Baltic Marine Environment Protection Commission

Seventh Meeting of the Working Group on Reduction of Pressures from the Baltic Sea Catchment Area

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## Background

The Ministerial declaration 2013, implies an option to account in proportion the effect of extra reductions on a neighboring basin with reduction targets. HOD 51-2016 endorsed the use of the methodology for accounting extra reduction as a trial calculation in the PLC-6 assessment.

Implementing the decision of PRESSURE 6-2017 (Outcome, para 7.28) the RedCore DG and PLC-6 project group elaborated a document containing a list of sub-basins where the extra reduction methodology can be applied and which countries can do that for their reduction targets. The Contracting Parties agreed on the sub-basins relevant to the use of the extra-reduction methodology for their national reduction targets in June 2017.

This document contains preliminary results, obtained by PLC-6 project, applying the methodology to account extra reductions in the assessment of progress towards national reduction targets.

## Action requested

The Meeting is invited to agree on the results of using the extra reduction methodology to evaluate the progress towards national reduction targets.

# Calculations of reallocation of extra reductions to basins with missing reductions for the assessment of CART

This document presents preliminary results from accounting for extra reductions following the principles and methods presented in previous document (Pressure 5, doc 8-3) and discussed at HOD 51 and the MAI-CART workshop 1 in Stockholm in March 2017.

The followed principles agreed to be used for a test case on the PLC6 CART assessment results are:

1. **Accounting should be based on countries individually**

This implies that countries can plan and implement measures across basins at their own discretion as long as it results in conforming to CART after accounting of extra reduction is performed.

2. **Countries could claim accounting for missing reductions even if MAI is exceeded due to inputs from other countries**

No country should need to wait for any other country before claiming themselves fulfilment of CART.

3. **Any relocation of measures should lead to at least the same environmental improvement as if CART were implemented**

This is imperative for the GES to be achieved eventually. Inevitably, using extra reductions will lead to less inputs than MAI as seen as a total for the Baltic Sea, but its distribution need to be such that GES will be achieved everywhere.

4. **The effect of extra reductions on neighboring basins with missing reductions should be estimated given that these are minor deviations from MAI**

The Baltic Sea is a strongly perturbed system and hence, functioning quite different today compared to how it will function when measures been implemented and status approach GES. The whole calculation of MAI is taking this into account and when deviations to MAI are to be analysed, it should be done assuming that we are close to GES.

5. **Accounting for extra reductions in connection with CART follow-up assessments are to be performed in a uniform way supervised by RedCore DG**

Accounting for extra reductions should be included in the regular CART assessment using a common and harmonized methodology. RedCore DG is the forum that supervises development of methodology and, after appropriate approval, implementation of this in the assessment.

6. **The Archipelago Sea phosphorus input reductions should be accounted in the Finnish CART for Gulf of Finland (cf. BSAP 2007)**

Already in BSAP 2007, Finland pointed out that models failed to separate the Archipelago Sea from Bothnian Sea and that this should be taken into account at a later stage. Also in the 2013 revision of the nutrient reduction scheme, model limitations failed to address separate MAI calculations for the Archipelago Sea. However, within the context of accounting for extra reduction can be an opportunity to take into account separately the nutrient inputs to Archipelago Sea from the remaining Bothnian Sea inputs.

7. **In the context of extra reduction accounting, reductions of phosphorus to Baltic Proper could be accounted as input reduction in Gulf of Finland**

In the calculations of MAI, the most limiting targets affecting the distribution of MAI for phosphorus were the winter nutrient concentrations in the Baltic Proper. Strictly following the principle of “maximum” inputs, led to a situation where this gave an optimal solution resulting in removal of virtually all phosphorus inputs to the Baltic Proper and barely any reductions to Gulf of Finland. This solution clearly violated the principle

of cost-efficiency so additional calculations based on cost functions for phosphorus input reductions were performed to distribute reductions between Baltic Proper and Gulf of Finland in a cost-efficient way. The obtained MAI results in conforming to phosphorus target in Baltic Proper, but in Gulf of Finland the resulting phosphorus concentrations will be significantly less than target. In line with this, it could be argued for states having phosphorus inputs both to Baltic Proper and Gulf of Finland, that *extra reductions* to Baltic Proper could be deducted from missing reductions in Gulf of Finland with 100% efficiency. However, one should keep in mind that the MAI for nitrogen to Gulf of Finland was determined from applying the HEAT approach, balancing nitrogen and phosphorus concentrations, so if MAI for phosphorus to Gulf of Finland is not achieved fully additional reductions on nitrogen inputs might be necessary.

8. **Following the precautionary principle, extra reduction accounting cannot be used to purposely increase inputs to a basin**

Although accounting of extra reductions is based current scientific knowledge and modelling, it comes with significant uncertainty and will sooner or later be subject of improvement. Therefore, it would be a risk for the environment to increase inputs to basins based on this methodology. In addition, a prerequisite for the calculations here is an environment close to GES and additional inputs today may cause significant deterioration of the present eutrophied state.

The calculations are based on the following equivalent reduction tables.

**Table 1: Equivalent reductions on nitrogen.** The table should be read so that each row provides the necessary input reduction to the basins to the left to provide the equivalent environmental effect in the basins in the top row, e.g. 1.3 ton reduction to GR gives the same effect in the BP as 1 ton reduction directly to BP. NB! That the factors are valid on single basin pairs under condition that all other basins fulfil MAI.

| | KT | DS | BP | BS | BB | GR | GF |
|---|---|---|---|---|---|---|---|
| KT | 1 | 7.29 | – | – | – | – | – |
| DS | 1.70 | 1 | 4.61 | – | – | – | – |
| BP | – | – | 1 | – | – | – | – |
| BS | – | – | – | 1 | 7.79 | – | – |
| BB | – | – | – | 1.06 | 1 | – | – |
| GR | – | – | 1.29 | – | – | 1 | – |
| GF | – | – | 4.00 | – | – | – | 1 |

**Table 2: Equivalent reductions on phosphorus.** The table should be read so that each row provides the necessary input reduction to the basins to the left to provide the equivalent environmental effect in the basins in the top row, e.g. 1.5 ton reduction to BS gives the same effect in the BP as 1 ton reduction directly to BP. NB! That the factors are valid on single basin pairs under condition that all other basins fulfil MAI.

| | KT | DS | BP | BS | BB | GR | GF |
|---|---|---|---|---|---|---|---|
| KT | 1 | 4.03 | – | – | – | – | – |
| DS | 0.84 | 1 | 3.18 | – | – | – | – |
| BP | 2.39 | 2.79 | 1 | 3.42 | 8.53 | – | 3.93 |
| BS | 3.81 | 4.64 | 1.50 | 1 | 2.57 | – | 6.00 |
| BB | – | – | 8.89 | 8.35 | 1 | – | – |
| GR | 3.79 | 4.40 | 1.53 | 4.95 | – | 1 | 6.55 |
| GF | 3.51 | 4.04 | 1.25 | 4.18 | – | – | 1 |

Calculations are made on the basis of the draft CART assessment by late September 2017 (doc. x.x PRESSURE 7 2017) on extra and missing reductions obtained using the trend method.

## Germany

### Nitrogen

Germany have extra reduction to DS that can be used to compensate fully for missing reduction in KAT and about 10% of the missing reduction to BAP. There is no significant feedback between BAP and KAT for small changes, therefore the extra reduction to DS can be used for both BAP and KAT.

| Germany TN | BOB | BOS | BAP | GUF | GUR | DS | KAT |
|---|---|---|---|---|---|---|---|
| Extra reduction | 38 | 214 | | | 42 | 3064 | |
| Missing reduction | | | 6866 | 177 | | | 775 |

| Germany TN | BOB | BOS | BAP | GUF | GUR | DS | KAT |
|---|---|---|---|---|---|---|---|
| Missing reduction | | | 6866 | 177 | | | 775 |
| Used extra reduction | | | 698 | | | | 1804 |
| Missing reduction after extra reduction | | | 6168 | 177 | | | 0 |

### Phosphorus

Germany have extra reduction to DS that can be used to compensate for a portion of the missing reduction to BAP.

| Germany TP | BOB | BOS | BAP | GUF | GUR | DS | KAT |
|---|---|---|---|---|---|---|---|
| Extra reduction | | | | | | 24 | |
| Missing reduction | | | 163 | | | | |

| Germany TP | BOB | BOS | BAP | GUF | GUR | DS | KAT |
|---|---|---|---|---|---|---|---|
| Missing reduction | | | 163 | | | | |
| Used extra reduction | | | 8 | | | | |
| Missing reduction after extra reduction | | | 155 | | | | |

## Denmark

### Nitrogen

Denmark fulfil nitrogen reduction requirements to all basins.

| Denmark TN | BOB | BOS | BAP | GUF | GUR | DS | KAT |
|---|---|---|---|---|---|---|---|
| Extra reduction | 57 | 252 | 433 | 51 | 99 | 6148 | 3126 |
| Missing reduction | | | | | | | |

### Phosphorus

Denmark have an extra reduction of 1 ton/yr that in principle can be used for compensating a part of the missing reduction to BAP, but in practice the change is insignificant since the extra reduction is so small.

| Denmark TP | BOB | BOS | BAP | GUF | GUR | DS | KAT |
|---|---|---|---|---|---|---|---|
| Extra reduction | | | | | | 1 | 119 |
| Missing reduction | | | 47 | | | | |

## Estonia

### Nitrogen

Estonia has extra reduction to GUR that can be used to compensate for the missing reduction to BAP.

| Estonia TN | BOB | BOS | BAP | GUF | GUR | DS | KAT |
|---|---|---|---|---|---|---|---|
| Extra reduction | | | | | 899 | | |
| Missing reduction | 11 | 31 | 194 | 835 | | 0 | 2 |

| Estonia TN | BOB | BOS | BAP | GUF | GUR | DS | KAT |
|---|---|---|---|---|---|---|---|
| Missing reduction | 11 | 31 | 194 | 835 | | | 2 |
| Used extra reduction | | | 699 | | | | |
| Missing reduction after extra reduction | 11 | 31 | 0 | 835 | | | 2 |

### Phosphorus

Estonia has extra reduction to GUR that can be used to compensate for the missing reduction to BAP.

| Estonia TP | BOB | BOS | BAP | GUF | GUR | DS | KAT |
|---|---|---|---|---|---|---|---|
| Extra reduction | | | | | 19 | | |
| Missing reduction | | | 12 | 132 | | | |

| Estonia TP | BOB | BOS | BAP | GUF | GUR | DS | KAT |
|---|---|---|---|---|---|---|---|
| Missing reduction | | | 12 | 132 | | | |
| Used extra reduction | | | 12 | | | | |
| Missing reduction after extra reduction | | | 0 | 132 | | | |

## Finland

### Nitrogen

Finland can use the extra reduction to GUR to compensate for a portion of the missing reduction to BAP.

| Finland TN | BOB | BOS | BAP | GUF | GUR | DS | KAT |
|---|---|---|---|---|---|---|---|
| Extra reduction | 329 | 585 | | | 43 | 17 | 13 |
| Missing reduction | | | 123 | 1600 | | | |

| Finland TN | BOB | BOS | BAP | GUF | GUR | DS | KAT |
|---|---|---|---|---|---|---|---|
| Missing reduction | | | 123 | 1600 | | | |
| Used extra reduction | | | 37 | | | | |
| Missing reduction after extra reduction | | | 86 | 1600 | | | |

### Phosphorus

Finland has extra reduction to BOB that can compensate a portion of the missing reduction to BOS.

| Finland TP | BOB | BOS | BAP | GUF | GUR | DS | KAT |
|---|---|---|---|---|---|---|---|
| Extra reduction | 137 | | | | | | |
| Missing reduction | | 56 | | 351 | | | |

| Finland TP | BOB | BOS | BAP | GUF | GUR | DS | KAT |
|---|---|---|---|---|---|---|---|
| Missing reduction | | 56 | | 351 | | | |
| Used extra reduction | | 16 | | | | | |
| Missing reduction after extra reduction | | 40 | | 351 | | | |

## Lithuania

### Nitrogen

Lithuania has no extra reduction that can be used to compensate any of the missing reductions.

| Lithuania TN | BOB | BOS | BAP | GUF | GUR | DS | KAT |
|---|---|---|---|---|---|---|---|
| Extra reduction | 2 | 34 | | | | | |
| Missing reduction | | | 15693 | 64 | 2740 | 1 | 12 |

## Phosphorus

Lithuania has extra reduction to GUR that can be used to compensate a portion of the missing reduction to BAP.

| Lithuania TP | BOB | BOS | BAP | GUF | GUR | DS | KAT |
|---|---|---|---|---|---|---|---|
| Extra reduction | | | | | 82 | | |
| Missing reduction | | | 427 | | | | |

| Lithuania TP | BOB | BOS | BAP | GUF | GUR | DS | KAT |
|---|---|---|---|---|---|---|---|
| Missing reduction | | | 427 | | | | |
| Used extra reduction | | | 53 | | | | |
| Missing reduction after extra reduction | | | 374 | | | | |

## Latvia

### Nitrogen

Latvia has extra reductions to GUR that can be used to compensate for the missing reduction to BAP. (NB! Due to new data for border loads in Daugava, input ceilings for nitrogen to GUR from LV, BY and RU may need to be adjusted).

| Latvia TN | BOB | BOS | BAP | GUF | GUR | DS | KAT |
|---|---|---|---|---|---|---|---|
| Extra reduction | | | | | 7218 | | |
| Missing reduction | 6 | 19 | 5299 | 71 | | 1 | 5 |

| Latvia TN | BOB | BOS | BAP | GUF | GUR | DS | KAT |
|---|---|---|---|---|---|---|---|
| Missing reduction | 6 | 19 | 5299 | 71 | | 1 | 5 |
| Used extra reduction | | | 5609 | | | | |
| Missing reduction after extra reduction | 6 | 19 | 0 | 71 | | 1 | 5 |

### Phosphorus

Latvia has no extra reduction.

| Latvia TP | BOB | BOS | BAP | GUF | GUR | DS | KAT |
|---|---|---|---|---|---|---|---|
| Extra reduction | | | | | | | |
| Missing reduction | | | 266 | | 578 | | |

## Poland

### Nitrogen

Poland has no extra reduction that can be used to compensate for missing reduction in other basins.

| Poland TN | BOB | BOS | BAP | GUF | GUR | DS | KAT |
|---|---|---|---|---|---|---|---|
| Extra reduction | 8 | 87 | | | | | |
| Missing reduction | | | 26990 | 268 | 81 | 16 | 187 |

### Phosphorus

Poland has only input to BAP.

| Poland TP | BOB | BOS | BAP | GUF | GUR | DS | KAT |
|---|---|---|---|---|---|---|---|
| Extra reduction | | | | | | | |
| Missing reduction | | | 6701 | | | | |

## Russia

### Nitrogen

Russia has no extra reduction.

| Russia TN | BOB | BOS | BAP | GUF | GUR | DS | KAT |
|---|---|---|---|---|---|---|---|
| Extra reduction | | | | | | | |
| Missing reduction | 134 | 274 | 5669 | 16570 | 1997 | 20 | 55 |

### Phosphorus

Russia has no extra reduction.

| Russia TP | BOB | BOS | BAP | GUF | GUR | DS | KAT |
|---|---|---|---|---|---|---|---|
| Extra reduction | | | | | | | |
| Missing reduction | | | 531 | 757 | 9 | | |

## Sweden

### Nitrogen

Sweden has extra reduction to DS and GUR that can be used to compensate for some of the missing reduction to BAP.

| Sweden TN | BOB | BOS | BAP | GUF | GUR | DS | KAT |
|---|---|---|---|---|---|---|---|
| Extra reduction | 3322 | 4738 | | | 32 | 944 | 6755 |
| Missing reduction | | | 1833 | 33 | | | |

| Sweden TN | BOB | BOS | BAP | GUF | GUR | DS | KAT |
|---|---|---|---|---|---|---|---|
| Missing reduction | | | 1833 | 33 | | | |
| Used extra reduction | | | 230 | | | | |
| Missing reduction after extra reduction | | | 1603 | 33 | | | |

### Phosphorus

Sweden have extra reduction to BOS and DS that can be used to compensate for some of the missing reduction to BAP. In addition, the extra reduction to BOS can be used to compensate for some of the missing reduction to BOB, but here one need to take into account the missing reduction in BAP as well (see Pressure 5, Doc 8-3).

| Sweden TP | BOB | BOS | BAP | GUF | GUR | DS | KAT |
|---|---|---|---|---|---|---|---|
| Extra reduction | | 252 | | | | 19 | 23 |
| Missing reduction | 173 | | 416 | | | | |

| Sweden TP | BOB | BOS | BAP | GUF | GUR | DS | KAT |
|---|---|---|---|---|---|---|---|
| Missing reduction | 173 | | 416 | | | | |
| Used extra reduction | 78 | | 174 | | | | |
| Missing reduction after extra reduction | 95 | | 242 | | | | |