Summary

NEFCO

Framework for a Nutrient Quota and Credits' Trading System for the Contracting Parties of HELCOM in order to reduce Eutrophication of the Baltic Sea

JR-080229-P5320-006

February 29th 2008

GreenStream NETWORK

EXECUTIVE SUMMARY

Simulations suggest that the current legislation and the measures therein, when fully implemented, will fall short of achieving the Ecological Objective with regard to eutrophication, defined in the Baltic Sea Action Plan. Without additional measures, nutrient discharges may even increase as a result of the recovery of agricultural activities in the Baltic States, Poland and Russia. High variability in abatement costs across the Baltic Sea States suggests that there are large efficiency gains to be obtained from international cooperation in combating eutrophication. Our analysis shows that nutrient trading may provide a feasible instrument in realising some of this potential.

However, creating a nutrient trading scheme for the Baltic Sea faces two major challenges. First, no annual monitoring data is available, neither for point nor for non-point sources. Second, there are certain legal barriers that must be addressed before nutrient credits can be used for compliance, that is, as an alternative to reducing nutrient discharges in response to more strict requirements on the use of Best Available Technology (BAT) or complying with stricter Emission Limit Values (ELV). There are legal challenges for creating a trading scheme but there are also legal elements in the international, EU and national legislation that provide support for the use of flexible policy instruments such as nutrient trading. To overcome the challenges, we propose an incremental approach, with a total of four phases, so that any later phase builds on the outcomes of the previous phases.

Our proposal is that the two first phases are based on voluntary demand of nutrient discharge reductions, whereas the latter two are based on compliance demand. The first two aim at establishing the fundamentals of the trading scheme, whereas the latter two aim at establishing a liquid market. To start with, we suggest that the scheme relies entirely on the principle of baseline-and-credit with the level of abatement required by law, i.e. current ELVs and BATs, as the baseline. In our view, employing the cap-and-trade approach similar to for example EU Emission Trading scheme for CO2 emissions, is not possible before consistent and comparable monitoring data is available for all sources that participate in the scheme. As the scheme evolves and the monitoring and reporting procedures are harmonised to provide more consistent monitoring data, point-sources such as MWWTPs may be transferred under a cap-and-trade scheme that is linked to the original baseline-and-credit scheme.

SUMMARY FOR POLICY MAKERS

In 2005, the Contracting Parties of HELCOM and EU resolved to develop the Baltic Sea Action Plan (BSAP), with the aim to reduce pollution and repair damage done to the marine environment. The BSAP is to be based on a set of Ecological Objectives and related indicators. The ecological objective with regard to eutrophication is *a Baltic Sea that is undisturbed by excessive inputs of nutrients*. To reach this objective the nitrogen load must be cut by more than 100 000 tons and the phosphorus load by more than 10 000 tons annually, based on simulations. The simulations suggest that the *current legislation and the measures therein, when fully implemented, will fall short of achieving these load cuts*. Without additional measures, nutrient discharges may even increase as a result of the recovery of agricultural activities in the Baltic States, Poland and Russia. Thus, new measures are needed to combat eutrophication. The purpose of this report is to present *nutrient trading as one potential future measure*; we analyse the prerequisites for nutrient trading in the Baltic Sea drainage area, and suggest a framework and a plan for implementing a feasible scheme for nutrient trading.

Economic rationale

High variability in abatement costs across the Baltic Sea States suggests that there are efficiency gains to be obtained from international cooperation. By and large, HELCOM has a long history on contributing to intergovernmental cooperation in the protection of the Baltic Sea and nutrient trading could further promote this cooperation and realize some of the efficiency gains available. The scale of the efficiency gains can be assessed based on the studies by Ollikainen & Honkatukia (2001) and Gren (2001). Both compare the cost of a 50% uniform nitrogen load reduction with the cost of a cost-efficient 50% nitrogen load reduction, achievable through international cooperation. Ollikainen & Honkatukia find that the cost of a uniform reduction (EUR 16 billion) is about EUR 10 billion higher than the cost of a cost-efficient reduction (EUR 5 billion). Gren finds that the cost of a uniform reduction (EUR 6,476 million) is twice the amount of a cost-efficient reduction (EUR 3 billion). In a more recent study by COWI (2007), it is estimated that the least-cost for fulfilling the target on water transparency (one of the indicators of eutrophication in the draft of the BSAP) is EUR 2.9 billion.

Legal issues

It is clear from the international, EU and national legal frameworks that there is strong support for the continued development of flexible policy tools to address the issue of eutrophication in the Baltic Sea. The authors suggest that complex and overlapping sources of law do not inherently prohibit the implementation of nutrient trading, and particularly in relation to Best Environmental Practices, for non-point sources, there is a legal niche for nutrient trading. However, there are several legal issues that have to be considered when implementing such a trading scheme.

Implementation plan

Drawing on analyses of the success and failures of previous nutrient trading schemes, we recommend designing a scheme that is as simple as possible. Thus, we propose that both nitrogen and phosphorus discharges are traded, interchangeably, across the whole Baltic

Sea drainage area without any restrictions on trades between sub-basins. More specifically, we propose that the unit of trade is an equivalent kilogram of nitrogen, such that the ratio between N and P is fixed by the Redfield ratio. As a consequence, one nitrogen equivalent kg refers to either one kg of nitrogen or 0.14 kg of phosphorus.

Unlike greenhouse gases, which are uniformly mixed global pollutants, waterborne nutrients are regional pollutants that do not transfer only to some extent in the sea. Therefore, abatement of nutrient load in one sub-basin of the Baltic Sea may not necessarily affect water quality in another. As a result, hot-spots (i.e. highly degraded areas) may emerge as a result of trading. To prevent this undesired outcome, we propose that no pollution source is allowed to increase its discharges as a result of trading. New entrants and existing sources that increase their capacity are allowed to emit the maximum amount permissible by law but no more, even if they acquired nutrient credits for the excess amount. This extraordinary constraint will reduce the efficiency of nutrient trading to some extent, but it will prevent the emergence of new hot-spots without increasing the complexity of the scheme. The loss in efficiency is the price that has to be paid for this compromise in scheme design.

Creating a nutrient trading scheme for the Baltic Sea faces two major challenges. First, no annual monitoring data is available, neither for point nor for non-point sources. Second, there are certain legal barriers that must be addressed before nutrient credits can be used for compliance, that is, as an alternative to reducing nutrient discharges in response to more strict requirements on the use Best Available Technology or complying with more strict Emission Limit Values.

To overcome these challenges, we propose an incremental approach, with a total of four phases, so that any later phase builds on the outcomes of the previous phases. Our proposal is that the two first phases are based on voluntary demand of nutrient discharge reductions, whereas the latter two are based on compliance demand. The first two aim at establishing the fundamentals, whereas the latter two aim at establishing a liquid market. Supply and demand is built step by step, as illustrated in Figure 1. To begin with, only MWWTPs (Municipal Wastewater Treatment Plants) will be included in the scheme. We suggest starting the implementation from the MWWTPSs because the MWWTPs are the low-hanging fruits, among other things, because they do not face the same monitoring challenges as non-point sources.

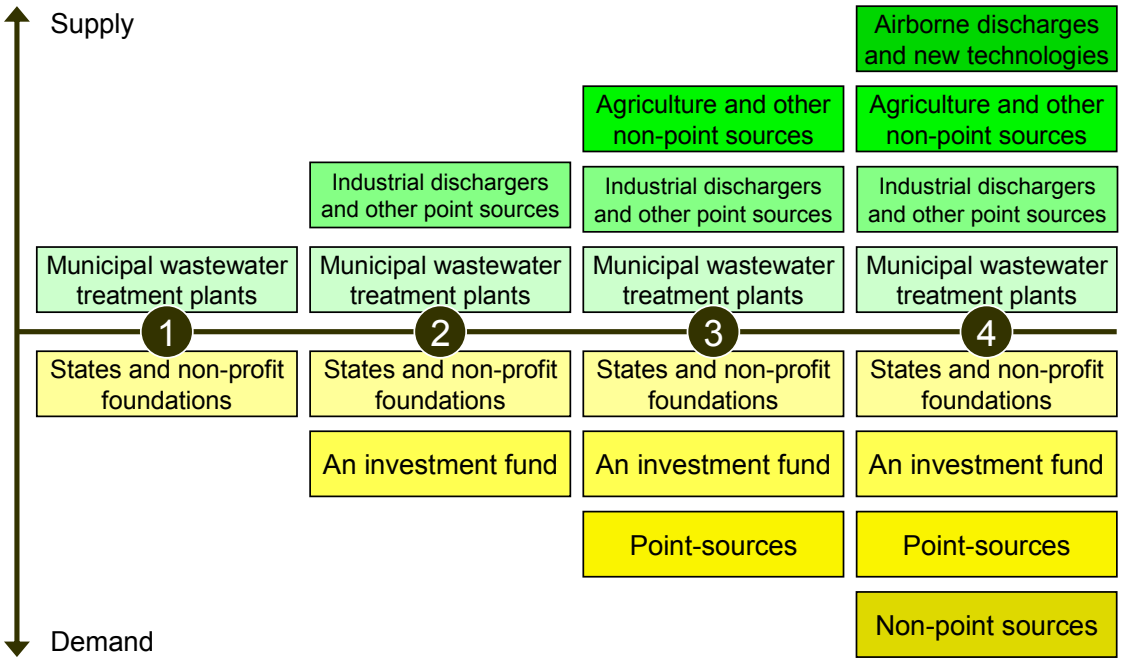

Figure 1. The coverage of the scheme increases gradually. Phases 1 and 2 are based on voluntary demand whereas Phases 3 and 4 are based compliance demand.

To start with, we suggest that the scheme relies entirely on the principle of baseline-and-credit with the level of abatement required by law, i.e. current ELVs and BATs, as the baseline. In our view, employing the cap-and-trade approach is not possible before consistent and comparable monitoring data is available for all sources that participate in the scheme. Capping discharges is not sensible before the size of the discharges is known. Depending on the allocation method, in a cap-and-trade scheme consistent monitoring data is typically required from two or three years back. As the scheme evolves and the monitoring and reporting procedures are harmonised to provide more consistent monitoring data, point-sources such as MWWTPs may be transferred under a cap-and-trade scheme that is linked to the original baseline-and-credit scheme.

Table 1 outlines the four phases and their objectives in more detail. We note that even if it was decided that the implementation of the scheme will not continue beyond the first two phases, measures taken to improve the quality of the monitoring data will not be in vain because the data can be used, as such, to prioritise future abatement efforts. It also provides essential information for other policy measures.

Table 1. Supply, demand, objectives and legislative issues of each Phase.

	Phase 1	Phase 2	Phase 3	Phase 4
Supply of credits	MWWTPs[1] whose efficiency can be improved, amongst others, in Russia, the Baltic States and Poland	In addition to MWWTPs, all other point sources, mainly industrial discharges and fish farms	In addition to point-sources, agriculture and animal husbandry, through e.g. conversion of agricultural land into grassland	In addition to point and non-point sources, airborne discharges and new technologies for reducing the internal load of the Baltic Sea, if proven effective
Demand for credits	Littoral states, non-profit foundations (e.g. John Nurminen Foundation) and private companies (e.g. Cargotec) on a voluntary basis	In addition to direct investments, an investment fund that pools voluntary investments and purchases nutrient credits for least cost, through e.g. tendering twice a year[3]	In addition to voluntary demand, MWWTPs and other point-sources that face more strict ELVs and BAT requirements	Point and non-point sources in addition to voluntary demand
Objectives	Move from ex-ante to ex-post funding of abatement efforts by introducing the concept of nutrient credits[2] Harmonisation of monitoring and reporting procedures, and the establishment of a register for nutrient discharges and projects aimed at reducing them	Establishment of an investment fund that purchases nutrient credits through tendering and, thus, improves cost-efficiency Quantification of abatement costs, through information provided by winning and non-winning tenders	Expansion of the voluntary demand, by allowing point-sources the flexibility of using nutrient credits for compliance Inclusion of agriculture in the scheme as a supplier of nutrient credits[4]	Creation of a liquid market for nutrient credits
Legislative issues	Because of its voluntary nature, Phase 1 avoids many of the legal issues that arise from existing international, EU and domestic regulation. However, EU state aid rules apply even if the scheme is voluntary	Inherently the same as in Phase 1. The tender process will be subject to the public procurement directives	Integration of the legal foundation of the scheme with the existing body of law that applies to the discharge of nutrients	The legal issues are substantially similar to Phase 3, although the design of legal instruments is undoubtedly complicated by the broader nature of Phase 4.

[1] Municipal wastewater treatment plants
[2] To make sure that investment fund is fully operational in Phase 2, the development of it should be initiated in Phase 1. If it turns out that the demand for nutrient credits in Phase 1 is low, the fund can be utilised to a limited extent already in Phase 1 to boost demand.
[3] The inclusion of agriculture in the scheme is likely to require more detailed information about the leaching of nutrients than is available today. Thus, the development of monitoring practices of agricultural sources should be initiated in Phase 1 to ensure that agriculture can be included in the scheme in Phase 3 as a supplier of nutrient credits
[4] Verification of nutrient discharges is included in the scheme from start. However, in Phase 1 verification is voluntary. Thus, the buyer of nutrient discharges decides whether it is required or not. From Phase 2 onwards, verification of monitoring reports is compulsory.

Trading potential

The theoretical trading potential in terms of nitrogen equivalents is 1.1 billion kilograms for the whole Baltic Sea drainage area. The theoretical trading potential is the current anthropogenic load to the Baltic Sea. In other words, the natural background load has been excluded from it. The potential doesn't consider the technical feasibility of reducing discharges. The determination of the technical feasibility is left to the price mechanism, created by the trading scheme. **Figure 2** illustrates the distribution of this potential per country and per sector. Of this potential, 49% originates from agriculture and forestry, and 35% from municipal wastewater treatment plants (MWWTPs), or the lack of them.

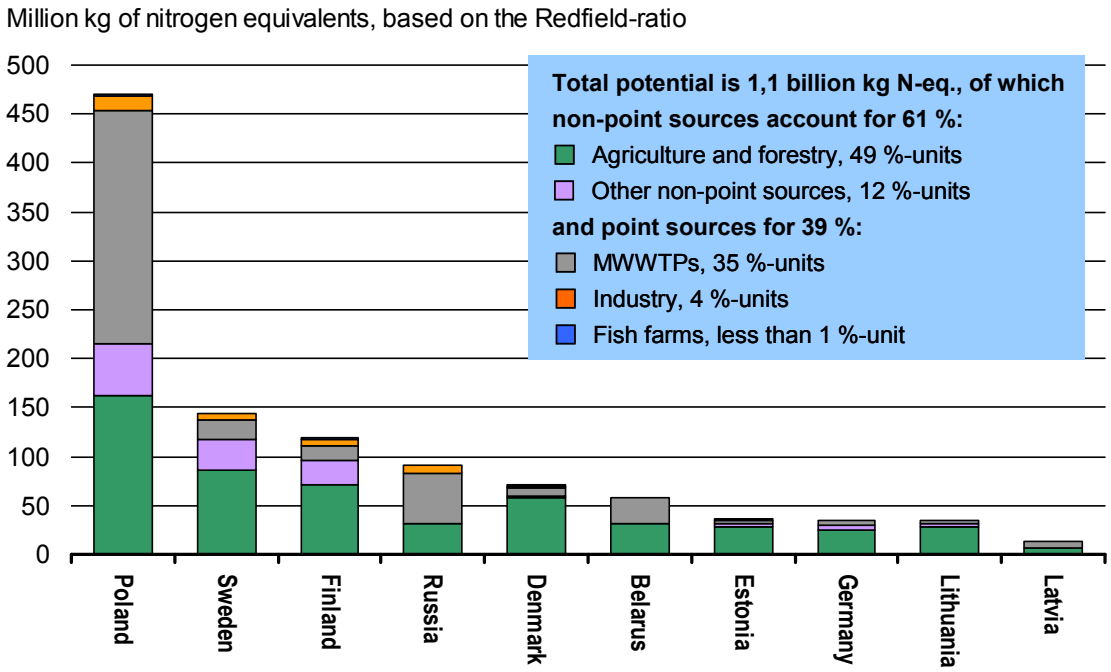

Figure 2. The trading potential in kilograms of nitrogen equivalents per country and per sector, based on the waterborne load caused by human activity that entered the Baltic Sea drainage in 2000. Here, one nitrogen equivalent kg refers to either one kg of nitrogen or 0.14 kg of phosphorus, based on the Redfield ratio. Source: Finnish Environment Institute.

Conclusions and recommendations

Simulations suggest that the current legislation and the measures therein, when fully implemented, will fall short of achieving the ecological objective with regard to eutrophication, defined in the Baltic Sea Action Plan. Without additional measures, nutrient discharges may even increase. Our analysis shows that nutrient trading may provide a cost-efficient measure to combat eutrophication. However, the non-global nature of nutrient discharges and the related issue of hot spots (i.e. highly degraded areas) have to be taken into consideration in designing the scheme. There are legal challenges for creating a trading scheme but there are also legal elements in the international, EU and national legislation that provide support for the use of flexible policy instruments such as nutrient trading.

A well functioning trading scheme has many prerequisites, such as accurate monitoring data and capacity of the polluters to participate in trading. Thus, we propose that the trading scheme would be set up in phases, in a way that the early voluntary phases build a strong foundation for later more ambitious phases.

A well designed, environmentally and economically efficient nutrient trading scheme has the potential to help States around the Baltic Sea comply with their obligations under Article 3 of the Helsinki Convention to *take all appropriate legislative, administrative or other relevant measures* to prevent and eliminate pollution in order to promote the ecological restoration of the Baltic Sea Area and the preservation of its ecological balance.

ABBREVIATIONS

BAT	Best Available Technology or Best Available Technique (as the case may be)
BEP	Best Environmental Practice
BREF	BAT Reference Document
BS	Baltic Sea
BSAP	Baltic Sea Action Plan
CAP	Common Agricultural Policy
CDM	Clean Development Mechanisms
ECT	Treaty Establishing the European Community
ELV	Emission Limit Value
EPER	European Pollutant Emission Register
EU ETS	European Union Emissions Trading Scheme
GSN	GreenStream Network Plc
HELCOM	Helsinki Convention
HU	University of Helsinki
JI	Joint Implementation
MWWTP	Municipal Wastewater Treatment Plant
N	Nitrogen
NEFCO	Nordic Environment Finance Corporation
N-eq	Nitrogen equivalent
OTC	Over the Counter
P	Phosphorus
PLC	Pollution Load Compilation
SYKE	Finnish Environment Institute
TEU	Treaty on European Union
UWWTD	EU Urban Waste Water Treatment Directive