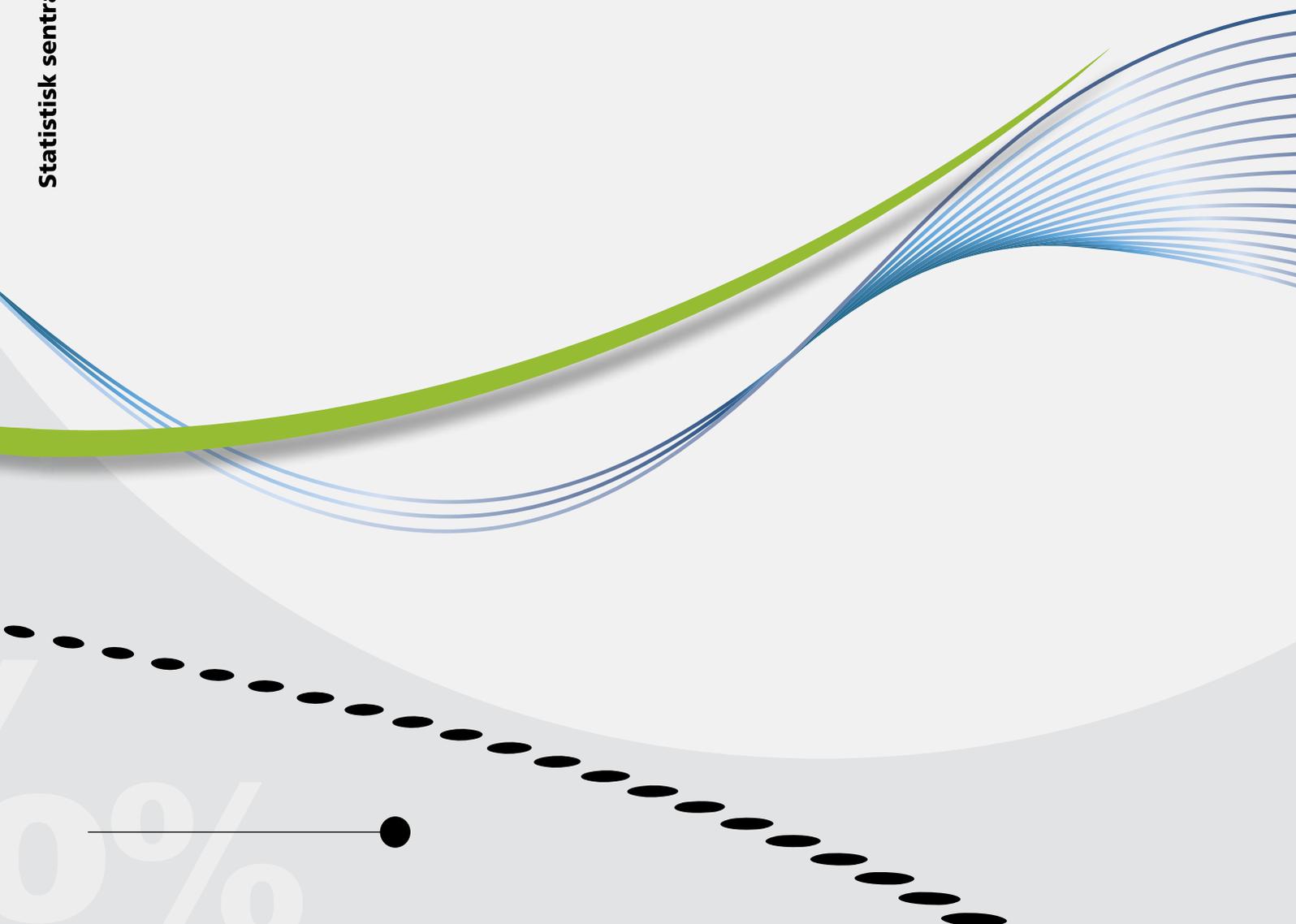
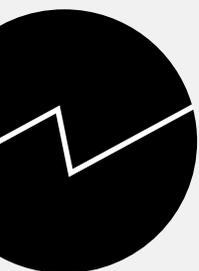


Kristine E. Kolshus and Trine H. Braathu

How to integrate emission permits into the environmental related tax statistics

Theory and practice. Test calculations for
Norway, 2008-2012



Kristine E. Kolshus and Trine H. Braathu

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Preface

The regulation (EU) No 691/2011 on European environmental economic accounts establishes a common framework for the collection, compilation and transmission of data on environmental accounts. The regulation covers several types of environmental accounts that are to be reported to EU. Norway adopted the regulation as Norwegian law in 2013.

This report presents the results from a project studying how to integrate emission permits into the environmental related tax statistics.

The project was initiated by a grant proposal from Statistics Norway under the leadership of Ms. Kristine E. Kolshus, in cooperation with the head of the division for energy and environmental statistics, Ms. Tonje Kjøber.

Contributors to the project have been Ms. Trine H. Braathu and Mr. Håkon Karlsen, both at the Division for Energy and environmental statistics, as well as Mr. Frode Borgås and Mr. Pål Martin Vinghøg, both at the Division for Public finances which are compiling the input data on taxes to be used in the national accounts. The Division for National Accounts participated in discussions at the start of the project.

Editors of this report have been Ms. Kristine E. Kolshus and Ms. Trine H. Braathu, both at the Division for Energy and environmental statistics.

Statistics Norway would like to thank Eurostat for supporting this project on emission permits by the contribution of a grant.

Statistisk sentralbyrå, 16 December 2013

Hans Henrik Scheel

Abstract

This document presents the results from the project “Preparing the Norwegian Environmental Economic Accounts for future reporting requirements – Part A. Sub-Action A.3: Greenhouse gas emission permits – treatment as tax and reporting to Eurostat under the legal base module for taxes by industry and households (Eurostat grant agreement no. 50904.2011.005-2011.300).

The objectives have been to clarify the meaning of the decision by ISGWNA (Inter-Secretariat Working Group on National Accounts) saying that part of the greenhouse gas emission permits are to be treated as taxes – and hence will be a part of the reporting to Eurostat under the legal base module for environmental related taxes by industries and households.

This document presents the international agreed theory and recent guidelines for this area.

The main conclusions from the project are the following:

- Only those emission permits sold by the government to domestic enterprises are to be reported as taxes.
- The Norwegian government is selling emission permits in an international market. It is therefore not straight forward to identify the emission permits bought by Norwegian enterprises and then to define those emission permits defined as a tax.
- The main data sources for estimating the tax revenue from emission permits treated as taxes are the central government budget and accounts, the unit registry and price information from the international stock exchanges. Which source to use when estimating the tax revenue depends on what method is used. The project has covered the following three methods for estimating the tax revenue:
 1. Government’s income from their total sale of emission permits
 2. Estimated average “tax value” using total surrendered (or issued) permits valued by an average auction price as presented in the MGDD and by the OECD.
 3. Enterprises’ costs/payments related to purchases of emission permits.
- Problems still remain with regards to which method to implement in the national account
- Further work is needed to develop methods for dividing the tax revenue by industries and to find more information on the share of permits bought in the market, to what prices and if possible by whom.

The years that have been examined are 2008 to 2012. This is in order to update the module on “environmental related taxes” that are to be completed for the first reporting of environmental related taxes in 2013 as part of the new regulation (EU) No 691/2011 on European environmental economic accounts.

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1. Introduction

1.1. Background

Norway is linked to the EU Emissions Trading Scheme – ETS, meaning that some Norwegian enterprises since 2008 have been obliged annually to surrender emission permits to the Norwegian government emission permit register. The surrendered emission permits have either been bought in the market or received for free from the Norwegian government.

How these transactions with emission permits are to be treated in official economic statistics in general and in the environmental related tax statistics in particular have been the object to huge discussions. With the recent finalization of the revised guidelines for how to compile national accounts (SNA2008 and ESA2010), government deficit and debt (MGDD, 2013) and the central framework for the System for Economic Environmental Accounts (SEEA CF, 2012) it is finally agreed upon a theoretical basis for how these transactions with emission permits are to be dealt with.

The guidelines state that the payments by enterprises for the emission permits surrendered to the government permit register as part of an ETS are to be recorded as an environmentally related tax – if these emission permits originally have been sold by the government (MGDD, 2013 and OECD, 2012).

However, it is not straight forward to understand the basic theory on how to treat the transactions of emission permits in monetary terms in economic statistics or to understand how this is to be done in practice.

Guidelines and examples on how to deal with these issues have fortunately started to appear, among others from Eurostat (MGDD, 2013) and the OECD (OECD, 2012) which makes it possible to start testcalculations in order to meet these new requirements according to the SNA2008.

1.2. Objective and deliverables

In this project, the objectives have been to:

- a) Review latest manuals and guidance's for the recording of emission permits to be defined as taxes in economic statistics.
- b) Understand which emission permits that are to be defined as taxes
- c) Discover whether the changes in SNA2008 regarding emission permits will affect the recording of environmental related taxes according to EU regulation 691/2011.
- d) Identify sources for possible recording of tax revenues from emission permits.
- e) Improve the routines for compilation of environmental related taxes to also include emission permits that are to be defined as taxes.

Expected results and deliverables:

- a) A report summarising the theoretical basis and practical guidelines explaining the treatment of emission permits in environmental related tax statistics and the results from some first trial calculations are presented.
- b) Updating the module on environmental related taxes in order to include new information about emission permits that are to be treated as taxes.

1.3. Structure of the report

This report starts with an introduction to the existing guidelines on how to treat emission permits in economic statistics. The focus is on the compilation of revenues from those emission permits issued under an ETS and that are to be defined as a tax (chapter 2). Then focus is given to the trading with emission permits in Norway in order to identify if there are any flows of emission permits that are to be treated as taxes in Norway, any if so which flows (chapter 3). Possible sources to use in the estimation of tax revenues from emission permits treated as taxes are then discussed (chapter 4). A presentation and discussion related to different possibilities to estimate the tax revenue is given (chapter 5). Conclusions, summing up main findings and further issues to be investigated upon are presented in the final chapter (chapter 6).

2. Guidelines for recording of emission permits under EU-ETS

The recording of the monetary flows related to emission permits issued under the ETS is found in several statistical manuals. The statistical guidelines most relevant for the treatment of emission permits in official economic statistics are the:

- System of National Accounts (SNA 2008) incl. SNA News and Notes No 30/31 and 32/33
- European System for National Accounts (ESA 2010)
- System for Environmental Economic Accounts (SEEA, 2012)
- OECD Revenue Statistics 2012 Edition – Special Feature S.2 Classification of tradable emission permits (OECD, 2012)
- Eurostat Manual for Government Deficit and Debt (MGDD, 2013)
- Eurostat guidelines for environmental related taxes (currently revising the 2001-version)

In order to find a solution on how to treat the emission permits surrendered under EU-ETS in Norway, it is particular the guidelines in the Manual for Government Deficit and Debt (MGDD, 2013) and the examples given in the special feature of the OECD Revenue Statistics (OECD, 2012) that have proved to be useful.

A brief summary of the history behind today's guidelines is given in chapter 2.1 before in chapter 2.2 some of the most relevant paragraphs from the Manual for Government Deficit and Debt (MGDD, 2013) and the OECD tax revenue will be analyzed and commented on in relation to possible treatment in Norwegian economic statistics. In chapter 2.3 a numeric example from OECD is presented and in chapter 2.4 a short discussion of the unclear aspects in the guidelines are given.

2.1. A brief summary of the history behind today's guidelines

Prior to 2008, there was no specific guidance in neither the SNA, ESA or in the SEEA on how to treat emission permits in the national accounts nor in environmental accounts.

With the huge volume of emission permits issued and traded internationally, and the increasing number of auctions of emission permits, there was a need for clarity on the statistical recording of such permits.

With the revised System of National Accounts in 2008 (SNA2008) emission permits are better covered than in the previous guidelines. SNA2008 however, only stated that the emission permits issued by the government are to be classified as a tax and should be valued at the market price for which they can be sold (§17.363). It did not address the recording of tradable emission permits. It was recognized that further guidance was needed.

In 2009 an OECD/Eurostat task force on emission permits was established in order to develop guidelines for recording the flows of emission permits issued under ETS based on the recommendations in SNA2008. The task force did not manage to decide upon one single solution on how to interpret the guidelines in SNA2008¹.

The ISWGNA (the Inter-secretariat Working Group on National Accounts) therefore published, in 2011, a note (SNA News and Note, Number 30/31,

¹The report of the task force is available at the OECD website at: <http://www.oecd.org/dataoecd/11/49/46424606.pdf>

February 2011²) clarifying how to record the payments for emission permits issued under ETS. However, UNSC concluded that these clarifications still represented an issue of interpretation and the ISWGNA was requested to consult the Advisory Expert Group on national accounts (AEG). After this consultation the ISWGNA published another note (SNA News and Note, Number 32/33, March 2012) concluding upon the now standing SNA recommendations for how to treat emission permits in an ETS.

The SNA News and Notes (Number 32/33) specified that the payments for the tradable emission permits *issued by the government under an ETS should be recorded as taxes on an accrual basis at the time the emissions occur, specifically other taxes on production (D29)*.

This SNA News and Notes was then the starting point for the guidelines decided upon in the revised Eurostat Manual on Government Deficit and Debt (MGDD, 2013, ch. VI.6) related to the treatment of emission permits in the Government expenditure and input statistics.

Since (parts of) the flows of emission permits granted under an ETS are to be treated as a tax, the treatment of emission permits are also an issue of discussion as part of the recording of emission related taxes as part of the EU regulation 691/2011 on environmental accounts.

The SEEA central framework summarizes conclusions from the SNA News and Notes (§§4.182 – 4.186) and states that the taxes paid for tradable emission permits are to be treated as environmental taxes and categorized as energy taxes when the permits relate to emissions of carbon dioxide (§4.187). It also states that, where possible, these taxes should be separately identified within energy taxes.

At time present it is particular the MGDD 2013 that, based on the SNA News and Notes, gives the most practical guidelines on how to treat emission permits under an ETS. Also OECD has, as part of the OECD Revenue Statistics, issued practical guidelines and examples on how to record the amount of tax revenue from emission permits surrendered as part of the EU ETS (OECD, 2012). These guidelines are in line with the MGDD 2013.

2.2. The OECD and Eurostat practical guidelines

Eurostat, through its 2013 publication of the revised Manual for Government Deficit and Debt (MGDD, 2013) and OECD, through its special features in its 2012 Revenue Statistics Publication (OECD, 2012), have presented some practical guidance related to estimation of the part of the emission permits that are to be defined as taxes.

Chapter VI in the MGDD2013 specifically deals with the treatment of emission permits in the national accounts, of which section

- VI.6.1 §§ 1-6 deal with the background to the issue of emission trading permits,
- VI.6.2 §§ 7-13 deal with the treatment in the national accounts,
- VI.6.3 §§14 – 25 deal with the rationale of the treatment with respect to the recording for emission permits under cap and trade schemes as described in the SNA News and Notes and

²<http://unstats.un.org/unsd/nationalaccount/sna/nn30-31-en.pdf>

- VI.6.4 shows two different accounting practices for hence the impact of auctioned emission permits and of the governments' sale of AAU.

In OECD Revenue Statistics (OECD, 2012), a special feature was included in order to guide on the treatment of emission permits in the national accounts. First, it summarizes the main recommendations and then a numeric example is given. The numeric example is presented (reprinted) in chapter 2.3.

It is particular sections 6.2 and 6.3 in the MGDD that have been looked into in detail, as well as the numerical examples given in the OECD tax revenue report. These two guidance's have been used in order to answer the following questions (chapter 2.2.1-2.2.4).

2.2.1. Which emission permits are to be treated as a tax?

The guidelines states:

*The starting principle for the worldwide agreement was that **payments for emission permits issued by government under cap and trade schemes should be recorded as taxes recorded at the time that the emission took place. More specifically it is considered that such payments should be recorded as other taxes on production (§§16-17, MGDD, 2013).***

Comments:

- When identifying what permits to be defined as a tax, the first to check is whether the government issues emission permits as part of the EU-ETS and if some of these are sold in the market. If yes, then tax revenues are to be recorded.
- The guidance is not clear whether the focus for the estimation of these taxes are the payments the enterprises have undertaken when purchasing the emission permits they need from the government or if it is the income that the government have had related to sale of emission permits. In a closed economy over a given period, these two different approaches are the same. It will therefore not matter which of the two approaches to use. However, in the EU ETS trade between countries is the purpose of this system, and further clarification regarding starting point for the tax revenue estimations would have been preferable.

2.2.2. When is the time of recording?

The guidelines states:

The detailed treatment, as described in the SNA News and Notes, is as follows:

*The payments for emission permits, issued by governments under cap and trade schemes, should be **recorded at the time the emissions occur as taxes**, specifically other taxes on production (D29), **on an accrual basis**. The timing difference between the payments received by government for the permits and the time the emission occurs gives rise to a financial liability (accounts payable) for government and a financial asset (accounts receivable) for the holder. The difference between the pre-paid tax value of the permit and the market value of the permit represents a marketable contract (non-produced non-financial asset) for the holder. The creation and disappearance of the non-produced non-financial asset are recorded as another change in volume of assets (§17, MGDD, 2013).*

*Whilst the time of recording to be applied to the tax revenue – respecting the accrual principle – should be when the economic activity generating the pollution takes place, **the worldwide agreement allows for a simplification**, which prevents the potential complications associated of revenue flows when there is a delay between time of pollution and time of surrender:*

In practice, however, it can be assumed, for simplicity, that the time the permit is surrendered is the same as the time that emissions occur, as long as there is no significant lag between the two events and the lag is constant. (§18, MGDD, 2013). *Within the EU Emission Trading System, permits are surrendered within around four months of the end of the year to which they relate, and therefore the time lag is relatively short. At the same time - in the absence of a ground-breaking pollution reduction technology - the difference between emissions in one year and the next may not be so significant, and therefore surrendered permits in any year could potentially be taken as a reasonable proxy for emissions in that year. For the purposes of harmonized recording across countries, this Manual therefore proposes to use the surrender date time of recording* (§19, MGDD, 2013).

Comments:

- The simplified recommendations state that the tax revenue is to be recorded at the time emission permits are surrendered.
- This recommendations means that the payments for emission permits issued by government in year t are to be recorded as tax revenues in year t+1.
- Within the EU Emission Trading System emission permits are surrendered in April. These surrendered emission permits are related to the previous year's emissions. This means that the recorded tax revenues in year t+1 are related to emissions in year t.
- This approach might be applicable for **total** emissions in physical units given that the difference between one year and the next is insignificant. However, differences between emissions in one year and the next might be significant at industry level, which is relevant for the environmental related tax statistics. With the significant annual changes in prices on emission permits, the tax revenue from emission permits might differ significantly from one year to another also for the totals.

2.2.3. What to do with cross-border flows?

The guidelines states:

There are in principle no cross-border flows to be recorded for taxes on production in relation to emission permits³. It is also consistent with the principle described in section II.2 of this manual that the impact on general government net lending/borrowing of taxes shall be equivalent over a reasonable period of time to the corresponding amounts actually received (§21, MGDD, 2013).

As SNA News and Notes acknowledges, in a multinational scheme it is possible that over time the number of permits issued and surrendered in any country may deviate. Two approaches are suggested to deal with this:

- *In countries that issue more permits than are surrendered ... in practice it is easier to ignore these flows and instead write off the permits (at the end of the permit's lifetime) in the issuing country's accounts as another change in volume of assets, (K22), as if they were unused.*
- *For those countries where fewer permits are surrendered in the country than issued, payments received exceeds taxes recorded. Setting aside the issue of recording flows of taxes on production from the R.O.W, the scope for payments received to exceed taxes recorded remains as not all permits will necessarily be surrendered, especially those purchased by environmental groups. Moreover for countries that issue significantly more permits than are expected to be surrendered in that country, a strong case can be made for considering the difference between payments received and taxes recorded as a windfall of sorts, akin to another change in volume of assets, even if theoretically they should be recorded as a tax on production from the R.O.W. (§22, MGDD, 2013).*

³ Following this approach, Balance of Payments statistics could reasonable assume that the entire amount of cross-border flows relating to emission permits could be recorded in the capital account.

Comments:

- Assuming there is no cross-border flows to be recorded for taxes in relation to emission permits under EU-ETS seem to be a too simplified assumption, since the overall purpose of this ETS is that cross-border flows are possible. When cross-boarder flows exist, the number of permits issued and surrendered may be different, as stated by SNA News and Notes.
- Preliminary calculations for Norway show that there are more permits surrendered than originally issued from the government (both in monetary values and in actual number of permits) (see figure 4.2 and chapter 5.2). This means that we have a surplus of permits that has been acquired in the international emission permits market. This situation is however not much discussed in the guidelines, mainly the opposite case.
- Our approach is to only include the amount of permits issued by the government as the tax revenue as in line with the agreement of which permits to be defined as a tax. This issue is further discussed in chapter 2.2.4 since it also affects the recommended method of calculation of the tax revenue.

2.2.4. How to estimate the tax revenue to be recorded at the time of surrendering?**The guidelines states:**

In the absence of precise information on individual permits (including their original sale price), the level of tax revenue to be recorded in any particular year shall be determined by a model as follows:

Tax revenue = [Number of permits surrendered] x [Average auction price of stock of permits]

The average auction price of stock of permits, calculated using data (on total relevant stock of AF79 payable and number of "live" domestically issued permits) as close as possible to (but before) the surrender date for permits, is determined as follows:

Average auction price = [Total stock of AF79 payable relating to sales of permits] divided by [Total number of domestically-issued permits which have not yet been surrendered].

*It is necessary that the sum of the tax revenues recorded over time in the accounts should be equal to the sum of auction proceeds received by government (ensuring that emission permits issued for free do not have an impact on the government accounts). **If it becomes apparent that the number of surrendered permits is significantly above or below the number of issued permits (leading either to a rapidly growing or shrinking stock of AF79 payables for government), entries should be made in other changes in volume of assets to increase or reduce the stock of AF79 payables to bring the model back into balance.** This re-assessment should take place at the end of each phase of the ETS, or earlier if the remaining stock of AF79 payable in relation to emission permits falls below zero.*

The difference between the pre-paid tax value of the permit and the market value of the permit represents a marketable contract (non-produced non-financial asset⁴) for the holder, and has no implications for government accounts (§§8-12, MGDD, 2013).

Comments:

- Some countries, like Norway, have precise information on total income related to the governments sale of emission permits issued under cap and trade schemes. These incomes are to be recorded as an AF79 in the

⁴This asset may have a positive or negative value, reflecting in aggregate the difference between the market price of permits and their original auction value.

accounts. The question is then which of the following three options to use when recording the tax revenue at the time of surrendering:

1. The registered income from the government auction of emission permits?
 2. The estimated tax revenue using number of permits surrendered and an average auction price of stock of permits as recommended in the MGDD and by the OECD?
 3. The estimated value of surrendered permits using number of surrendered permits bought in the market and a weighted average auction price based on price statistics from the stock exchanges.
- The main reason why these three tax revenues differ is because cross-border flows actually exist. The government is not only selling emission permits to domestic enterprises, but also to foreign enterprises. And domestic enterprises might buy emission permits that originally were sold from other enterprises or from the rest of the world (ROW).
 - Given that cross border flows exist and there is no direct link of flows of emission permits between the government and the domestic enterprises, the definitions of the variables used in the recommended method are not straightforward to define. The definitions of “number of permits surrendered” and “total number of domestically-issued permits” are unclear.
 - It is not directly clear what is meant by “**number of permits surrendered**”.
 - a) Is it total **surrendered** permits, both issued free of costs and purchased, **regardless** of who originally sold the emission permits?
 - b) Is it total **surrendered** permits, both issued free of costs and purchased **from the government**?
 - c) Is it the number of permits that originally was **issued** from the government free of costs and those **sold to the domestic and foreign enterprises**?
 - d) Or is it the number of permits that originally was **issued** from the government free of costs and those **sold to the domestic enterprises**?

The flows of emission permits in suggestion b) and d) is not possible to identify, although it is the suggestion in b) that seems to be the flow that one ideally wants to estimate. However, it is the flow in suggestion a) that in practice is estimated. According to the definition given in chapter 2.2.1 on the definition of emission permits treated as a tax, it ideally seems to be the flows in alternative d) that will be the most suitable starting point for the tax revenues because it is the *payments for emission permits issued by government* that are to be treated as a tax. However, in practice this flow is not possible to identify and it will be the alternative in c) that would have been the starting point. BUT, due to the assumptions of no-cross border flows, alternative b) and d) will be forced to be the same.

Nor is it straight forward to identify the “total number of **domestically-issued permits** which have not yet been surrendered”. Preferable information about emission permits issued domestically and surrendered emission permits that originally was obtained from the government is needed. In practice one will identify this number as total issued emission permits, both originally issued for free and bought in the market, less those permits that have been surrendered. The problem arises when number of surrendered emission permits exceeds the number of emission permits originally issued. The guidelines mention what to do in this situation. However, in order to estimate the “total number of **domestically-issued permits** which have not yet been surrendered”, it is necessary to have data for total surrendered emission permits and total issued permits (both issued for free and sold) – preferable related to domestically obtained and issued emission permits.

The guidelines suggests that “domestically-issued permits which have not been surrendered” should be measured “as close as possible to the surrender date for the permits”. It should be notified that those emission permits only referring to the same period as the AF79 should be included and that those emission permits, either received for free or bought, that are related to the next years tax revenue calculations should not be included in the calculations.

2.3. Numerical example presented by OECD

The following example is copied from the OECD Revenue Statistics 2012 Edition – Special Feature S.2 Classification of tradable emission permits (OECD 2012), page 46:

- The amount of the tax payment to be recorded for any single surrendered permit in period t is equivalent to the total amount the government has received in payments for all the permits outstanding at that particular time divided by the number of outstanding permits.
- This approach is used to take account of the fact that at any particular time, the range of outstanding permits will have a variety of issue prices. Some will have been issued by government free of charge and others will have been auctioned at varying prices. The amount recorded as the tax payment is therefore the average of the issue prices for all the permits outstanding at the time of emission.
- The recording of tax revenues will depend on a very detailed level of records being kept of permits issued, the amounts paid for them in each case and the date of surrender.

Then, an example illustrating how the rules will operate is given:

The example assumes in line with the guidance that all permits surrendered in a country are equivalent to a permit issued by that country’s government.

- Assume the government issues 1000 permits to allow a given volume of emissions. 500 are issued free of charge and 500 are auctioned at 10 units of currency.
- The financial liability of the government is the amount paid for the permits i.e. 5 000 units of currency and the average amount after dividing by the number of outstanding permits is 5.
- If at a subsequent point, 250 permits are surrendered then the tax revenue would be recorded as $5 \times 250 = 1\,250$ at the time the emissions take place.
- The adjusted financial liability is the original financial liability minus the tax received.

- On this basis, the adjusted financial liability would be 3750 (i.e. 5 000-1 250) and with the number of outstanding permits being 750, the average amount divided by the number of outstanding permits is still 5 units.
- If a further 500 permits are surrendered at a later point then the tax revenue would be recorded as $5 \times 500 = 2\,500$ and the total financial liability and the average liability per permit would be recalculated as 1 250 and 5 respectively with 250 permits outstanding.
- If then a further 500 permits are then issued free of charge, the outstanding financial liability remains at 1 250 but with 750 permits outstanding the average liability is reduced to 1.67.
- This process will continue as permits are issued and surrendered.

2.4. Conclusion – what do the guidelines state?

It seems clear from the guidelines from Eurostat that the determinant deciding whether a country has flows of emission permits to be regarded as a tax is if the government receives payments from sale of emission permits (see chapter 2.2.1).

From our point of view, the guidelines are not clear whether the preferred focus for the estimation of the tax revenues is issued permits or surrendered permits.

Since it is the *payments for emission permits issued by government* that is the main criteria for deciding whether a flow of emission permits are to be decided as a tax or not, it is subject to misunderstandings when the text in the guidance most of the time is focusing on the surrendering of emission permits and does not focus on issued emission permits. It seems that the reason for the guidance to be unclear on this issue is due to the assumption of no cross-border flows of emission permits. This makes it irrelevant whether the focus is issued permits or surrendered permits.

Is the focus the actual payments that the government receives from its sale of emission permits or is the focus payments that enterprises have had in relation to purchase of emission permits to meet required amount that are to be surrendered?

Due to the presumptions taken in the guidelines, i.e. that no cross-border flows exist, the time of recording is equal to the time of surrendering. The two different focuses will give a total tax revenue that are the same, so this might not be a big problem. However, in real life, the tax revenue will differ a lot depending on what focus (starting point) to take. Is it the estimated value of the payments that the government receive from its sale of emission permits that are to be used, or is it the payments that enterprises have had in relation to purchase of emission permits that are to be the “final result”. This is not discussed in the guidance.

Challenges regarding the choice of preferred method to use in order to estimate the part of the emission permits that are to be treated as a tax will further be elaborated on in the next chapters. Based on the guidelines from Eurostat and OECD, we will examine if there are tax revenues from trade with emission permits that are to be estimated for Norway and, if there is, what method to use in order to estimate this tax revenue.

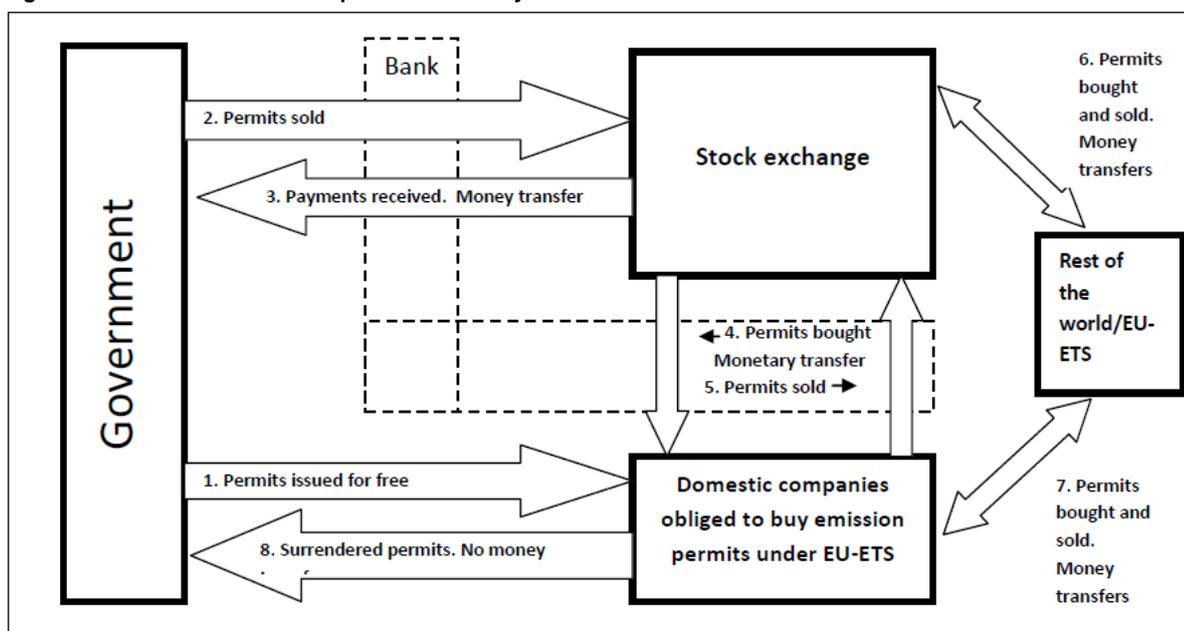
3. Are there emission permits to be treated as taxes in Norway?

In line with many other countries, the Norwegian government is also increasingly turning to the issuing of emission permits as an alternative to direct taxation of greenhouse gas emissions. The question is if there are emission permits to be treated as taxes in Norway; i.e. if tax revenues from trade with emission permits are to be included in economic statistics in general and in environmental related statistics in particular. To answer this question we first need to know whether the Norwegian government is selling emission permits in the market.

3.1. Identification of the flows of emission permits in Norway

If some of the payments related to the flows of emission permits in Norway are to be treated as tax revenue, knowledge about the current situation in Norway have to be identified. Figure 3.1 illustrates briefly the flow of emission permits in Norway.

Figure 3.1. Flows⁵ of emission permits in Norway and with the ROW



⁵ When in the report referring to the enterprises outlays or costs in relation to purchases of emission permits (see flow 4), only those purchases of emission permits needed in order to surrender the required amount of emission permits are included. No costs related to purchases of emission permits in order to save these for later periods or to be sold in the market are included.

From 2008, the Norwegian emission trading scheme was integrated with the EU-ETS. Type of enterprises (more precise: what types of activities/production) that are obliged to participate in the EU-ETS are given by law. All these enterprises have to surrender emission permits to the government equal their emissions to air from specified activities.

Not all Norwegian enterprises participating in the EU-ETS receive emission permits for free. If they do not have received any emission permits for free or if their emissions are larger than the emission permits initially allocated to them for free, they have to buy additional permits. If an enterprise reduces its emissions, it can keep the spare emission permits to cover its future needs or else sell them to another enterprise that is short of emission permits.

Although some of the surrendered emission permits originally are bought in the market and not received for free from the government, this will not according to SNA alone fulfill the requirements for treating these emission permits as taxes. For a country to have tax revenues from emission permits, the government must have received payments from selling emission permits under an ETS (see chapter 2.2.1). Even more precise, only those emission permits sold from the government to domestic enterprises are to be treated as a tax.

Knowing the various transactions with emission permits, it should in theory be easy to trace these transactions between the Norwegian Government and the Norwegian Enterprises, but, this is unfortunately not the case since the trade of emission permits is fulfilled via stock exchanges. In addition, it is seldom the actors themselves that are trading at these stock exchanges, but they have banks or other specialized enterprises doing these trades for them.

For the Norwegian government and the Norwegian enterprises, it is the InterContinental Exchange and the BlueNext stock exchanges that mostly are used when buying and selling CO₂-emission permits.

The Norwegian Ministry of Finance awarded in 2009, through a public procurement process, Barclays Capital (“Barclays”) the mandate to conduct the sales for the Norwegian Government. Through the Central Government Budgets and Accounts annually information is received on the income from the sales of CO₂-emission permits. However, there is no information available about who are the buyers of the emission permits sold from the Norwegian government. There is no direct flow between the government's sale of emission permits to domestic enterprises buying emission permits since these flows go via the stock exchange (see flow 2 and 4 in figure 3.1).

Emission permits bought in the market (flow 4, 6 and 7 in figure 3.1) might originally have been sold from governments or enterprises situated both abroad or domestically. Likewise, emission permits sold domestically by the Norwegian government (flow 2 in figure 3.1) or enterprises (flow 5 and 7 in figure 3.1) might be bought by entities in Norway (flow 4 in figure 3.1) or abroad (flow 6 in figure 3.1).

Information about the origin of the emission permits bought in the market (flow 4, 6 and 7 in figure 3.1) is not available for statistical purposes. Most of the trades are done via banks and stock exchanges. Tracking the flows of each of the emission permits seems not possible.

3.2. Yes, there are flows of emission permits in Norway that treat as a tax

From information about the Norwegian emission permit market presented in chapter 3.1, we now know that there are flows of emission permits in Norway that

are to be treated at taxes since the Norwegian government receives payment from sale of emission permits in the EU-ETS (see flow 3 in figure 3.1). The transfers recorded in the central government budget and accounts show that the government has sold emission permits, i.e. there are tax revenues to be recorded, see chapter 4.1.

At the time being, Norway is one of eight countries in Europe where the government is auctioning emission permits (OECD 2012, page 47).

Therefore: Tax revenues from trade with emission permits have to be estimated and included in economic statistics in Statistics Norway.

This is further documented by the central government budgets and accounts published annually by the Ministry of Finance that shows that the Norwegian Government since 2008 have sold (and bought) emission permits. This is in line with the allocation plan for Phase II of ETS (2008-2012) which was adopted in 2009, stating that the total volume that should be added to ETS by the Norwegian government is about 75 million emission permits (EUAs) in this 5-year period. A total of 39 million emission permits (EUAs) was then planned to be allocated to Norwegian enterprises and 4.2 million to a New Entrants Reserve. The balance of 31.8 million emission permits (EUAs) was according to the plan to be sold in the market⁶.

However, since there are cross-boarder transactions of emission permits to and from Norway, it is not straight forward to identify what flows that are to be the focus for the estimation of the tax revenue. Following the theory presented in chapter 2, it should be flow number 3 which is the payments the government receives from sale of emission permits. However, the theory assumes that this flow will have the same value as both flow number 4 and 8 due to the assumption that no cross-boarder transactions occur. Since this is not the reality, we will in practice end up with three different values for each of these flows.

Which flow to identify as the basis for the tax estimations is still to be decided upon and will be further discussed in chapter 5 of this report. The questions are if it is flow number 3 (payments the government receive from sale of emission permits, i.e. alternative No. 1), flow number 4 (the cost enterprises have in order to buy emission permits that are to be surrendered, i.e. alternative No. 3) or flow number 8 (the estimated value of all surrendered emission permit, i.e. alternative No. 2) in figure 3.1?

⁶Press release, 18.05.2009, No.: 51/2009, <http://www.regjeringen.no/en/dep/fin/press-center/press-releases/2009/norwegian-ministry-of-finance-to-sell-eu.html?id=562657>.

4. Sources - where to find information about emission permits?

Information about emission permits is included in various statistics published by Statistics Norway, but no systematic identification of which statistics or the coverage in each statistic has been undertaken in order to conclude on what sources would be relevant to use in the environmentally related tax statistics.

When identifying the coverage of emission permits in today's statistics, the following information (determinants) about emission permits were characterized as important to find:

- 1) Volumes of permits that are surrendered
- 2) The proportion of the surrendered permits that originally was issued free of charge
- 3) Price information for the permits that have been auctioned by the government and/or bought by enterprises
- 4) The payments to the government from sale of emission permits
- 5) The NACE-code for the enterprises surrendering emission permits

The emission permits defined as environmental related taxes will from November 2014 be included in the national accounts as part of the revision of the SNA2008/ESA2010. Then, the National accounts will be the main source for the compiling of environmental related taxes (but the National accounts cannot be used as a source when in September 2013 tax revenues from emission permits are to be included in the environmental related tax statistics that are to be reported to Eurostat).

Work therefore has been undertaken in order to identify other sources than the national accounts in order to make a first estimate of the tax revenue related to the emission permits that are to be included in the statistics for environmentally related taxes.

In practice, this identification of possible sources will be of great help for the national accounts when deciding upon what basic statistics to use in order to conclude on a final solution for the inclusion of emission permits for the national account 2014 publication.

Common for the statistics and information now available on emission permits is that there is very little information about emission permits in monetary units. No information of the costs for enterprises in order to obtain the amount of emission permits they are obliged to surrender, the value of the emission permit transactions in all or the tax revenue from surrendered emission permits.

In chapter 4.1 to 4.4 the coverage of emission permits in today's statistics will be presented. Chapter 4.5 summarizes the available information.

4.1. The central government budget and accounts

The central government accounts is published annually showing figures for sold and purchased emission permits in monetary value, as well as information about the stock of emission permits. If monthly transactions have occurred, this information is available for statistical purposes.

In table 4.1 information from the central government budget and accounts for the years 2008 – 2012 is summarized. Only information in monetary units is available, although some information about the total number of permits available in reserves by the government also is published. In the central government budgets the amount of permits sold in the last year is published along with the expected sold amount for the coming year.

Table 4.1. Information about permits published in the central government budget and accounts

	Payments for permits bought (Kap. 1638, post 21) 1000 NOK	Income from permits sold (Kap 4638, post 01) 1000 NOK	Stock Number of permits	Stock Total costs when bought End of year (average price/permit)	Stock Total marked-value End of year (average price/permit)
2008 ⁷ ..	4 714	289			
2009 ⁸ ..	50 627	1 529 640	750 299	62.7 mill NOK (111 NOK/permit)	85.9 mill NOK (114.4 NOK/permit)
2010 ⁹ ..	112 533	760 121	1 931 740	180.1 mill NOK (111,4 NOK/permit)	229.5 mill NOK (118.8 NOK/permit)
2011 ¹⁰ .	255 264	639 407	6 071 929	389.8 mill NOK (87.07 NOK/permit)	240.1 mill NOK (39.55 NOK/permit)
2012 ¹¹ .	197 808	530 790	9 311 000	627.7 mill NOK (72.82 NOK/permit)	

If it is the total payments received by the government from sales of emission permits in EU-ETS that are to be defined as D29, this information is then available from the central government statistics and accounts.

In the central government budget and accounts only sale and purchase in monetary values are presented. However, by request to the Ministry of Finance, also the total number of emission permits as well as average monthly prices was made available for us to use in the trial calculations as part of this project. Whether this is information that will be available for us at a regular basis in future calculations is not yet clarified.

In the government expenditure and income statistics in Statistics Norway the central government budget and accounts are the main source of data. However, until SNA2008 is incorporated, the income and expenditures from the governments' trade with emission permits is recorded as acquisitions less disposals of non-produced non-financial assets (ESA1995 code K22) as COFOG 5.3, i.e. purpose "protection of ambient air and climate". This means that for the time being, the statistics does not include government expenditure on emission permits as a tax.

The government expenditure and income statistics will from 2014 incorporate the SNA2008 and MGDD2013 recommendations.

⁷St.meld.3 (2007-2008):

<http://www.regjeringen.no/pages/2178737/PDFS/STM200820090003000DDDPDFS.pdf>

⁸ St.meld.3 (2008-2009):

<http://www.regjeringen.no/pages/3536408/PDFS/STM200920100003000DDDPDFS.pdf>

⁹ St.meld.3 (2009-2010):

<http://www.regjeringen.no/pages/16350108/PDFS/STM201020110003000DDDPDFS.pdf>

¹⁰ St.meld.3 (2010-2011):

<http://www.regjeringen.no/pages/37861440/PDFS/STM201120120003000DDDPDFS.pdf>

¹¹ St.meld.3 (2011-2012):

<http://www.regjeringen.no/pages/38307311/PDFS/STM201220130003000DDDPDFS.pdf>

4.2. The unit registry

All transactions with emission permits by Norwegian enterprises are constantly kept track of in an “EU-ETS emission permit register”, referred to as the Union Registry¹², which includes an European Union Transaction Log (EUTL) that automatically checks, records, and authorizes all transactions that take place between accounts in the Union registry. The Union registry¹³ replaced Member States' national registries after a revision of the ETS Directive in 2009. The single registry covers all 31 countries participating in the EU ETS covering all trade that are taking place with emission permits where enterprises obliges to surrender emission permits are involved. These detailed transactions are not available for statistical purposes due to confidentiality issues.

It is the Norwegian Environment Agency that is the institution responsible for the Union Registry in Norway. The information in the Union Registry is not official data available for statistical purposes. All detailed information on enterprises and transactions are confidential for 5 years.

In the unit registry, there is no information in monetary units available.

4.3. The current emission permit statistics

In the emission permit statistics published by Statistics Norway since 2011 it is possible to identify both the total volumes of permits that are surrendered as well as permits issued free of charge for the Norwegian enterprises' involvement in EU ETS. This statistics is partly based on information from the unit registry. These publications also focus on the part of the emissions of greenhouse gases covered by emission permits¹⁴. Also the research department in Statistics Norway has published several articles related to carbon market related transactions¹⁵.

The statistics is presented for industries which are classified, with some few exceptions, according to NACE rev 2 (see table 4.2).

¹² http://ec.europa.eu/clima/policies/ets/registry/index_en.htm

¹³ The Union Registry: http://ec.europa.eu/clima/policies/ets/registry/links_en.htm

¹⁴ <http://www.ssb.no/natur-og-miljo/artikler-og-publikasjoner/fire-av-ti-klimakvoter-gratis> (in Norwegian) and <http://www.ssb.no/en/natur-og-miljo/statistikker/klimagassn/aarforelopige/2012-05-08>

¹⁵ <http://www.ssb.no/en/forskning/energi-og-miljookonomi>

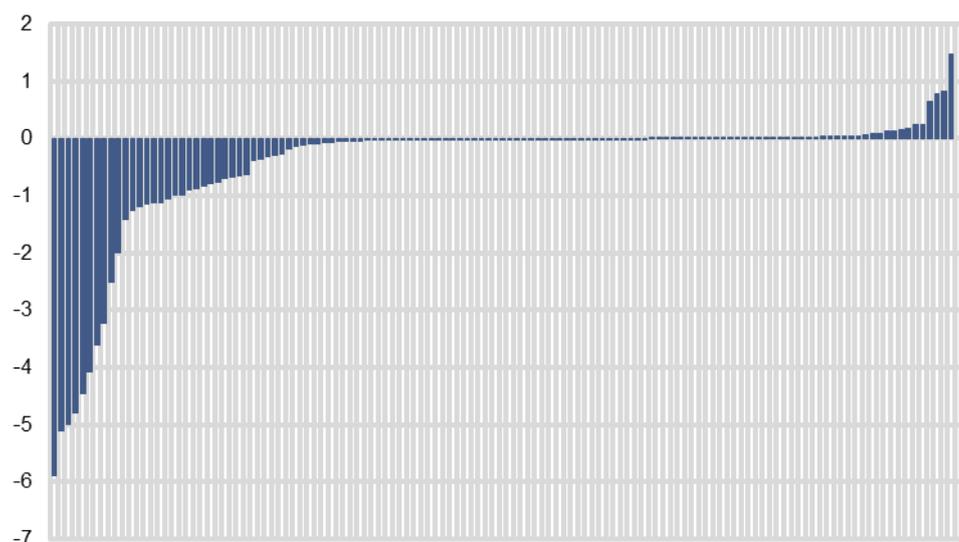
Table 4.2. Emissions and permits issued for free, 2008-2012

Industries	Emissions from the regulated sector	Share of total Norwegian emissions	Emissions issued for free	Share of emission permits issued for free of total emissions	Surplus of emission permits *	Number of enterprises in the regulated sector in 2012
Enterprises incl. in EU-ETS, total	95,6	36 %	40,2	42 %	55,4	117
Enterprises in the regulated sector without emission permits issued for free	57,7	22 %	0,0	0 %	57,7	47
Enterprises in the regulated sector with emission permits issued for free	38,0	14 %	40,2	106 %	-2,3	70
Oil and gas sector, enterprises with emission permits issued for free	6,6	2 %	5,8	87 %	0,8	5
Manufacturing, enterprises with emission permits issued for free	26,4	10 %	31,3	119 %	-4,9	44
Manufacture of food, beverages and tobacco products	0,4	0 %	0,5	116 %	-0,1	5
Manufacture of wood, woodwork and paper products	1,8	1 %	2,4	137 %	-0,6	15
Manufacture of refined petroleum products, chemicals, basic mineral and metal products and production of metals	16,5	6 %	19,7	119 %	-3,1	13
Manufacture of rubber, plastic and mineral products	7,7	3 %	8,7	113 %	-1,0	11
Energy supply and waste incineration, enterprises with emission permits issued for free	5,0	2 %	3,2	64 %	1,8	21

* A negative value indicates that the emission is lower than the amount of permits issued for free.

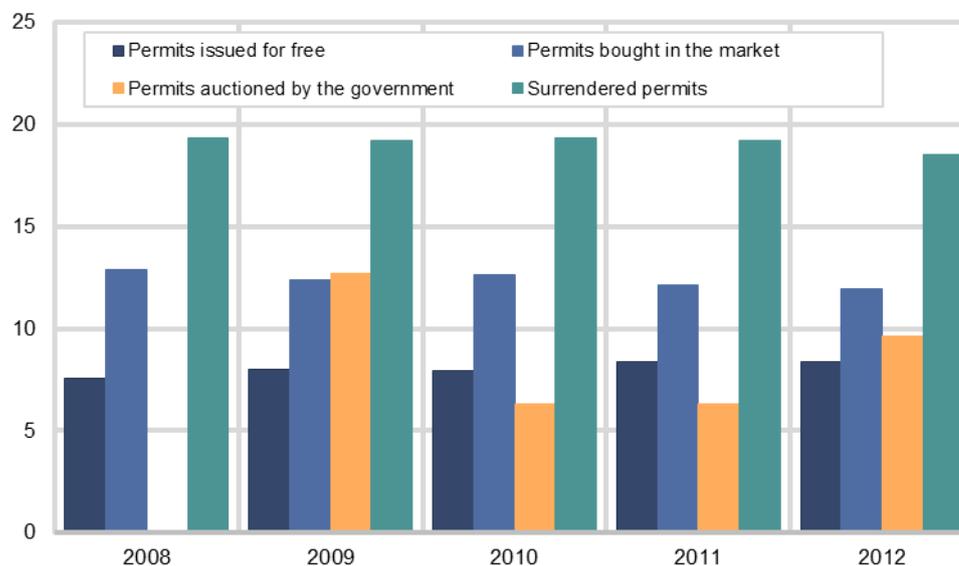
In order to compile statistics needed for the environmental related tax statistics, the tax revenue has to be broken down by industries. For each enterprise there is available information on the total amount of surrendered permits (emissions from the regulated sector) and the amount of emission permits originally received for free (see figure 4.2).

Figure 4.1 shows the surplus of emission permits for the period 2008-2012 for each enterprise obliged in the EU ETS. The surplus is the difference between the permits issued for free and the amount of permits purchased in the market.

Figure 4.1: Surplus of emission permits, million tons CO₂, 2008-2012

From the emission permit statistics we know the total emission permits surrendered (in year t) for emissions in year (t-1), as well as the portion of emission permits issued for free (for the year t). The guidelines state that the difference is to be seen as emission permits originally bought in the market.

Figure 4.2 summarizes the available information in the emission permits statistics; the permits issued for free, permits auctioned by the government, the number of surrendered permits and the assumed number of permits bought in the market by the enterprises. In addition, also information by industry is available.

Figure 4.2. Emission permits, million tons, 2008-2012

The number of permits bought in the market is calculated by taking the amount of surrendered permits and subtracting the permits issued for free for each enterprise. In some cases the number of surrendered permits is less than the number issued for free. This means that the permits issued from the government (for free and auctioned) do not add up to the amount surrendered when some of the permits issued for free is not surrendered.

4.4. Available price information

It is stated from the OECD revenue statistics (OECD, 2012) that in order to record the tax revenue, a very detailed level of records must be kept. This includes details about every emission permit issued (issued for free or auctioned), the amount paid and the date of surrender. If this information is available, the price paid for each permit would be known. In Norway, however, this is not the case at the moment. From the central government we can get information about their monthly auctioning of permits and the average monthly average price that the permits were sold for. We also know the recorded income from the government's sale of permits.

It is also specified from the guidelines that the amount of tax payment for each surrendered permit in a given period is equal to the total amount of the government has received payments for all the permits issued not yet surrendered at that time divided by the number of issued permits not yet surrendered. This tax amount for each surrendered permit is called "the average auction price of stock of permits" by MGDD 2013. In the absence of the detailed price information on each permit, the tax revenue can be calculated by multiplying the number of permits surrendered with the average auction price of stock of permits.

Barclays execute the sale of EU permits on behalf of the Ministry of Finance where the permits are sold with a stable daily volume. The price is based on published stock exchange indexes for permits traded immediately and with delivery at the end of the current year (December contracts). For 2011 and 2012 the indexes are published by the emission trading exchanges Bluenext and InterContinental Exchange (ICE). In 2009 and 2010 the permits were sold with both immediately delivery and with delivery in the end of the year (future December contracts). This means that two different prices were used. In 2011 and 2012 only December contracts were auctioned. The government auctioned the permits in a specific six months period each year on a range from Mars to November with some variation between the years.

Example of available information from the central government's budgets is presented in table 4.3.

Table 4.3. Emission permits auctioned by the government. 2012¹⁶

Month	Sold (tons)	Average price (euro)	Estimated monthly income (euro)
March	562 426	7,17	4 032 594
April	1 068 598	7,07	7 554 988
May	1 237 324	6,79	8 401 430
June	1 068 598	7,33	7 832 823
July	1 237 324	7,52	9 304 676
August	1 237 324	7,48	9 255 184
<i>Total</i>	<i>6 411 594</i>		<i>46 381 696</i>

In addition to the average prices given from the government for the monthly sale, price information for daily trades is available from the different stock exchanges used on the EU Common Auction Platforms, mainly The European Energy Exchange (EEX) and ICE Futures Europe (ICE).

This price information includes the daily settlement prices¹⁷, weighted average price¹⁸ and the price spread during the trading day (highs and lows). The

¹⁶ <http://www.regjeringen.no/nb/dep/fin/dok/regpubl/prop/2012-2013/prop-1-s-20122013/6/4/5.html?id=702016> -in Norwegian.

¹⁷ Settlement price is the average price of the trades done in the last minutes of the trading day. This price is used when calculation the traders risk and liquidity for the traders on the stock exchange for the next trading day.

¹⁸ The daily weighted average price calculated from each trade's price and volume.

information is available for all the different products traded on the stock exchanges. The type of permit is also available (EUA, CER or EUAA).

The products traded can be divided into two main categories; spot and future contracts. The spot contracts are contracts with immediate delivery the next day, while the future contracts have delivery in a specified month and year in the future. The data from the stock exchanges show that the contracts with the highest traded volume are the future contracts with delivery in December within the same year. There are also three different markets where the trades can be executed. The first is the auction (primary market), the second is the spot market with delivery the next day, and the third is the OTC (over-the-counter) market (the secondary market) where the stock exchanges acts as a surveillance and controller for the trades done directly between the traders.

4.5. Summary– what information do we have and what is missing?

At time being, only the central governments buying and selling of emission permits are found in official economic statistics, i.e. in the basic data of the central government revenue and expenditure statistics (se chapter 4.1). The monetary transactions made by those Norwegian enterprises obliged to surrender emission permits as part of the EU-ETS are not yet visible in any official *economic* statistics.

The other sources discussed in the chapters 4.1 – 4.4 can partly be used in order to help estimating the determinants needed in order to estimating a tax revenue from emission permits (see table 4.4).

Table 4.4. The main determinants for estimating a tax revenue from emission permits

Determinant	Sub-chapters of this report where the various determinants are discussed:			
	4.1 The central government budget and account	4.2 The unit registry	4.3 The current emission permit statistics	4.4 Available price information
1) Volumes of permits that are surrendered			X	X
2) The proportion of the surrendered permits that originally was issued free of charge			X	X
3) Price information for the permits that have been auctioned by the government and/or bought by enterprises	X			X
4) The payments to the government from sale of emission permits	X			
5) The NACE-code for the enterprises surrendering emission permits				X

In the current emission permits statistics there is information for each enterprise that has surrendered emission permits, if they have surrendered more or less emission permits that were received for free or if they have surrendered emission permits without having received any emission permits for free. But we do not know for sure the origin of the surrendered permits, i.e. which were received and which were bought, and we do not know when the permits may have been bought. There is also no information on the stock of emission permits held by enterprises.

There is no available information at the moment regarding the time of purchase of the CO₂-emission permits that are surrendered which could help in identifying the origin of the surrendered CO₂-emission permits. This information might be present in the Unit Registry, but the detailed information in this register is, due to confidentiality reasons, first available for the public 5 years after the transactions have occurred. Having this information would have helped a lot in knowing the

amount of surrendered CO₂-emission permits that have actually been bought in the market, although we still was left with the challenge of valuing these purchases. With the available data in the central government budget and accounts and with the guidelines from the MGDD and the transactions with emission permits in Norway we can give some preliminary solutions on how to treat the government's sale of emission permits as a tax in the national account.

The payments received by the government for sales of emission permits under EU-ETS is at the time of the sale (year = t) to be recorded as a AF79. This will be seen as a prepaid tax.

At the time when enterprises are surrendering emission permits (year = t+1), the payments by the enterprises are to be defined as a D29.

Three solutions have been discussed:

1. D29 might be set equal to AF79, implicitly stating that there is no multinational trade occurring in the EU-ETS. It is the emission permits sold from the Norwegian government that give rise to the estimated tax revenue. This recording seems to be in line with the recommendations given in MGDD 2013.

This means that the tax revenue recorded in the national accounts and in the environmental related tax statistics related to emission permits, in most cases, is not similar to the total costs that enterprises have had in relation to purchases of permits that are in line with its emission to air.

Doing it this way, the tax revenue can be traceable in the government statistics and accounts. The estimated value of D29 is not visible in any government statistics and accounts. However, D29 could be visible in the accounts of the enterprises, depending on how they record the purchases of emission permits. It seems that the enterprises keep accounts of these purchases as part of the ordinary running expenses, and do not include the costs related to purchases of emission permits as part of other taxes that they are obliged to report.

2. D29 might be calculated as recommended in the MGDD. This recording seems also to be in line with the recommendations given in MGDD2013. But doing it this way, the tax revenue cannot be traceable in the government statistics and accounts since $D29 \neq AF79$.

If $D29 \neq AF79$, the difference might be recorded as a type of transfer between Norway and the ROW.

3. D29 might be estimated based on surrendered permits of which a share is originally bought in the market.

Trial calculations of these different solutions are presented in chapter 5.

If calculations are to be made on how much the Norwegian enterprises actually pay in order to fulfill the obligations under the EU ETS then we have to make some assumptions about the prices they pay and about the trading pattern of the Norwegian traders since these cannot be identified in the market. Such an assumption might be that the Norwegian traders follow the same pattern as the rest of the world, i.e. a given share of the daily traded volume on the stock exchanges. A different assumption might be that the traders act without any consideration to

the trading day i.e. no preferred trading day. The last assumption indicates that we can use an average market price for the traded permits, while for the first assumption we can use a weighted average price.

Other eminent assumptions are in regards to what products are sold and bought in the market and in what kind of market. Even under the assumption about a fairly equal trading pattern as the rest of the world, it is not given that the traded products are the same since the preferred product or market can differ between traders and countries.

In conclusion, the daily volume, the product and the prices used will affect the estimation of the tax revenue if market data is used.

5. Estimation of tax revenue from emission permits

This chapter presents a first approach on how to estimate the share of the CO₂-emission permits that are to be treated as taxes. This approach is based on the recommendations from Eurostat and OECD based on the theoretical guidelines given in SNA2008/ESA2010 and SNA News and Notes and MGDD.

The chapter also includes alternative approaches to estimate the tax revenue and approaches on how to calculate the costs for the enterprises included in EU-ETS.

5.1. Three main alternative methods for estimating the tax revenue

There may be several methods to be used in the calculation of tax revenue, depending on the interpretation of the guidelines. The calculations may result in different outcome if the guidelines are interpreted directly (chapter 5.1.1 and 5.1.2) or if we make some adjustments on certain areas on account for an European market for emission permits (chapter 5.1.3).

The different outcomes of the methods are mainly because of the discrepancy between the number of emission permits issued and the number surrendered. As presented in chapter 4.2.2, the suggested alternatives are to:

1. use the governments recorded sales of emission permits directly as the tax revenue (AF79 = D29),
2. calculate the tax revenue (D29) according to the guidelines,
3. calculate the cost/payments for permits bought in the market by enterprises

5.1.1. Alternative No.1 (government income from sale of permits)

This first alternative is equivalent to the first suggestion on how to record the government's income and expenditures where the tax revenue (D29) in year t is set equal to the governments income from the sale of emission permits in year $t-1$ (AF79).

In relation to the environmental tax statistics the tax revenue would have to be allocated by industries. To do so the emission permits statistics can be employed with estimation of the number of permits bought in the market in the different industries and thereby assume an even share bought from the government.

The calculations for each year are given in table 5.2 along with the test calculations for the other alternatives as well as presented in table 4.1 (Information about permits published in the central government budget and accounts).

5.1.2. Alternative No. 2(method recommended in guidelines)

This second alternative applies the guidelines recommendation directly to estimate the tax revenue as a tax on other production (D29). This alternative is equal to the second suggestion on how to record D29 in the government expenditure and income statistics.

However, some alternatives are still possible within this framework with regards to which prices to use and the strict assumption that issued permits over time equals surrendered permits.

An assumption that is made in the guidelines is that all permits surrendered in a country are equivalent to the permits issued by that country's government over time. For this assumption to hold the only alternatives are a closed national market

for permits or that the only trade present is direct sale from the government to the national enterprises. The first period of EU-ETS that Norway participated in, showed that the amount of permits surrendered each year exceeded the amount of permits issued by the government and emphasizes the participation in an international emission permits market.

The difference between the strict assumption in the guidelines and the assumption that the amount of permits surrendered exceeds the amount issued can be shown with an example:

Assume as in the example from the OECD revenue statistics shown in chapter 2.3 that the government issues 1 000 permits a year, 500 for free and 500 auctioned. The permits issued for free are issued in the beginning of the year, while the permits auctioned are spread throughout the year with varying prices with an average of 10.

The average auction price and tax revenue are according to the guidelines calculated in the following way:

$$\text{Average auction price} = P = \frac{\sum A_i * P_i + Free * 0}{\sum A_i + Free} = \frac{500 * 10 + 500 * 0}{500 + 500} = 5$$

$$\text{Tax revenue} = P * \text{Surrendered permits}$$

P in the average auction price, and A is the amount of permits auctioned by the government.

The financial liability of the government (AF79) is 5 000 at the end of the year before the permits are surrendered.

If we assume that the amount of surrendered permits is below the amount of permits issued by the government, as in the example by OECD, the financial liability will be positive since the tax revenue is below the initial liability.

However, if we assume that the amount of surrendered permits exceeds the amount of permits issued by the government as the case in Norway, for example that 1 200 permits are surrendered four months later, the tax revenue is equal to 6 000, higher than the financial liability. The financial liability is then adjusted to – 1 000. As stated, this was the case for every year in the period 2008-2012 and the financial liability would then be unequal to the tax revenue even over time.

It might be more likely to state an assumption that all permits issued within a given year are actually surrendered to account for the tax revenue that same year. The surplus of the surrendered permits is then attributed to the rest of the world. In this scenario, the tax revenue is equal to 5*500 and the same as the financial liability. This assumption seems valid since we know that the amount surrendered exceeds the amount issued and that there is an international emission permits market. This is also a valid assumption since only the permits sold from the government are to be included as tax revenue according to the guidelines.

Also, the emission permits statistics shows that not all permits issued for free are surrendered.

A second aspect is which price to use in the calculation of the average auction price. Since the price of each permit auctioned by the government is unknown, some discussion is needed. The estimation might seem straight forward, but the prices used to calculate the tax revenue will affect the outcome of the calculation of

the tax revenue. The first approach is to use the average price for each month given by the government. The second would be to calculate the average price based on the government's recorded income from the auctioning of the permits. The third approach would be to use prices from the stock exchange to give a more precise market value. Within the third approach there are alternatives to either use prices for the period for when the government auctioned their permits, or to use a weighted average of the daily prices through the year.

The calculation of the average auction price will also depend upon the definition of "total surrendered permits" and "total number of domestically-issued permits which have not yet been surrendered" (see chapter 2.2.4). Defining total surrendered permits as all permits surrendered, both issued free of costs and purchased, **regardless** of who originally sold the emission permits, will give a negative "average auction price" since total surrendered permits is higher than the "total stock of AF79 payable relating to sales of permits". However, following the assumptions that only those emission permits sold to the domestic enterprises are to be accounted for, the "Total stock of AF79 payable relating to sales of permits" are the total amount of emission permits can be assumed not to be sold too any foreigners and only to domestic firms. i.e. Norway will not have any number of domestically-issued permits which have not yet been surrendered, and AF79 will be defined as the "total surrendered permits" original bought from the government. However, in Norway we know that this amount of surrendered permits is lower than the real amounts of emission permits surrendered. The difference between the value of the AF79 and the actual amount of surrendered emission are in the guidance's recommended to be included in other changes in volume of assets in order to increase the stock of AF79 payables to bring the model back into balance. In practice this difference can be seen as the amount of emission permits bought from abroad, assuming that the government does not sell any emission permits to foreign companies.

Our recommendation is therefore that in order to follow the recommended method in the guidelines, is to use the government's recorded income and to assume that the number of surrendered permits to be counted for as tax revenue is equal to the permits issued by the government.

The following example shows the difference between the two methods above with actual figures from Norway figures for 2010:

Permits auctioned by the government: 6 334 594 = *G_{Number}*

Permits issued for free: 7 937 552 = *Free*

Surrendered permits: 19 333 255 = *Surrendered permits*

Income from auctioned permits: NOK 760 121 000 = *G_{Value}*

Issued permits = permits issued for free + permits auctioned by the government

$$\text{Average auction price} = P = \frac{G_{\text{Value}} + \text{Free} * 0}{G_{\text{Number}} + \text{Free}} = \frac{760\,121' + 7\,935 * 0}{14\,272'} = 53.26 \text{ NOK}$$

- a) Tax revenue = P*Surrendered permits = 53.26*19 333 255 = 1 029 NOK million
- b) Tax revenue = P*issued permits = 53.26*14 272 146 = 760 NOK million

Alternative b) is then equivalent to alternative No. 1 above, setting the tax revenue equal to the financial liability, when surrendered permits is equal to issued permits. The calculations for each year are given in table 5.2 along with the trail calculations for the other alternatives.

5.1.3. Alternative No. 3 (payments by enterprises for permits purchased)

The third alternative is to use the market prices from the stock exchanges to calculate the cost the enterprises face when obliged to participate in the EU-ETS. Using this method, we will be able to divide the costs by the different industry groups. The cost can either be calculated for the purchase of the amount of permits the government sells each year, or the amount of permits seemingly bought in the market the current year (calculated by taking the amount of permits surrendered and subtracting the amount of permits issued for free by each enterprise (see chapter 4.3)).

In Statistics Norway work has been undertaken to estimate costs of compliance for enterprises in the regulated sector in relation to greenhouse gas emission permits as an environmental instrument together with environmental taxes¹⁹. So far calculations for 2008-2012 are complete.

This estimation is different from the estimation of tax revenues from emission permits in alternative 1 and 2 above since the entire amount of permits bought in the EU common market is included, not only those permits assumed bought from the government. Another difference is the treatment of the permits issued for free. In the case of an enterprise receiving permits for free from the government, only the amount of permits surrendered in the end of the year that exceeded the free permits from the government was included in the calculation. In the case where enterprise did not receive any free permits, the entire amount of permits surrendered was included. This is also an assumption that the permits acquired in the current period (bought or issued for free) are the permits surrendered for the emissions that year. The enterprises can in practice buy permits in one period and save for future years, or as they receive next years free permits from the government these permits can be used at the time of surrendering permits.

A detailed analysis of the market prices and traded volumes on the InterContinental Exchange (ICE) in the period 2008-2012 show that the most traded contract was the future contract with delivery in December the same year. This volume constituted for almost 63 per cent of the total amount of permits exchanged in 2010. From this analysis the chosen product to estimate the prices was the December contract.

The total yearly cost was estimated based on prices and the volume of permits exchanged each day from the InterContinental Exchange. The average yearly price

¹⁹ This is a national statistics on environmental economic instruments and is separate from the environmental tax statistics obliged reporting to Eurostat under EU regulation 691/2011.

was calculated with the daily price of the December contracts weighted against the daily volume through the year.

Table 5.1. Estimation of cost of compliance for enterprises, 1 000 euro. 2008-2012

Year	Issued for free	Surrendered	Net bought ²⁰	Weighted average price (euro)	Cost (1 000 euro)
2008	7 547	19 342	12 900	22,76	293 545
2009	7 975	19 216	12 375	13,27	164 270
2010	7 938	19 333	12 625	14,59	184 213
2011	8 364	19 229	12 155	13,23	160 851
2012	8 360	18 543	11 949	7,51	89 790
Total	40 183	95 664	62 003		892 670

In total the difference between surrendered and issued for free will exceed net bought when some enterprises received more permits than surrendered.

The calculations show that in the first period Norway participated in the EU-ETS the Norwegian enterprises had a total cost of 893 million euro. The number of permits bought in the market has decreased through the period, and along with the fall in market prices, the yearly cost has fallen by 70 per cent from 2008 to 2012.

As with alternative No. 1, we can use the emission permits statistics to allocate the cost by industries.

5.2. Evaluation of the three possible methods

The three possible solutions to calculate the total tax revenue does not end up with equal results.

When following the assumptions in the guidelines about no cross-boarder flows alternative 2 and 3 should give the same results given that there is a national closed emission market or if there is only trading of permits from the government to the enterprises. This is not the case in reality.

Alternative 3 gives the most realistic image of the situation with regards to what actually happens in Norway and in regards to what the individual enterprises might regard as a tax on CO₂ emissions.

If we are to follow the guidelines, alternative 1 is most likely to be the chosen approach.

Table 5.2 shows the results from the three possible methods, were Alternative 1 and 2 does not have any recorded tax revenue until 2010 because the central government auctioned the first emission permits in 2009 which were then recorded as tax revenue the year after.

Table 5.2. Tax revenue according to the three alternative methods, million NOK. 2008-2013

Year	Alternative 1	Alternative 2	Alternative 3
	Tax revenue	Tax revenue	Payment
2008			24 148
2009			14 355
2010	15 296	14 238	14 752
2011	7 601	10 297	12 542
2012	6 394	8 368	6 717
2013	5 308	5 473	0
Total	34 600	38 376	72 514

The tax revenue according to estimation method number 2 accounts for 2.1 per cent of the total environmentally related taxes and 17.2 per cent of the total CO₂ taxes in 2010.

²⁰ Net bought is the difference between permits surrendered and permits issued for free for each enterprise in EU-ETS. If this difference is negative it counts as zero i.e. if surrendered – issued for free < 0 => = 0.

5.2.1. Pros and cons for alternative No. 1 (government income from sale of permits)

The benefit of this approach is that the tax revenue does not need to be calculated, but are visible and directly applicable from the central governments accounts.

A problem with this approach is that we don't know who the buyer of the sold emission permits are, it can be sold to both domestic enterprises and foreign enterprises.

A second problem is regarding an allocation of the tax revenue by industries. The only information by industry is on surrendered permits from the emission permits statistics, and not on which permits are bought by the enterprises from the government. To be able to use this information by industries, we must make some assumptions with regards to the enterprises behavior in the emissions market.

5.2.2. Pros and cons for alternative No.2 (method recommended in guidelines)

The advantage of this alternative is that the method can be used by everyone for which the guidelines apply to.

The downside is that the method gives a wrong image of which industry actually pays the tax revenue when each surrendered permits are given the same average auction price independently of if the permit was issued for free or bought in the market (either from the government or by foreign traders). Industries like the manufacturing industry in Norway are then seemingly paying a good amount of tax when in reality the permits surrendered originally were issued for free by the government.

Another disadvantage is that the formula can be interpreted in different ways in regards to both which permits are included in "number of permits surrendered" and "domestically issued permits". A problem also arises when we cannot know who the buyer of the auctioned permits is since the permits are auctioned in an international emission permits market. It may result in taxes received from foreign enterprises rather than domestic.

A third and important downside is the problem when total issued emission permits does not equal total amount of surrendered emission permits due to international trading. This may result in discrepancies between the financial liability by the government (AF79) and the tax revenue paid by the enterprises.

The number of permits sold by the government might not be available. Usually only price or value of the sold permits is available in the central governments accounts.

5.2.3. Pros and cons for alternative No. 3 (payments by enterprises for permits purchased)

The advantages of this third alternative are that the actual costs for the individual enterprise are estimated and that the cost can be allocated by industry with the use of the emission permits statistics. Another advantage is that the costs are more linked to the CO2 emissions than the other alternatives.

The method involves some uncertainty related to the data in regards to the share of the surrendered permits which is bought by the enterprises and which is issued for free by the government.

The trail calculations have also shown that this method gives a higher cost for the enterprises than the income the governments has from the sale of emission permits.

6. Summary and conclusion

The revised SNA2008 states that some of the emission permits issued under the EU Emissions Trading Scheme – ETS are to be defined as taxes. The SEEA central framework states that these taxes are to be regarded as environmental related taxes, meaning that they have to be included in the obligatory reporting of environmental related taxes to EU as part of EU regulation 691/2011 from 2013 on.

The environmental related taxes are to be compiled in harmonization with the national accounts definitions, preferably using the national accounts as the main source.

The revised SNA2008 has not yet been implemented in the national accounts in Norway. This will, according to international agreements, be done in 2014. This means that in the first obligatory reporting of environmental related taxes to EU, the national accounts cannot be used as a source for the emission permits defined as environmental related taxes.

It is not straight forward to understand the theory behind the identification of those emission permits to be defined as taxes, nor to compile these monetary values according to the theory. In addition to identify the total tax revenue from those emission permits to be defined as taxes, this total figure are to be divided by industries in order to fulfill the reporting obligations according to the EU regulation 691/2011.

As part of this project, the latest guidelines and recommendations for the recording of emission permits submitted under EU ETS that are to be defined as taxes have been examined, relevant basic sources have been identified as well as various numerical examples have been undertaken and presented.

6.1. The main findings of the project

Main determinant for estimating part of emission permit as taxes: It is only those countries that have governments that sell emission permits under EU ETS that will have tax revenue from emission permits to be reported as part of the environmental related taxes.

There are at least three possible estimations of the tax revenue:

The tax revenue to be calculated for emission permits submitted under EU ETS are equal to the

1. Government's income from their total sale of emission permits
2. Estimated average "tax value" using total surrendered (or issued) permits valued by an average auction price as presented in the MGDD and by the OECD.
3. Enterprises' costs/payments related to purchases of emission permits.

The three possible estimations of the tax revenue are not necessarily equal

This is not always clear in the guidance's since one of the assumptions for the recommendations given by Eurostat and OECD is that all emission permits sold and given for free by the government is to be surrendered by domestic enterprises. Although the theory states that this assumption is wrong only looking at one single year, it states that over time this assumption is valid. Looking at the first five years of the EU ETS in Norway, the value of the surrendered permits have each year been higher than the income received by the government. In Norway, the total income from the government's sale of emission permits is available from the Ministry of Finance, while the enterprises cost related to the purchase of surrendered permits have been estimated.

The estimated tax revenue – what does it actually refer to?

It is the *payments for emission permits issued by government* that are to be defined as a tax and of which a tax revenue are to be defined. It is important to be aware of

that this estimated tax revenue does not necessarily give information about the actual payments (costs) that the enterprises have had related to the surrendering of emission permits. This would have been the case if the surrendered emission permits was actually bought only from the government, but this is not the case, at least in Norway, due to that cross-border flows of emission permits do exist. It seems that in most cases, the estimated tax revenue gives information only about the government income from sale of issued emission permits.

No direct link between the sale of emission permits from the government and the buyers.

The Norwegian government does not sell emission permits directly to domestic or foreign enterprises. A UK bank is set to administrate this sale to enterprises via a stock exchange in UK. There is no information to be found about whom buys the emission permits originally sold from the Norwegian government.

Little information about the origin of the surrendered emission permits.

In order to divide *all three possible estimations of the tax revenue* by industries, we might as a proxy use the information from the “emission permit statistics” in Statistics Norway, which shows the surrendering of emission permits to the government by industries obliged to surrender emission permits as part of EU ETS. This statistics is originally in physical units only. With the exception of the oil and gas enterprises, we have no direct information regarding the origin of the emission permits that are being surrendered. They might have been received for free from the government, they might have been bought or they might have been saved from earlier periods. However, since the emission permits sold from the Norwegian government is sold not only to domestic enterprises, and since domestic enterprises also buy emission permits not only issued from the Norwegian government, the “emission permit statistics” might not be a correct starting point for the industry breakdown.

6.2. Conclusion

As a result of the work undertaken in this project, Statistics Norway will, as part of the reporting of environmental related taxes to EU in September 2013, be able to report also the tax revenues related to emission permits issued under EU ETS. As of now, the figures that will be reported are from alternative No. 1 and are not adjusted according to the estimated value of surrendered permits by enterprises included in the EU-ETS, i.e. alternative No. 3.

The reported values for the tax revenue related to emission permits issued under EU ETS will have to be regarded as preliminary figures and might be revised as part of the SNA2008/ESA2010 revision of the National Accounts to be published in November 2014.

The Norwegian national account is the source and provider of the basic data used for the reporting of figures to EU for the environmental related taxes. This could in theory also be the case for the tax revenues originated from emission permits. However it could also be the case that the current proposal for estimating these tax revenues from emission permits will serve as input data into the national accounts when including the guidelines in SNA2008/ESA2010 from 2014.

6.3. Further work

As part of the SNA2008/ESA2010 revision of the National Accounts a final method for the tax revenues related to emission permits issued under EU ETS will be decided upon by the division for national account and the division for public finances.

In addition to the reporting of environmental related taxes to EU, Statistics Norway will publish as part of the general statistics on environmental economic instruments

also the payments that enterprises have had related to the part of the surrendered emission permits that are bought in the market. This information is regarded as very relevant when calculating the cost of CO₂-emissions by enterprises. The method used is the one in alternative No. 3.

In order to improve the overall quality of this statistics covering both the tax revenue received by the government from sale of emission permits and the costs by enterprises, further work is needed in order to find more detailed information about the share of the surrendered CO₂-emission permits that are actually bought in the market, to what price and if possible by whom. Since most of the trade with emission permits are undertaken via stock exchanges, it is in general seen as difficult to identify the origin of the emission permits bought and specific to identify the direct flows from the Norwegian government to the Norwegian enterprises.

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