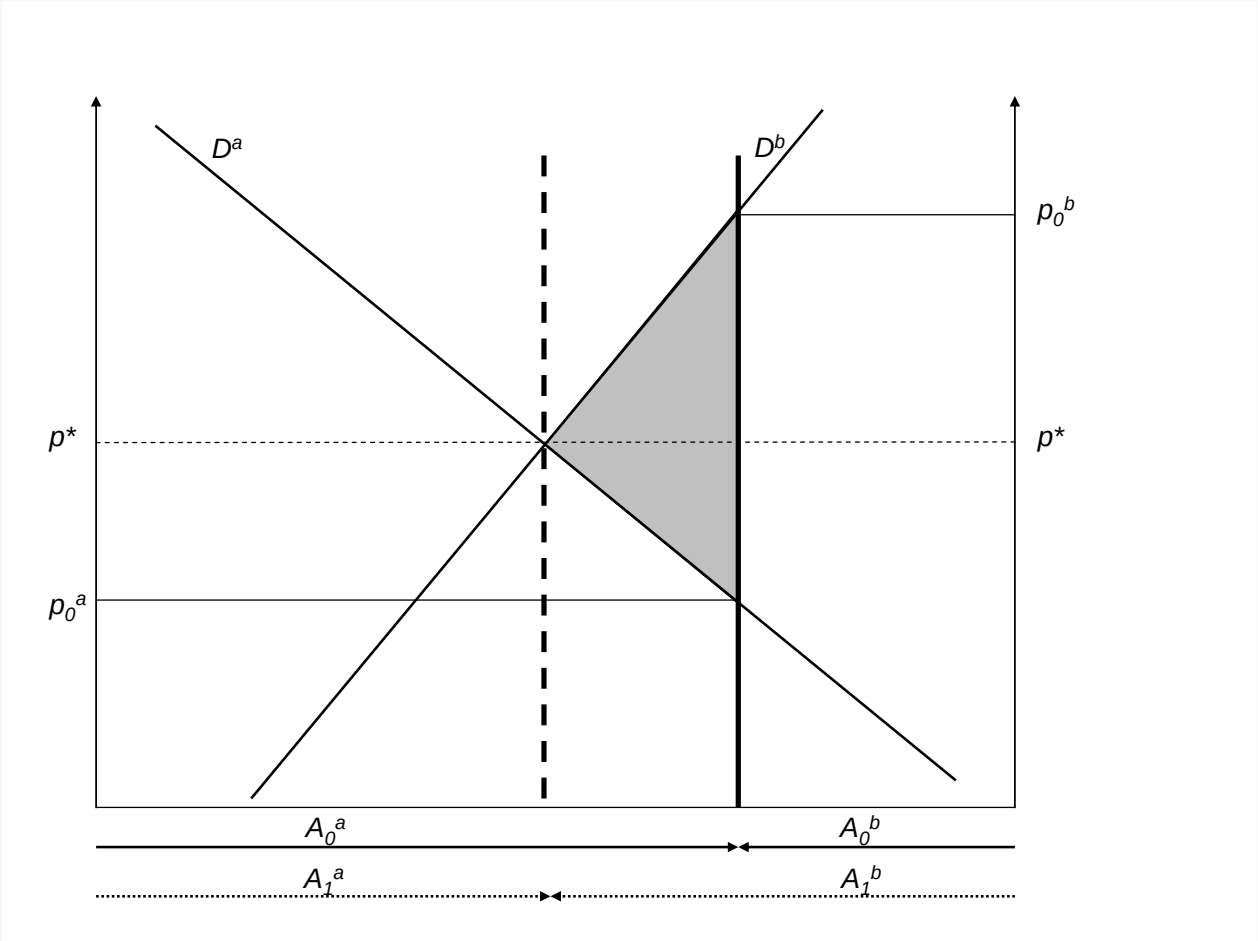
Green certificates -supply



White certificates -demand



Brown certificate – or carbon trade



Limit the amount:

A shadow price occur

Initial allocation

Distribution of cost and benefits

Taxes an subsidies

Supplementary instruments

- Regulation - shadow price – “tax” – “subsidy”
- Standards - shadow price – “tax” and “subsidy”
- R&D – subsidy – and a “tax”
- Market concentration – regulation?
  - Good for the environment - Tax and subsidy

Fundamentally:

- All instruments are fundamentally a combination of:
  - a “tax” and a “subsidy”
- When producing statistics:
  - we should remember that and treat them equally

Instruments and statistics - fundamentals

Sector	Sector	Sector		Gasoline	Fuel oil	Coke	Coal	Wood	Waste	Intermediates
Primary indus	Primary	Primary industries	Agriculture	Amount of emissions of compound x – the product of table 1 and 2						
			Fisheries							
			Forestry							
Manufactur	Manufa	Manufacturing	Pulp and paper							
			Machinery							
			Metals							
			Other							
Construction	Constructi	Construction								
Electricity etc	Electricity	Electricity etc								
Private Serv	Private	Private Services	Banking							
			Insurance							
			Transport							
			Other							
Public services	Public serv	Public services								
Residential	Residentia	Residential								

Instruments and statistics – “technologies”

Sector	Gasoline			Fuel			Coke			Coal			Wood			Waste			Intermediates		
	P	T	S	P	T	S	P	T	S	P	T	S	P	T	S	P	T	S	P	T	S
Agriculture	**Table 3 - split into processes (P) - Transport (T) and Stationary (S) end uses – Why; - discriminatory or - different environmental impact - tax rates per unit - subsidies vary - allowances vary? - certificates vary? - regulation vary? Tax rates for each emission activity Same principle for all instruments OECD data base of environmental taxes, exemptions, reimbursement, caps etc http://www.oecd.org/env/policies/database - cf the criticism above**																				
Manufacturing																					
Services																					
Households																					

Instruments and statistics

- Taxes – Table 4x-x (taxes and discrimination – accounts)
  - Tax rate on volumes of proven environmental impact -
    - Ex. emissions of carbon dioxide.
  - Data collection and definition – are tax rates split ?:
    - Simple in theory – difficult in practice ? cf. Eurostat (2001)
      - Ramsey, environmental, energy, resource, transportation infrastructure,
      - Bye and Bruvoll (2008b)
    - Harmonize with the total collected taxes measured in public accounts
      - (i.e. a tax account matrix).
  - Steinbach et al. (2008a)
    - Environmental taxes in the context of the SEEA
- Subsidies – table 5x-x (complexity versus registers)
  - Measure keeps prices below their market value for consumers and above market value for producers
  - In practice - direct transfers or tax credits (foregone income)
  - In UNEP (2004) direct transfers, public R&D, preferential tax treatments, price controls and loans-lower than market interest rate
  - Our paper has a much broader definition of subsidies - only possible to calculate indirectly –cf. market responses – relevant data for analysis – make analysis possible
  - Data collection
    - Subsidies are normally launched to investment projects in terms of a specific amount or a lump sum
    - to producing facilities based on a production basis (for instance a feed in tariff – i.e. a unit subsidy)
    - for facilities that want to save the use of input (energy efficiency projects) on the demand side, either lump sum or per unit.
    - Lump sum subsidies are normally linked to some kind of volume measures, i.e. they may be transformed to a unit measure.
    - In practice this measure is complex and some data transformation processes are needed to make the measures comparable in units.
    - Subsidies are normally directed towards detailed projects, i.e. these data are on matrix form, cfr. table 3.
    - The bright side - government will normally establish some kind of a register
  - Steinbach et al. (2008b) discusses Environmental subsidies in the context of the SEEA manual.

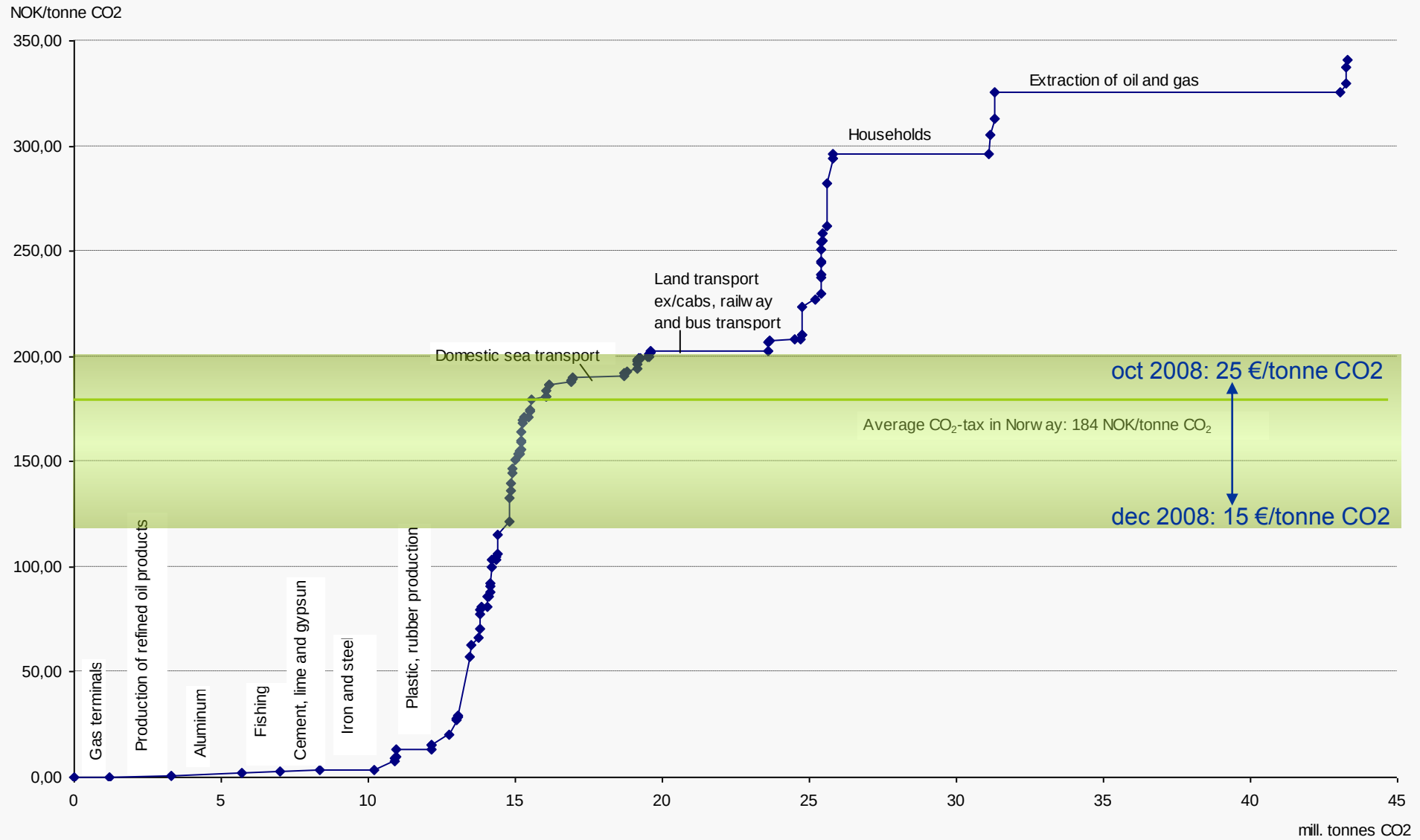
Instruments and statistics

- Carbon market – table 6x-x – cf create 50 percent reduction in 2050?
  - Shadow price of regulation – equals the ”tax”
- Two sets of additional statistical tables
  - Initial assignment of free allowances in volumes
    - (implies also a value transfer – volume times the market price)
  - Economic and volume capturing the trading of emission permits
  - Aggregates over the columns in table 3:
    - normally directed towards sectors and not activities – but who knows what happens
- Data source
  - The assigned amount of allowances may be collected from public registers
    - grandfathered, i.e. based on historic emissions,
    - other free emissions (for instance for new facilities).
    - Surrendered emission,
    - The “verified” emissions follow from table 3.
  - Trade of permits – both volumes and values (some may not be tradable)
    - Allowances – public registers
    - CDM trade –public registers
    - JI trade –public registers
    - Verified emissions – table 3
    - Net trade on exchange – accounting principle
  - The permit market in the context of the SEEA manual and the SNA - Olsen (2008).

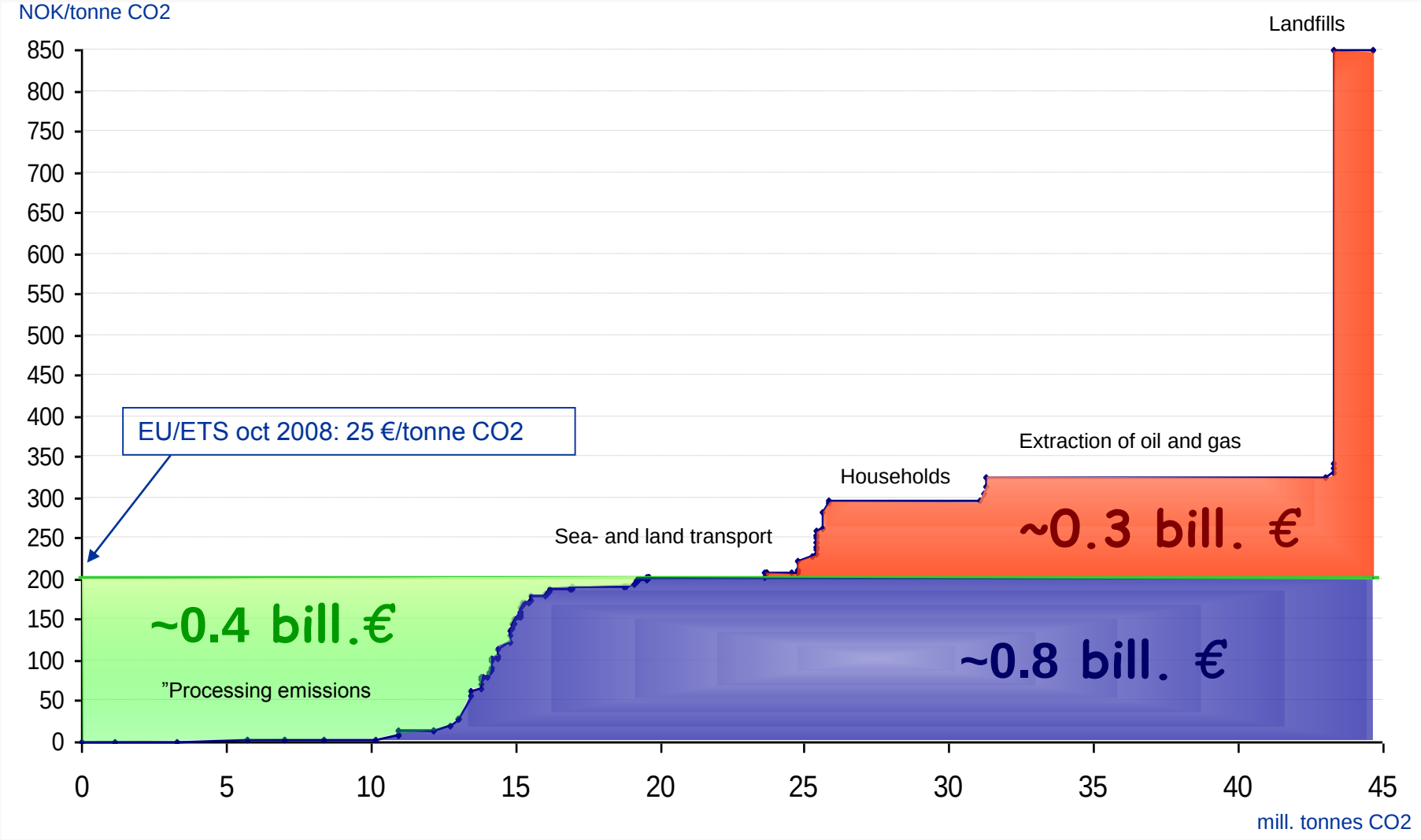
Instruments and statistics

- Green certificates – table 7x-x – cf at least 20 percent of EU market in 2020
  - Approval - delivery of the number of certificates by technology choice and firms in public registers
  - The value of the certificate on the pool /exchange
  - Energy balance (residential) or the energy account (territorial) framework
    - depends upon national or international framework?
- White certificate - table 8x-x – cf. at least 20 percent of EU market in 2020
  - Public register of how much each firm/sector is supposed to save
  - The principal agent assumption eases the data collection.
    - Each agent (for instance a distribution company for electricity) has to verify the savings and the cost for each principal (consumer)
- Regulation table – table9x-x
  - Regulations are normally set up by public firms on a firm specific regime.
  - Public sector should follow up on their own regulation
    - both the regulated and the verified outcome is registered – consistency check to table 3
  - The information needed then should be based on these registers.

A Norwegian example (table 3,4,6) – CO_2 "taxes"



A Norwegian example–who pays how much?



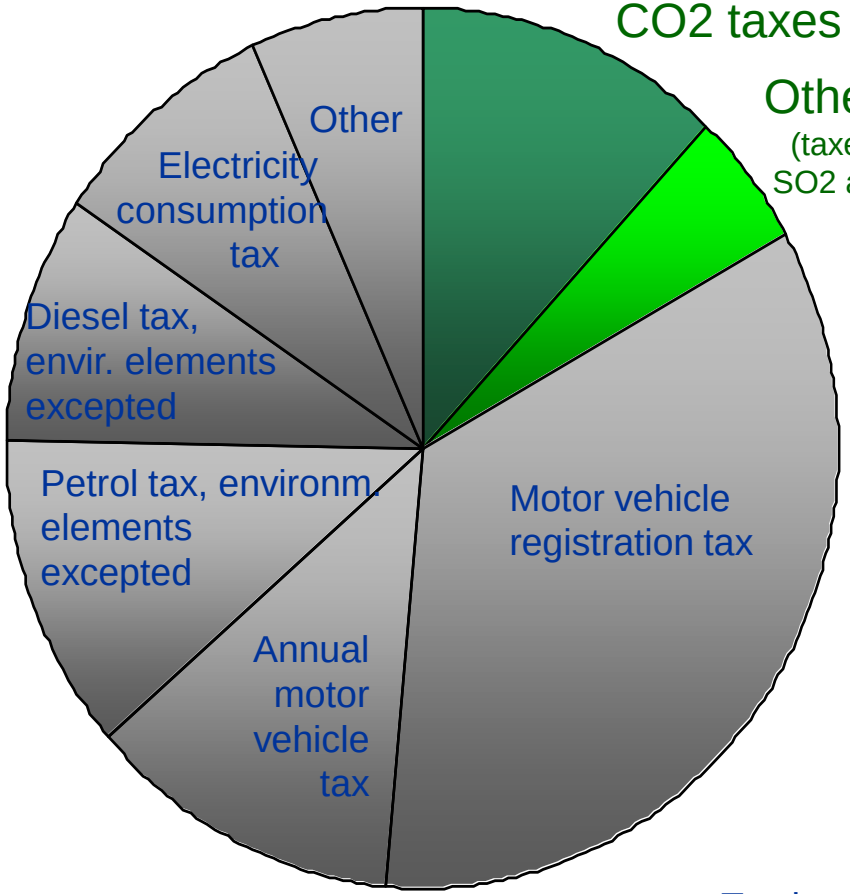
Summary and conclusion

- Mitigation is about instruments
- What is an environmental tax?
- Complex instruments introduced
- All instruments are combinations of “taxes and subsidies”
- Statistics for just one instrument is “a lie”?
- Statistics for all instruments on the same principle
- Input/output matrix
- Tax rates
- Registers
- Accounting
- Analyses made possible
  - Driving forces
  - Effect of instruments – partially/bilaterally/trilaterally/multilaterally

Some questions raised:

- The paper advocates that all instruments in climate policy reduce to a combination of taxes and subsidies. Does the London Group agree?
- The paper advocates that it is important that statistics gather information on instruments in climate policy in a detailed manner, which makes it possible to study the market and technology effects of instruments. Does the LG agree?
- To follow the impact of climate policy it is important that as many instruments as possible are included in the statistics. For some instruments it seem easy, for others it is more complex. However, research on how to include complex instruments should be emphasised?
- The paper advocates that the statistical detailed setup for instruments should follow the statistical setup for emissions (i.e. the national and energy account setup). Does the LG agree?
  - For statistical purposes this eases the data gathering as values may be based on tax rates and emission accounts.
  - Consistency may be checked by aggregation of these tax rates emission accounts calculations and total public tax accounts.
- Emission permits should be included in the statistical system on the same basis?
  - This includes tradable permits in the markets, which may be calculated indirectly, see below
  - This includes JI – which may be found in national registers
  - This includes CDM – which may be found in national registers
  - This includes free allowances –which may be found in national registers
- We should include new instruments as green and white certificates?
- Statistics for regulations should be gathered – how to include them should be studied further?
- Important lessons are to be learned from the OECD-database
  - However the DEFINITIONS of environmental taxes ARE disputed?

Norwegian environmental taxes as share of ”environmentally related taxes” reported to Eurostat



Total reported taxes: 8.2 bill Euro
Environmental taxes: 1.4 bill Euro (<20%)

Sources: *Bruvoll, Næss and Smith (2009) (forthcoming)*
Ministry of Finance (2007): An evaluation of Norwegian excise taxes, NOU 2007:8