Emission permits

Thomas Olsen, Statistics Denmark

Issue paper prepared for the 13th meeting of the London Group on Environmental Accounting,
Brussels, Belgium 30 September - 3 October 2008

Issue paper – Emission permits

Statistics Denmark
September 2008

Contact information:

Thomas Olsen

Senior Adviser
National Accounts - Environmental Accounts
Statistics Denmark
Sejrogade 11
DK-2100

Phone: +45 39 17 39 17
Direct: +45 39 17 38 28
E-mail: Tol@dst.dk

Table of contents

1 Background[1]

At the previous London Group meeting in Rome in December 2007 it was decided that the London group should continue to follow the discussion within the System of National Accounts (SNA) Advisory Expert Group (AEG) in relation to emission rights[2] and with the final decision of the AEG evaluate the impact on the current text in the SEEA.

It was also agreed that how the London Group decides to describe the flow of permits, in terms of numbers of permits or in monetary values in the revised handbook on National Accounting on Integrated Environmental and Economic Accounting (SEEA) should not be too restricted by the final outcome of the update of the SNA 1993.

Outline

Section 2 describes the treatment of emission rights in the SNA 1993, SEEA 2003 and the SNA 2008. Based on the SNA 2008 section 3 argues for a more comprehensive description of the physical and monetary flows of emission rights in the revised SEEA. Section 4 summarises the points for discussion. In short, the questions raised are:

- Do you agree with the interpretation of the SNA 2008 with respect to the treatment of emission rights and its implications for the revised SEEA?
- Do you agree that the revised SEEA 2003 should be developed to include the *physical flows* of the permits as well as supplementary information highlighting the monetary flows?
- Do you agree that the permits should be included as part of the environmental taxes framework?

The annex, based on a Danish experience, gives a presentation on the type of information, which would be made available if the more comprehensive treatment is decided on.

2 Current treatment of the emission rights

2.1 Treatment in the SNA 1993 and in the SEEA 2003

Assets

The SNA 1993 does not deal with emission permits explicitly. However, emissions permits could be seen as non-financial intangible non-produced assets, as part of the leases and other transferable contracts.

The description of emission permits in the SEEA 2003 is based on the SNA 1993. Cf. the text below.

[1] During the work with this issue paper the author received comments from Statistics Sweden, the Australian Bureau of Statistics, Statistics Norway and Eurostat. The author would like to express his thanks to those who submitted comments; it highly facilitated the work with the paper.

[2] In this paper, the terms emission right, permit and allowance are used synonymously.

From SEEA 2003

Property rights

§ 6.39. The 1993 SNA introduced a new category of assets called non-financial intangible non-produced assets among which is an item called leases and other transferable contracts. The characteristic of intangible non-produced assets is that they entitle their owners to engage in specific activities or to produce certain specific goods and services and to exclude other institutional units from doing so except with the permission of the owner. These attributes are what economists refer to as property rights.

§ 6.40. The leases themselves are not produced but are legal constructs designed to permit or inhibit certain actions. They may control, for example, who may use a piece of software, who may extract a natural resource and under what conditions, or which sports club has the services of a particular player.

§ 6.41. Not all leases represent assets. For example, the tenant of a house or apartment often is party to a lease which is a document spelling out the responsibilities of the landlord and the tenant and may be used as the basis for settling any disputes between them. Usually the lease itself will not have an economic value. However, if the rental payable on the house were fixed and the lease entitled the tenant to sub-contract his tenancy, the lease would acquire a value if the rental the tenant could charge exceeded the rental he had to pay the landlord.

Emissions permits

§ 6.53. Emissions permits designate the amount of specific emissions, for example greenhouse gases, that may be generated before triggering a penalty payment. As with fishing rights, the quantity of emission permitted is often based on historical patterns. Such permits may be used simply as regulatory mechanisms but more realistically by allowing the permits to be traded, and in particular to be traded internationally, they provide an incentive for a producer to reduce his emissions so that he may realise the value of the emissions permit by selling or leasing it.

Accounting entries for tradeable permits

§ 6.54. When a tradeable permit is issued, the unit issuing the permits (almost always Government) creates the asset and records this creation in its other changes in assets account. If the permit is sold (maybe by auction or maybe at a predetermined price), then the sale and purchase are recorded in the capital accounts of the two units involved. If it is issued free, but has a positive value, determined e.g. on markets or through net present value calculations, it is still recorded in the same way as sale and purchase in the capital account, but in addition a capital transfer of the same size is made from the issuer to the new owner of the permit. This transfer exactly cancels the acquisition of the permit so the lending or borrowing position of each of the two units is unaffected.

§ 6.55. Tradeable permits may be of infinite duration or for a fixed period. The value of a tradeable permit is determined in the market but it is assumed that the value is consistent with a net present value representing the value of the permit for each of the years for which it is valid, suitably discounted. If the life length of the permits is fixed, as each year passes, the market value will decrease, reflecting the approach of the expiry date. This decrease in the value of the tradeable permit is recorded as disappearance of an intangible non-produced asset in the other changes in assets account.

§ 6.56. For as long as they are valid, permits may be traded and any actual trading is recorded as before in the capital account. The market value of permits may rise and fall in response to changing supply and demand

patterns, giving rise to holding gains and losses on the permits. These holding gains and losses are recorded in the revaluation part of the other changes in assets account.

§ 6.57. The introduction of tradeable permits aims to limit the production giving rise to environmental damage by legislative means, implemented *via* a capital market mechanism. While the existence of tradeable permits is expected to influence production behaviour, it does not show up in the production account but in other SNA accounts dealing with the acquisition of assets. Even when an annual licence is issued for the use of environmental assets, this would only feature in the production account if it were classified as a tax on production which, an indicated above, is unlikely to be the case. Instead it would be recorded as a payment of rent in the distribution of primary income account.

2.2 Treatment in the SNA 2008

Taxes

The SNA 2008 mentions emission permits explicitly and introduces the emission permits as taxes / assets, cf. the text below.

From chap. 17 in the SNA 2008

Permits issued by government

§ 17.341. When governments restrict the number of cars entitled to operate as taxis or limit the number of casinos permitted by issuing licences, they are in effect creating monopoly profits for the approved operators and recovering some of the profits as the fee. In the System these fees are recorded as taxes, specifically as other taxes on production. This principle applies to all cases where government issues licences to limit the number of units operating in a particular field where the limit is fixed arbitrarily and is not dependent only on qualifying criteria.

…

§17.354.Governments are increasingly turning to the issuing of emission permits as a means of controlling total emissions. These permits do not involve the use of a natural asset (there is no value placed on the atmosphere so it cannot be counted as an asset) and are therefore classified as taxes even though the permitted "activity" is one of creating an externality. It is inherent in the concept that the permits will be tradeable and that there will be an active market in them. The permits therefore constitute assets and should be valued at the market price for which they can be sold.

Based on the text in the SNA 2008, the permits could be treated as described below.[3]

Permits from the Government to the industries

If there is a payment greater than zero related to the transfer of the permits from the Government to the industries, this is categorised as a prepaid tax. In the industries' asset accounts, this is registered as two assets partly consisting of the prepaid tax (financial asset) and partly consisting of a non-financial asset representing the difference between the prepaid tax and the market value of the permits. The non-produced non-financial asset is created through the *other changes in volumes*. A liability equal to the two divided asset is registered in the public sector accounts.

The asset, the liability, the prepaid tax, is settled as the permits are surrendered by the companies. In connection with this the remainder of the value of the two divided asset disappears through other changes in volumes
If a company chooses to sell the permits it is both the tax asset and the non-financial asset which are sold.

[3] Work in progress: It should be emphasised that the treatment as outlined here is based on discussions within Statistics Denmark during 2008. It should therefore be seen as work in progress.

The tax event occurs when the permit is surrendered. The tax payment is only relevant for that part of the permits, which is surrendered and which originally was purchased from the Government.

Permits, which are not surrendered before they expire, are lost (both parts of the asset), which gives rise to other changes in volume.

If a CO_2 permit – which contains an element of a prepaid tax – is lost, then the loss regarding the prepaid tax is considered to be a loss of a financial asset for the owner of the asset (correspondingly a gain for the Government). In the case of a loss, the non-financial non-produced asset disappears from the asset account through other changes in volume.

In the case, where there is not related a payment to the transfer of the permits from the Government to the companies, the value of the prepaid tax is zero. With that, the value of the permits corresponds to the value of the non-produced non-financial asset.

Tax on production

The SNA 2008 could be interpreted in such a way that the tax part of the permits is treated as other taxes on production (D.29).[4]

Exports of the permits

If a CO_2 permit – which contains an element of a prepaid tax – is sold to a foreign company, then the tax part of the asset is treated as a sale of a financial asset to abroad. When the permit is surrendered by the foreign company, the tax payment is recorded in the resident country.

Imports of permits

When a CO_2 permit – which possibly contains an element of a prepaid tax – is purchased by a resident unit from abroad, then the value of the permits is divided into two assets; 1) the prepaid tax and 2) a non-financial non-produces asset. The split of the permit is expected to be carried out based on a matter of judgment.

3 Treatment in the revised SEEA

SEEA-2003 and SNA 2008

In the SEEA 2003 and the SNA 2008, the permits are seen as economic assets and assets / tax payments respectively and as a result of that the link to the physical aspects, the use of energy and the associated air emissions are not mentioned, i.e. only the monetary flow is dealt with.

Physical flows should be accentuated

Therefore, the current description in the SEEA 2003 on how permits, e.g. CO_2 permits should be dealt with should be developed further. The description in the revised SEEA should not be limited to the guidelines in the SNA 2008. The revised SEEA should cover other aspects and other dimensions of the market for CO_2 permits than just the flows as described in the SNA 2008.

The description of the flow of CO_2 permits within the SEEA framework would make it possible to analyse the relationship between CO_2 permits and other environmental domains, e.g. the use of energy and air emissions, whereas the link to the national accounts enables analyses of the relationship between the economic activity and the CO_2 permits, e.g. output, gross value added, employment etc.

The description of the physical flow of permits is also crucial in order to understand the relationship between CO_2 emissions caused by a country's economic activities and the way the country comply with emission reduction targets obliged to, e.g. the Kyoto-protocol.

[4] Because of the close relationship between the use of energy, the CO_2 emissions and the need for permits it could seem obvious to threat the permits as a products tax. However, emissions can also originate from processes, which are not related to the use of energy.

Bridge tables has already been developed in order to understand the link between emissions caused by the use of energy on the territory (Kyoto) and the emissions caused by the total economic activities (environmental accounts). However, to understand the difference between the emissions reported to the Kyoto and the emission level obliged to, it is important to include the permits to explain the possible gap between the emission target and the actual emissions.

Supplementary information on monetary flows

As already mentioned and compared to the SEEA 2003, the description of the emission permits in the SNA 2008 entails that the CO_2 permits should be recorded as a tax if the permit is bought from the Government, whereas it should be recorded as a transfer of an asset if it is given to the industries for free or traded between other agents.

This way of treating the permits might not be the best way in order to understand how the permits affect the economy. Furthermore, it does not facilitate modelling of the permit market either. Therefore, it could be an idea if the revised SEEA would also offer an additional way of describing the monetary flows related to the permits showing supplementary information highlighting the flows. Cf. the Annex.

Permits and environmental taxes

Another reason for highlighting the physical flows and the monetary flows directly related to them is that tradeable emission rights have become more and more important as one of the means used for monitoring of the CO_2 emissions, i.e. a means for regulation analogous to environmental taxes.

Therefore, as a consequence of the shift from taxes to permits it is very important to account for the total costs related to the surrendered permits as well, i.e. not only the permits classified as taxes in the SNA 2008 framework. From a policy perspective, it would be very useful to be able to identify and to analyse the regulation of the industries based on permits and environmental taxes as a whole. This entails that all costs for permits, which are surrendered should be seen as a tax or at least be thought of as a part of the environmental taxes framework.

3.1 Physical flows of the CO_2 permits

All types of permits should be included in the accounts

It is important to emphasize, that in order to get the full picture all types of permits that might exist should be included in the accounts. For instance, in Europe one type of permit is the permits issued by the Governments in the member states of the European Union (EU) that can be traded and used in all EU countries (EU permit). But other types of permits also exist. For instance permits / credits acquired from using what is referred to as the flexible mechanisms, i.e. by taking part in the following types of projects:

CDM (*Clean Development Mechanism*) – projects. This involves a company taking part as a (co)financier of a project with a partner in a developing country. The CO_2 reduction that the project implies is credited the (co)financier and the company thereby gets a larger number of permits at its disposal.

JI (*Joint Implementation*) – projects. Similar to CDM projects, but where the partner is in a country, which is also obligated to reduce CO_2 emissions according to the Kyoto Protocol. It is only possible to take part in this type of arrangement from 2008.

CDM and JI projects have to be approved by the United Nations (UN) before they can be put into action. From 2008 a ceiling will be placed on how large a part of a production unit's CO_2 reduction can be paid for using CDM and JI credits. The credits from the CDM and JI projects can also be traded.

The CO_2 permit registry

The most important source, to the description of flows of the CO_2 permits in the EU is the CO_2 emission permit registries, which can be thought of as an internet bank in which, the deals that take place are registered. In Denmark, the register is administered by the Ministry of Climate and Energy.

Object of the register

The object of the register is not to effect contact between buyer and seller. Neither does the price appear from the register. The deal is registered in the form of a transfer from the seller's account to the buyer's account.

The information in the allowance register creates an opportunity for compiling a large amount of statistics, which are relevant for the environmental accounts as well as the national accounts.

Method

The data obtained from the CO_2 allowance register is at micro level. Therefore, the task is to allocate the information in the emission registry to the national accounts industry classification, which is also the basis for the environmental accounts.

More details

For a more comprehensive description of the emission permits registry and the methods used, in order to relate the data to the national accounts industry classification, please see Statistics Denmark (2006).

3.1.1 What information to be gained?

New information in the Environmental Accounts

When the data on the permits has been related to the national accounts industry classification, it is possible to imagine a number of statistics and analysis on the permits. Some of the possibilities are mentioned below.

Depending on the level to which environmental accounts already exist in a country, it would be relevant to juxtapose information on the industries' use of energy, the associated air emissions, and the industries' payment of energy taxes and in addition to this, a series of information on the CO_2 permits.

Policy relevant

For politicians and other decision-makers, information on the CO_2 permits is very policy relevant. If described within the Environmental-Economic Accounting framework, the CO_2 emission permits accounts would be able to answer the following questions:

Questions that could be answered

- What are the origins of the permits?
    a. Are they issued by the Government?
    b. Are they purchased from abroad by the industries? Or by the Government?
    c. Or did the permits enter the economy as a consequence of the use of the flexible mechanisms (joint implementation or clean development mechanism)?

- From where have the industries received the permits?
    a. Are they received from the Government for free (grandfathering)?
    b. Are they bought, maybe at an auction, from the Government?
    c. Are they bought from a foreign company?

- Who owns / holds the permits?
    a. Is it the energy companies or manufacturing industries that need to have permits in order to undertake their activities?
    b. Is it investment banks which are only interested in the permits from an arbitrage perspective?

c. Or is it the non-governmental organizations (NGO's) or is it the private households?

– Who is actually trading with the permits?
  a. What is the trade in volumes?
  b. What is the value of the trade?
  c. What is traded internally between the industries (not only the industries included in the allowance system)?
  d. What are the imports and the exports of the permits?

– What is the relationship between the use of energy and the CO_2 emissions?
  a. What is it for the total industries?
  b. What is it for that part, which is included in the emission trading scheme?

– What is the relationship between the emissions of CO_2 and the emission permits?
  a. What is the relationship between the industries' total CO_2 emissions and that part of the industries CO_2 emission, which is included in the emission trading scheme?
  b. Have the industries acquired a sufficient number of permits compared to their CO_2 emissions?
  c. If not, how big fines have had to be paid (from 2008, 100 Euro/ton).

– What is the relationship between the CO_2 permits and other taxes / subsidies?
  a. The cost for CO_2 permits in relation to the environmental related taxes.
  b. The value of the permits received for free in relation to other environmental related subsidies.

4 Questions / points for discussion

– Do you agree with the interpretation of the text in the SNA 2008 with respect to the treatment of emission rights, i.e. treatment as taxes / assets and its implications for the revised SEEA? (section 2.2)

– Do you agree that the revised 2003-SEEA should be developed to include the *physical flows* of the permits as well? (section 3.1 and the annex section 6.1)

– Do you agree that the revised SEEA in addition to the description as taxes / assets also should offer supplementary information highlighting the monetary flows related to the permits based on the physical flows? (section 3 and the annex section 6.2)

– Do you agree that the total costs related to the surrendering of the permits should be included as part of the environmental taxes framework? (section 3).
If yes, should it be categorised as:
  a. An energy tax?
  b. Or a pollution tax?

5 Relevant documents

Statististics Denmark: Integrated Environmental and Economic Accounts for Tradeable Carbon Dioxide Emission Permits – Denmark 2005 (2006).

Olsen, Thomas: Integrated Environmental and Economic Accounts for Tradeable Carbon Dioxide Emission Permits. Paper prepared for the Conference on Climate Change and Official Statistics, Oslo, 14-16 April 2008.

Tietenberg, T. H.: Transferable Discharge Permits and Global Warming from the Handbook of Environmental Economics edited by Daniel W. Bromley. PP. 317 – 352. Blackwell Publishers (1995).

United Nations et al.: Handbook of National Accounting – Integrated Environmental and Economic Accounting. ST/ESA/STAT/SER.F/Rev.1 (final draft). (2003).

United Nations et al.: System of National Accounts (1993).

United Nations et al.: Chapter 17 in the Pre-edited white-cover version of Volume 1 of the 2008 System of National Accounts (2008).

6 Annex: Results from a Danish experience

Results from the Danish experience

Below, some of the results from a Danish experience are shown. See also Statistics Denmark (2006).

Danish experience only covers a subset of the emission trading scheme

The study is only on a subset of the emission trading scheme and described in the tables 1 to 7. It is only that part of the emission trading scheme, in which it is mandatory to be part of, which is covered in the tables. This is due to the fact that it was not possible to gain full access to the Danish emission registry.

However, this does not mean that in the future it would not be possible to complete the tables. Where information is missing this is indicated by a *NA*.

Therefore, the tables should not be seen as a comprehensive description of the Danish carbon market, but more as what is possible and as an introduction to the possibilities.

6.1 Physical flows of the CO_2 permits

Initial allocation

Table 1 shows the initial allocation of the allowances. It is only the industries *Agriculture, fishing and quarrying*, *Manufacturing* and *Electricity, gas and water supply* which are affected by the emission trading scheme. The allowances are valid from 2005 to 2007. The companies can choose for themselves in which year they want to use the allowance. However, the allowances cannot be surrendered after 2007.

Table 1 **Initial allocation of the tradeable permits**

Industries	2005	2006	2007
	1 000 allowances / 1 000 tonnes CO_2		
Total	**40 046**	**30 679**	**30 590**
Permits to be sold by the Government	1 675	1 675	1 675
Permits for new entrants and new activities	1 000	1 000	1 000
Total industries	**37 371**	**28 004**	**27 915**
1 Agriculture, fishing and quarrying	3 056	2 292	2 292
2 Manufacturing	7 525	5 601	5 601
3 Electricity, gas and water supply	26 790	20 111	20 022
4 Construction	0	0	0
5 Wholesale and retail trade; hotels, restaura.	0	0	0
6 Transport, storage and communication	0	0	0
7 Financial intermediation, business activities	0	0	0
8 Public and personal services	0	0	0

Table 2 shows the number of permits grandfathered to the industries and the (verified) emissions actually caused by the industries being part of the emissions trading scheme. The table shows that the companies had to surrender fewer allowances than were actually provided for them in 2005. This implies that it is possible for the companies, because they have a surplus of allowances, either to increase their emissions in 2006 and 2007 or to sell that surplus on the allowance market.

Table 2 **Grandfathered permits, verified emissions and surrendered permits 2005**

	Industries	Grandfathered permits	Verified emissions	Surrendered permits
		1 000 allowances / 1 000 tonnes CO_2		
	Total	**37 371**	**26 476**	**26 471**
	Households	0	0	**0**
	Total industries	**37 371**	**26 476**	**26 471**
1	Agriculture, fishing and quarrying	3 056	2 328	2 328
2	Manufacturing	7 525	5 452	5 438
3	Electricity, gas and water supply	26 790	18 696	18 704
4	Construction	0	0	0
5	Wholesale and retail trade; hotels, restaura.	0	0	0
6	Transport, storage and communication	0	0	0
7	Financial intermediation, business activities	0	0	0
8	Public and personal services	0	0	0

Verified emissions

Table 3 shows the verified emissions compared to the total emissions accounted for in the Danish air emissions accounts. The total emission is exclusive of the Danish operated ships and aeroplanes bunkering abroad. The emissions relevant for the emissions trading scheme account for 58 pct. of the industries CO_2 emissions and for 46 pct. of the total emissions, including the households.

Table 3 **Verified emissions and total emissions 2005**

	Industries	Verified emissions	Total emissions
		1 000 tonnes CO_2	
	Total	**26 476**	**57 911**
	Households	0	11 941
	Total industries	**26 476**	**45 970**
1	Agriculture, fishing and quarrying	2 328	4 723
2	Manufacturing	5 452	6 530
3	Electricity, gas and water supply	18 696	25 059
4	Construction	0	1 297
5	Wholesale and retail trade; hotels, restaura.	0	1 345
6	Transport, storage and communication	0	5 203
7	Financial intermediation, business activities	0	529
8	Public and personal services	0	1 284

Even though, there was generally a surplus of allowances in 2005, a few companies did not manage to surrender the correct amount of allowances. These companies had to pay a fine as a consequence of that. The fine amounts to 40 € / ton in 2005, so the total fine paid by the companies amounted to 0.56 mill. euro.

This amount of allowances, which is not surrendered, is referred to as the amount of under-surrendered permits.

Table 4 **Under-surrendered permits and payment of fines 2005**

	Industries	Under surrendered permits	Fine
		1 000 allowances	€
	Total	**- 14**	**563 480**
	Households	0	0
	Total industries	**- 14**	**563 480**
1	Agriculture, fishing and quarrying	0	0
2	Manufacturing	- 14	563 480
3	Electricity, gas and water supply	0	0
4	Construction	0	0
5	Wholesale and retail trade; hotels, restaura.	0	0
6	Transport, storage and communication	0	0
7	Financial intermediation, business activities	0	0
8	Public and personal services	0	0

Until now, the tables have only showed information on that part of the emissions trading scheme of which the companies are legally obliged to be part. However, in order to account for the entire CO_2 allowance market table 5 has been established.

As already mentioned, because of all the problems connected with gaining access to the most detailed information in the CO_2 allowance register, it is not possible to fill out table 5 completely. Therefore, where data has not been available, the cells in the table are marked with a *NA*.

Balance sheet

The places of production are allocated an average number of permits every year, so it is necessary to establish a sort of balance sheet for every industry, in order to show: the stock at the beginning of the year; the supply in the form of allocated and purchased permits, and credits from JI and CDM projects; the amount of used permits, including those that may have to be given back because of fines in the previous period; and finally the stock at the end of the year. The closing stock provides the opening stock for the year YYYY+1. Thus, table 5 takes into account all transactions with CO_2 allowances.

The number of allocated permits in column (2) equals the amount of the allocated permits. Cf. table 1.

If information had been available on the trade with allowances, the industries' purchase of allowances would have been registered in column (3), whereas the amount of allowances sold should be registered in column (6). Allowances originating from CDM and JI projects should be registered in the columns (4) and (5).

Table 5 **Balance sheet 2005**

Industries	Opening stock	Grand-fathered	Purchased	CDM credits	JI credits	Sold	Surrendered allowances	Surrendered (fines, etc)	Closing stock
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(=1+...+5-6-7-8)
	1 000 allowances / 1 000 tonnes CO_2								
Total	**0**	**37 371**	**NA**	**NA**	**NA**	**NA**	**26 471**	**0**	**10 901**
Households	0	0	NA	NA	NA	NA	0	0	0
Total industries	**0**	**37 371**	**NA**	**NA**	**NA**	**NA**	**26 471**	**0**	**10 901**
1 Agriculture, fishing and quarrying	0	3 056	NA	NA	NA	NA	2 328	0	728
2 Manufacturing	0	7 525	NA	NA	NA	NA	5 438	0	2 087
3 Electricity, gas and water supply	0	26 790	NA	NA	NA	NA	18 704	0	8 086
4 Construction	0	0	NA	NA	NA	NA	0	0	0
5 Wholesale and retail trade; hotels, rest.	0	0	NA	NA	NA	NA	0	0	0
6 Transport, storage and communication	0	0	NA	NA	NA	NA	0	0	0
7 Financial intermediation, business active.	0	0	NA	NA	NA	NA	0	0	0
8 Public and personal services	0	0	NA	NA	NA	NA	0	0	0

The number of surrendered allowances in column (7) should equal the verified emissions. Cf. table 2.

If the production unit emissions exceeds the number of permits surrendered then, as already mentioned and besides the fine, the number of permits with which the production unit has exceeded their allowance is deleted from their allowance in the following period. This is accounted for in column (8). See also table 4.

Table 6 **Balance sheet 2006**

Industries	Opening stock	Grand-fathered	Purchased	CDM credits	JI credits	Sold	Surrendered allowances	Surrendered (fines, etc)	Closing stock
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(=1+...+5-6-7-8)
	1 000 allowances / 1 000 tonnes CO_2								
Total	**10 901**	**28 004**	**NA**	**NA**	**NA**	**NA**		**0**	
Households	0	0	NA	NA	NA	NA		0	
Total industries	**10 901**	**28 004**	**NA**	**NA**	**NA**	**NA**		**0**	
1 Agriculture, fishing and quarrying	728	2 292	NA	NA	NA	NA		0	
2 Manufacturing	2 087	5 601	NA	NA	NA	NA		14	
3 Electricity, gas and water supply	8 086	20 111	NA	NA	NA	NA		0	
4 Construction	0	0	NA	NA	NA	NA		0	
5 Wholesale and retail trade; hotels, rest.	0	0	NA	NA	NA	NA		0	
6 Transport, storage and communication	0	0	NA	NA	NA	NA		0	
7 Financial intermediation, business active.	0	0	NA	NA	NA	NA		0	
8 Public and personal services	0	0	NA	NA	NA	NA		0	

The closing stock in 2005 equals the opening stock in 2006. However, it is important to remember that banking is not possible between the two periods 2005 – 2007 and 2008 – 2012. Therefore, the opening stock in 2008 is going to be zero. Hence, it is very important to be aware of the rules in relation to banking between the different periods.

Trade, imports and exports

Tables on the domestic trade and the external trade could also be a part of the system. However, due to the fact that it was not possible to gain access to the CO_2 allowance register, it was not possible to provide any information in the Danish experience on the trade or the foreign trade with the CO_2 allowances. It is also important to be aware that the imports and the exports of allowances also have implications for the balance of payments.

Table 7 **Purchase / sale and imports / exports of the permits 2005**

	Industries	Purchase of permits (or Sale of permits)	Of which imports (or Of which exports)
		1 000 allowances / 1 000 tonnes CO_2	
	Total	**NA**	**NA**
	Households	NA	NA
	Total industries	**NA**	**NA**
1	Agriculture, fishing and quarrying	NA	NA
2	Manufacturing	NA	NA
3	Electricity, gas and water supply	NA	NA
4	Construction	NA	NA
5	Wholesale and retail trade; hotels, restaura.	NA	NA
6	Transport, storage and communication	NA	NA
7	Financial intermediation, business activities	NA	NA
8	Public and personal services	NA	NA

6.2 Monetary flows of the CO_2 permits

The underlying idea of the monetary flows of the allowances is first of all to get an idea of the size of the CO_2 market and the agents who act on this market. Secondly, the monetary account is expected to provide the basis for actually implementing the economic flows associated with the European emissions trading scheme and the global CO_2 market in the national accounts.

All allowances have an economic value

A large proportion of the allowances are, as already mentioned, given for free to the companies being part of the emissions trading scheme. However, because the allowances represent an economic value for the companies we put a value on the allowances.

Allowances sold by the Government either by auction or directly have clearly an economic value.

Agents on the carbon market

A number of traditional energy companies have established units that mediate and trade CO_2 permits. Their approach is not only to use the CO_2 permits themselves, but rather to make money on the permits through arbitrage. They also have a function as traders and they act on the global market.

In the same way, financial companies also act on the allowance market. A look at the list of members, which are part of the Nordic Power Exchange (Nordpool) market for CO_2 allowances, show that the list contains energy companies as well as financial institutions.

Size of the carbon market

The carbon market has grown dramatically over the last few years. The increase from 2006 to 2007 was 64 pct. so that the global CO_2 permit market had a total value of c € 40 bn. (Danish newspaper Borsen, 19 March 2008). For 2008, the expectation is that the value of the global market could reach c € 60 bn. (Danish newspaper Information, 12 March 2008).

The European market constitutes approximately two thirds of the global market.

Observed prices In connection to the establishment of the European allowance market, a number of CO_2 trading market places[5], which buyers and sellers can use, have been established.

Valuation The valuation of the CO_2 permits is based on the physical CO_2 permits accounts as well as observed prices.

Overall method The overall method for establishing the monetary account is to multiply the amount of allowances by the observed market price for the allowances.

Unfortunately, we do not have information on the extent to which the companies make use of financial instruments, such as price contracts in order to provide against a rise in the future allowance price. Therefore, the monetary CO_2 permits accounts as shown below are valued at the average spot price.

Results The value of the allowances valued at the average spot market price in 2005 appears from table 8. Based on the average spot market price in 2005[6], which was c € 17, the value of the permits allocated to the Danish industries is c € 0.64 bn.

[5] See for instance:
www.cantorco2e.com
www.europeanclimateexchange.com
www.eex.de
www.exaa.at
www.nordpool.com
www.powernext.fr
www.pointcarbon.com

[6] In 2005, the lowest price was observed in January at c € 7 whereas it peaked in July at c € 30.

Table 8 Balance sheet 2005

National Accounts Industries	Opening stock	Grand-fathered	Purchased	CDM credits	JI credits	Sold	Surrendered allowances	Surrendered (fines, etc)	Closing stock
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(=1+...+5-6-7-8)
	Mill. €								
Total	**0**	**636**	**NA**	**NA**	**NA**	**NA**	**451**	**0**	**186**
Households	0	0	NA	NA	NA	NA	0	0	0
Total industries	**0**	**636**	**NA**	**NA**	**NA**	**NA**	**451**	**0**	**186**
1 Agriculture, fishing and quarrying	0	52	NA	NA	NA	NA	40	0	12
2 Manufacturing	0	128	NA	NA	NA	NA	93	0	36
3 Electricity, gas and water supply	0	456	NA	NA	NA	NA	318	0	138
4 Construction	0	0	NA	NA	NA	NA	0	0	0
5 Wholesale and retail trade; hotels, rest.	0	0	NA	NA	NA	NA	0	0	0
6 Transport, storage and communication	0	0	NA	NA	NA	NA	0	0	0
7 Financial intermediation, business active.	0	0	NA	NA	NA	NA	0	0	0
8 Public and personal services	0	0	NA	NA	NA	NA	0	0	0

Allowances sold by the Government

In addition to the value shown in the table above comes the value of the allowances which it is possible for the Government to sell. Cf. table 1. Based on the same average price the value of this amount of allowances is c € 29 mill.

Revaluation

The balance sheet on the value of the permits should also contain a column, which accounts for the changes in the total value of the permits caused by the rise or fall in the permit price. This column showing the revaluation could be added to the table as a ninth column.