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<b>Document title</b>	Suggestions for the contents of the CART assessment policy message
<b>Code</b>	8-1
<b>Category</b>	CMNT
<b>Agenda Item</b>	8 – Pollution Load Compilation
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<b>Submitted by</b>	RedCore DG
<b>Reference</b>	Outcome of PRESSURE 4-2016, paras 7.21-7.25

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### Background

PRESSURE 4-2016 considered the initial suggestions for the CART assessment 2016 and supported the current structure of the scientific report. Nonetheless, the meeting was of the opinion that the scientific report should recommend a unified assessment methodology to avoid deviation in interpretation of the assessment data.

PRESSURE 4-2016 suggested various methods to assess the progress towards national reduction targets, e.g. using a 3- or 5-year averaging period or statistically estimated data on the last year of the assessment. The meeting noted that the Contracting Parties are not fully satisfied with the clarity of the policy message of the assessment 2015.

PRESSURE 4-2016 agreed on the questions which should be included into the policy message.

PRESSURE 4-2016 agreed that the HELCOM workshop dedicated to MAI/CART assessment methodologies will outline the policy message.

### Action requested

The Meeting is invited to consider the document, collect views from the Contracting Parties on the contents of the policy message product to be further elaborated by RedCore DG and finalized at the MAI/CART workshop.

## Initial suggestions on the content of CART assessment 2016

### Background

HELCOM Nutrient Reduction Scheme is a regional approach to sharing the burden of nutrient reductions to achieve the goal of the Baltic Sea unaffected by eutrophication agreed by the Baltic Sea countries.

The Scheme has been introduced and agreed first in 2007, in the HELCOM Baltic Sea Action Plan. At that time, the countries agreed on provisional nutrient reduction targets and decided that the figures will be revised using a harmonised approach and most updated data as well enhanced modelling. The revision process started in year 2008 and has been completed in 2013.

The Country-Allocated Reduction Targets (CART) indicate how much nutrient inputs the HELCOM countries need to reduce by 2021 for in future achieving a Baltic Sea free of eutrophication. The reductions are compared with average nutrient inputs in the reference period (1997–2003). The CART is a part of the HELCOM nutrient reduction scheme, which other component - the Maximum Allowable Inputs (MAI) - serves as annually updated HELCOM core pressure indicator on nutrient inputs to the Baltic Sea.

The progress towards reductions targets is regularly assessed. The assessment is based on the evaluation of normalized annual net input of nutrients from Contracting Parties or other sources to the Baltic Sea sub-basins compared with the Country by sub-basin net input ceilings 1995 to 201x.

The net input is an estimate of the amount of nutrients ending up in the Baltic Sea sub-basins coming from a particular country (or other source e.g. ship traffic). The calculations integrate:

- waterborne inputs (nutrient inputs and flow entering the sea via rivers (riverine inputs) and nutrient inputs and flow from point sources discharging directly to the sea (direct inputs))
- airborne inputs (atmospheric deposition from a particular country, group of countries, shipping etc.)
- transboundary inputs (nutrient inputs via rivers discharging through another country taking into account retention)

The net input ceiling is the maximum allowable nutrient inputs from a country to a Baltic Sea sub-basin, assuring the good environmental status of the Baltic Sea in terms of eutrophication. The net input ceiling for total nitrogen (TN) for Country A to sub-basin 1 is determined by deducting country A's CART to sub-basin 1 ( $CART\_TN_{A1}$ ) from the TN input from this country to sub-basin 1 in the reference period ( $TN_{ref1997-2003}$ ):

$$TNC_{A1} = TN_{ref1997-2003} - CART\_TN_{A1}$$

The sum of net input ceilings for all countries to a specific sub-basin will sum up to the Maximum Allowable Input for that sub-basin.

The assessment of progress toward reduction targets consists of two steps (outcome of HOD 49-2015):

- a scientific CART assessment report;
- a policy message, related to the implementation of the HELCOM nutrient reduction scheme.

The first step in the CART follow-up assessment is a scientific evaluation of the air- and waterborne inputs and progress toward fulfilling reduction targets based on a complete, quality assured and approved PLC assessment data set. The result of such a scientific evaluation is published as a scientific report accomplished with all the input and output assessment data. The CART assessment implies several assumptions, calculations, statistical analyses and tests documented in a scientific report (Outcome PRESSURE 4-2016), and the first draft CART assessment includes several of the statistical analysis, calculation and assessment that also will be included in a scientific CART assessment report.

## Content of the policy message product

The policy message product will be based on the scientific assessment report and contain the main results of the CART follow-up assessment with focus on answering to the most acute questions demanded by the Contracting Parties. The policy message will be elaborated by the HELCOM Secretariat according to the structure described in this document. Scientific consistence of the policy message is assured by the RedCore DG.

PRESSURE 4-2016 agreed that the main questions to answer in the policy messages are:

- Whether the reduction targets is achieved?
- What are the distance from the targets?
- What is the trend and changes in nutrient inputs?

### Assessment frequency

PLC data used for the assessment of the progress toward reduction targets is collected by Contracting Parties and reported to the PLC database annually. Further EMEP annually reports nitrogen deposition to the Baltic Sea sub-basins (phosphorus deposition it estimated from a fixed annual deposition rate (5 kg P km<sup>-2</sup>)). But to assess CART fulfilment, it is necessary to request EMEP also to calculate country per basin deposition, and the Contracting parties to report information on transboundary riverine inputs. With these data available and with the assessment tools developed as products of the HELCOM MAI CART OPER project (tools ready early 2017) it is possible to make a CART follow-up assessment with reasonable resources, and therefore RedCore DG recommends to elaborate the scientific report annually.

The frequency of the policy messages product depends also on reporting needs in relation with WFD and MSFD, Ministerial meetings etc. The frequency also reflects the methodology used for evaluation progress in fulfilment of CART. If e.g. an average of the latest 5 year available nutrient inputs is used for assessing CART fulfilment the frequency of the policy messages product should not be more often than every 3 years.

The first draft CART follow-up assessment, including the policy message was based on input assessment data set covering 1995-2012, was published early 2016. The next CART follow-up assessment with the policy message product will be available in 2017 based on inputs covering 1995-2014. The further work will be carried out in the frame of the PLC-7 project which integrates the CART follow-up assessment with the policy message product based on input data covering 1995-2017. The product will be available late 2019/early 2020 (outcome of HOD 50-2016). RedCore DG therefore proposes that the decision on the frequency of CART follow-up policy message products should be postponed pending on the experience from the two planned products and with the understanding that it is possible with reasonable resources to produce extra policy message products if needed.

### Whether the reduction target is achieved (and what is the progress)?

When adopting HELCOM Baltic Sea Action Plan the HELCOM Contracting Parties agreed to define the reference input as the average normalized annual net inputs in the period 1997-2003. Accordingly, the CART are determined as the required reductions in nutrient inputs country pr. Baltic Sea basin as compared with the inputs in the reference period to achieve the goal of the Baltic Sea unaffected by eutrophication.

As mention on page 2 these CART's have been expressed as a net country pr. basin input ceiling which is the maximum allowable input of nitrogen and phosphorus from a country to a Baltic Sea sub-basin. Therefore, CART fulfilment can be evaluated by comparing net nitrogen and phosphorus inputs from a country to a sub-basin with the corresponding input ceilings using normalized input data to take into account variation due to weather conditions and also taking into account uncertainty on the nutrient inputs.

However, there are different possibilities estimating the net inputs country pr. basin:

1. obtained with a statistical methods using the information from the nutrient input time series (at present 1995-2014) to estimate the normalized inputs in 2014 and the uncertainties on these inputs (the analysis will take into account break points if any in the time series). This method provides estimate of inputs from the most recent year (e.g. 2014 in the next CART assessment) and further has the advantages including information from the time series both regarding trends in nutrient inputs and of the uncertainties on nutrient inputs
2. average of the last 3 year normalized annual inputs, and adding an uncertainty on these inputs (the uncertainty will usually be based on the three years, but might be based on the input time series). This method provides an estimate of the status on inputs as average from the latest three years available (e.g. 2012-2014 in the next CART assessment), but do not use the information from the input time series on trends etc.
3. average of the last 5 year normalized annual inputs, and adding an uncertainty on these inputs (the uncertainty will usually be based on the five years, but might be based or on the time series). This method provides an estimate of the status on inputs as average from the latest five years available, but do not use the information from the input time series on trends etc. For the next CART evaluation, it would imply an average of 2010-2014 to be available in 2017 – which then include a rather old status on nutrient inputs. Further, it will take more years to identify progress in reducing nutrient inputs and fulfilling CART as compared with method 1 (or 2)

The fulfilment of CART could be presented with colours: green (fulfilled taking into uncertainty on inputs), yellow (not fulfilled taking into account inputs), red (not fulfilled) – the red colour could be graduated reflecting deviation from CART fulfilment in percentages.

The progress in reducing inputs since the reference period can be evaluated country pr. basin by:

- quantifying the percent of the required nutrient reduction achieved in year 201x (or using average of x years) or alternatively the percent of missing reduction to fulfil CART;
- quantifying are missing reduction to fulfil CART in year 201x (or using average of x years) in tons;
- based on the present changes in inputs since the reference period estimate how many years it will take before CART are fulfilled.

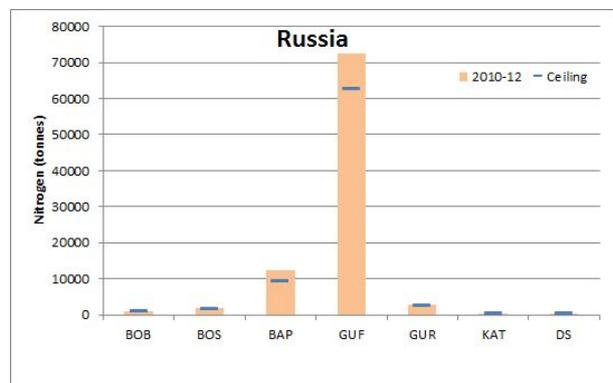
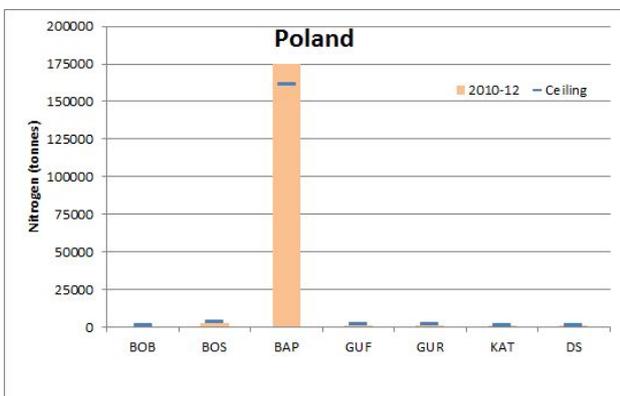
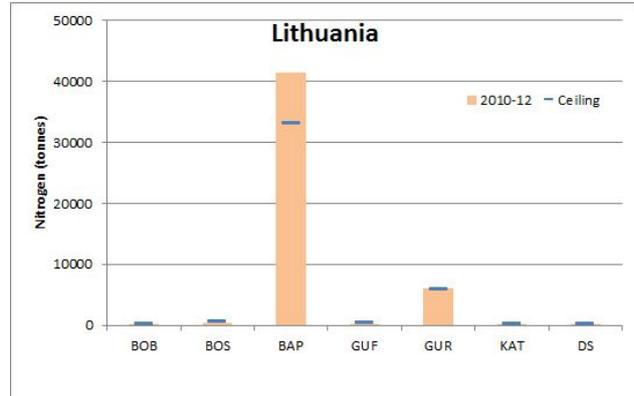
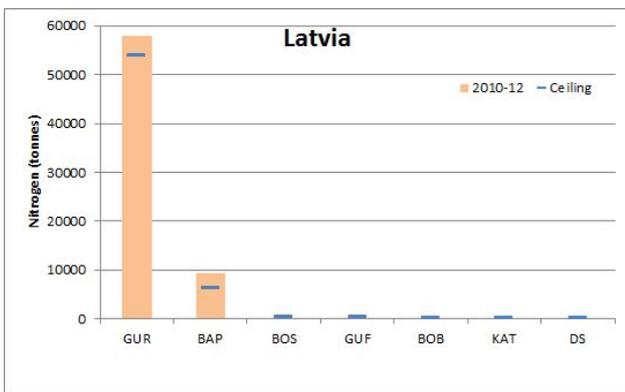
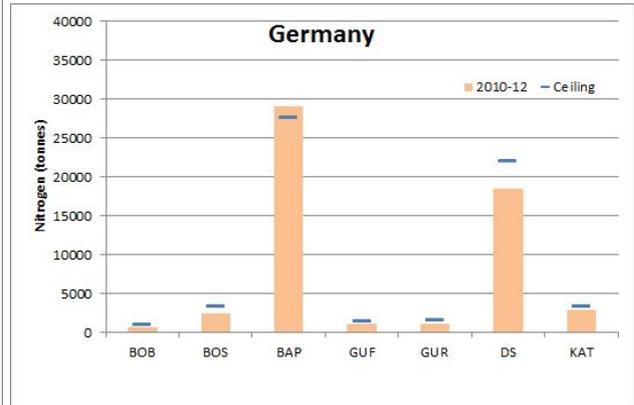
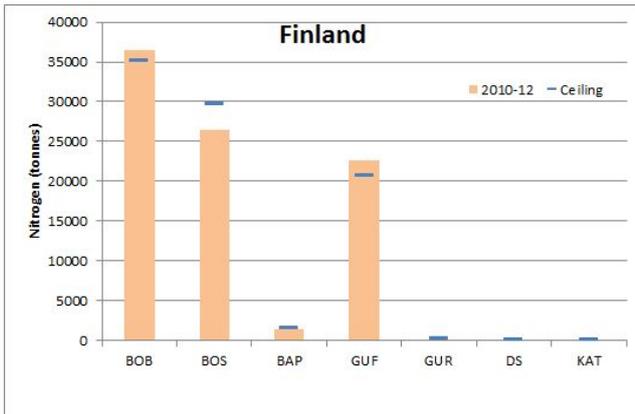
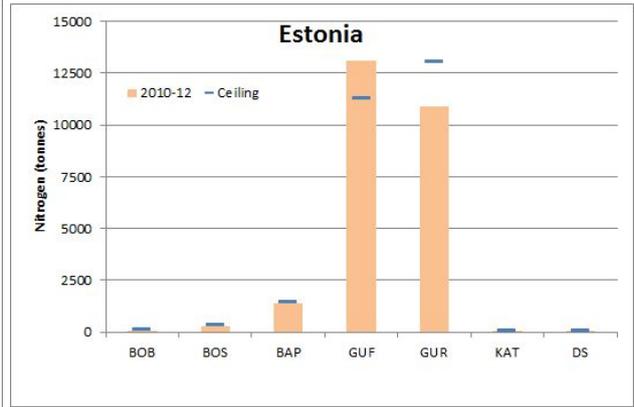
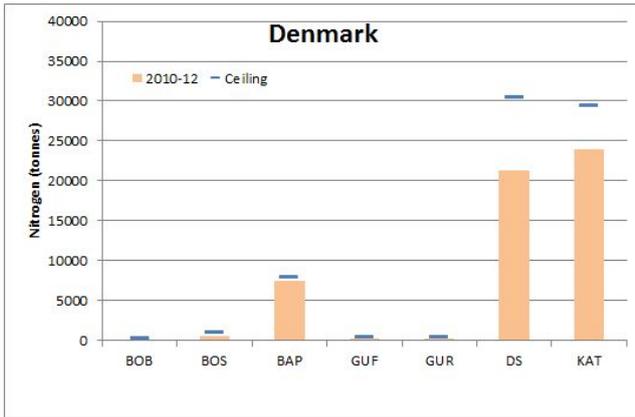
### **What is the distance from the target?**

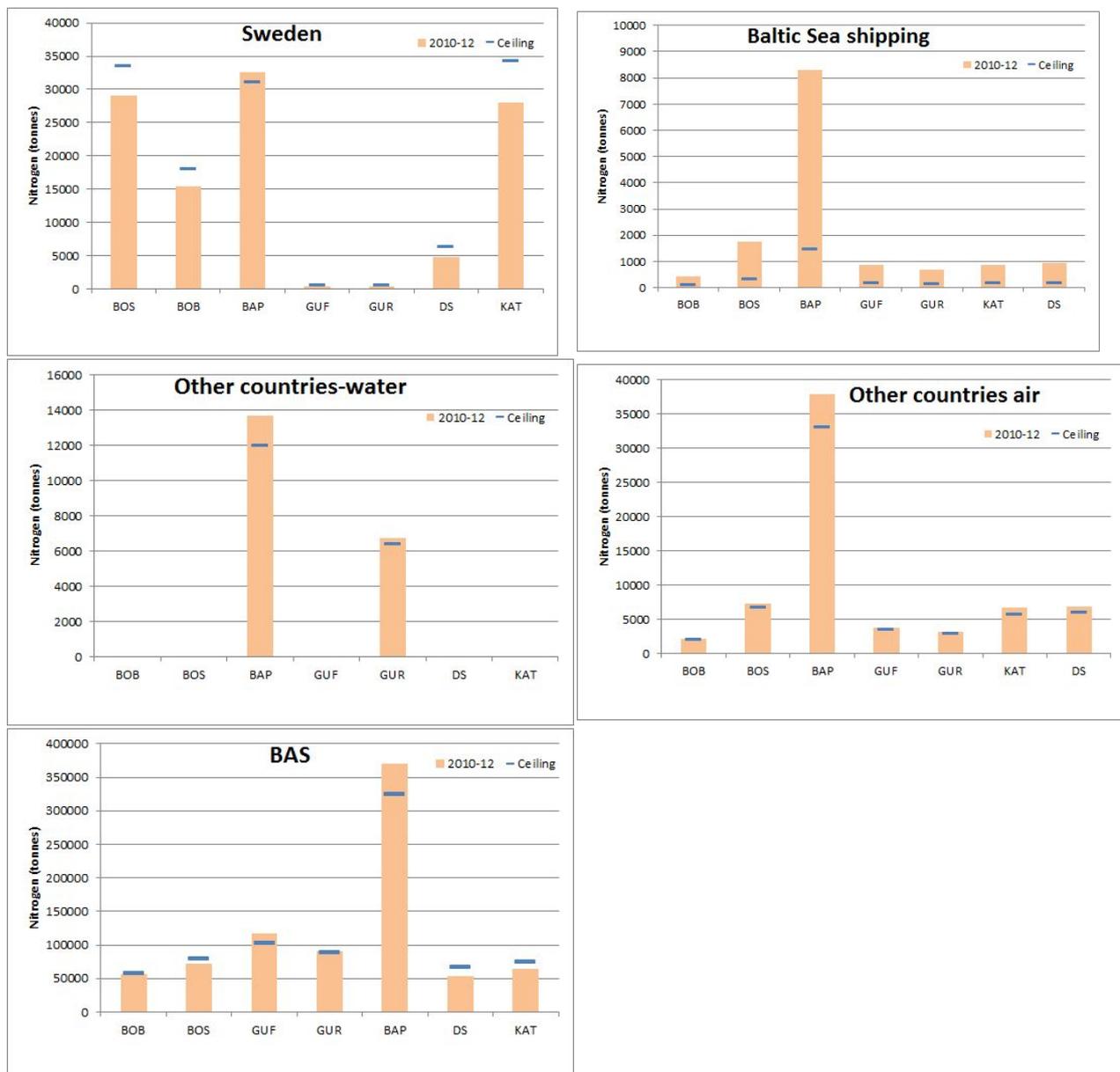
The distance from fulfilling the reduction target country by basin (or the nutrient input ceiling) can be expressed in tons in bar diagrams e.g. as in fig. 1 below taken for the first CART follow-up assessment. Using tons is relevant when evaluating missing reduction with the expected effect from different measures.

Although if we want to compare distance from targets between sub-basins and countries, it could be more comprehensive to express the distance from the target as a percentages of fulfilment where 100 % is just fulfilled taking into account uncertainties, numbers > 100 % indicates that extra reductions have been achieved and numbers < 100 % is reductions requirements are not yet met (and we could add colours – green numbers when fulfilled and red when they are not fulfilled). The results could be shown either on a map or in a table country pr., basin.

The distance could also be indicated by using graded colours scales (green, yellow and red) as an alternative to the percentages mentioned above.

The net inputs used for evaluation of “distance to the target” should be the same as used under the paragraph “Whether the reduction targets are achieved”.





**Figure 1.** An example of visualizing of “the distance from the target”.

Average normalized net air- and waterborne nitrogen inputs in 2010-2012 compared with nitrogen input ceilings (blue line) per country (and source) per sub-basin. From “Svendsen, L.M., Gustafsson, B., Pyhälä, M. 2015. Assessment for fulfilment of nutrient reduction targets of the HELCOM Nutrient Reduction Scheme.”

### What is the trend in inputs?

The development in the normalized net nutrient input indicates whether inputs in a selected period progresses in the right direction. If the net input from a country to a sub-basin is higher than the net inputs ceilings (CART not fulfilled), it is important to know whether the net inputs have been reduced during the latest xx years. Trend analysis serves to assess whether the input increase or decrease significantly, and if the trend is significant, then the changes within the period could be estimated.

Normalized annual net inputs of nitrogen and phosphorus from a country to a sub-basin are tested for trends. The trend analysis includes test for break points, e.g. as if there have been a significant decrease from 1995 to 2008 in total phosphorus inputs to a sub-basin and afterwards no trend in inputs, then no trend is used for inputs after 2008 and no changes can be calculated in net inputs after 2008. For periods with significant

trend the changes in net inputs can be expressed as an annual change in tonnes nitrogen or phosphorus or a percentages change during the period.

Presenting trend (country pr. basin):

- show the normalized annual net inputs of nitrogen and phosphorus country by basin including a trend line if any trend, including with break point and not linear trends
- indicate in e.g. a table or a map a number indicating the percentage change in net inputs during a specified period, or show trends with and arrow (up = increase, down = decrease in inputs).

It is generally assumed that we are presenting total nitrogen and phosphorus inputs pr. country and sub-basin, but if required, it is possible to divide net inputs in riverine, direct (or waterborne = riverine + direct) and atmospheric compartments.