Results of computation of updated nutrient input ceilings (NICs)

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Primary objective:
Introduce Nutrient Input Ceilings (NIC) as replacement of Country-Allocated Reduction Targets in the BSAP

1. NIC has been de-facto been used in the follow-up of progress towards reaching CART
2. NIC directly ensure consistency with MAI

Secondary objective:
Update allocation according to:

1. Expected reductions from NECA implementation for Baltic **and North Sea** shipping
2. Highlight contributions from the major transboundary rivers
    i. Enhance the cooperation with river basin commissions/management authorities
    ii. Increase robustness of the reduction scheme
3. Take into account updated data and data processing methodology
    i. New emissions and deposition of N from EMEP
    ii. Riverine inputs flow normalized on individual catchment level (> 200 catchments)
    iii. New transboundary load information (border loads and retention estimates)
    iv. New reporting of old data in some cases
    v. New calculations of expected nitrogen deposition reductions by 2030 from implementation of Gothenburg protocol and NECA are available from ENIRED II project

Maintain allocation principles from 2013 Ministerial Declaration (except for *)

- Reductions are shared in proportion to nutrient inputs in the period 1997-2003.
- Expected reductions due to emission reductions in non-HELCOM countries from implementation of the Gothenburg Protocol are be taken into account before allocation.
- Expected reductions due to emission reductions by Baltic Sea **and North Sea*** shipping from implementation of NECA are taken into account before allocation.
- Each HELCOM country as well as other countries contributing with waterborne transboundary inputs (i.e., Belarus, Czech Republic and Ukraine) should reduce their inputs in proportion to their contribution to the inputs to the Baltic Sea in the reference period.

Difference in new and old atmospheric deposition reference inputs

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New calculations by EMEP resulted in higher deposition

Atmospheric deposition

	NEW REF	2013 REF	PERCENT CHANGE
BOB	10168	8185	24
BOS	31835	24767	29
BAP	162785	126243	29
GUF	18363	13333	38
GUR	11860	10045	18
DS	31293	24393	28
KAT	27717	20277	37
BAS	**294022**	**227242**	**29**

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Difference between new and old waterborne inputs in the reference period

- Only relatively small changes except for TP to GUR

Total Nitrogen

	NEW REF	2013 REF	PERCENT CHANGE
BOB	52816	49437	6.8
BOS	55883	54605	2.3
BAP	288442	297679	-3.1
GUF	110118	102919	7.0
GUR	78733	78373	0.5
DS	41996	41605	0.9
KAT	58907	58484	0.7
BAS	686895	683102	0.6

Total Phosphorus

	NEW REF	2013 REF	PERCENT CHANGE
BOB	2653	2494	6.4
BOS	2439	2379	2.5
BAP	16632	17274	-3.7
GUF	7987	7359	8.5
GUR	2828	2235	26.5
DS	1366	1496	-8.7
KAT	1553	1569	-1.0
BAS	35458	34807	1.9

Difference between new and old total inputs in the reference period

- General but relatively modest increase in TN
- Major increase for TP in GUR due to improved data, otherwise modest differences

Total Nitrogen

	NEW REF	2013 REF	PERCENT CHANGE
BOB	62984	57622	9
BOS	87718	79372	11
BAP	451228	423922	6
GUF	128481	116252	11
GUR	90593	88418	2
DS	73288	65998	11
KAT	86625	78762	10
BAS	**980917**	**910346**	**8**

Total Phosphorus

	NEW REF	2013 REF	PERCENT CHANGE
BOB	2835	2675	6
BOS	2833	2773	2
BAP	17678	18320	-4
GUF	8137	7509	8
GUR	2921	2328	25
DS	1470	1601	-8
KAT	1671	1687	-1
BAS	**37546**	**36894**	**2**

Separate NIC calculation for shipping and other countries atmospheric deposition based on expected reductions until 2030

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EMEP calculated depositions in 2005 and 2030 within the ENIRED II project. These scenarios had some offset compared to the normalized time-series used for the reference period. Therefore a ceiling was computed based on that the relative change in the ENIRED II data was applied to the normalized time-series deposition in 2005. Expected reduction was computed by subtracting reference inputs from ceilings.

	BOB	BOS	BAP	GUF	GUR	DS	KAT	BAS
REFERENCE INPUTS								
OC	2877	10423	56263	5735	4169	10911	10318	100696
BSS	604	2360	10412	1308	776	1282	1225	17967
NOS	389	1292	6561	548	414	1717	1885	12806
EXPECTED REDUCTION								
OC	1502	5415	29316	2750	1981	5978	5816	52758
BSS	320	1219	5232	633	431	631	524	8989
NOS	258	817	4134	352	264	988	1001	7814
NUTRIENT INPUT CEILINGS								
OC	1375	5008	26947	2985	2188	4933	4502	47938
BSS	284	1141	5180	675	345	651	701	8978
NOS	131	475	2427	196	150	729	884	4992

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Change in ceilings and reference inputs of Baltic Sea shipping

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Ceilings for Baltic Sea shipping are much higher than previously:

a) Partly because of higher depositions

b) Mainly because less expected reduction

Ceilings

	NEW CEILING	2013 CEILING	PERCENT CHANGE
BOB	284	72	294
BOS	1141	292	291
BAP	5180	1434	261
GUF	675	147	359
GUR	345	112	208
DS	651	165	295
KAT	701	149	371
BAS	**8978**	**2372**	**278**

Reference inputs

	NEW REF	2013 REF	PERCENT CHANGE
BOB	604	361	67
BOS	2360	1461	62
BAP	10412	7169	45
GUF	1308	739	77
GUR	776	561	38
DS	1282	826	55
KAT	1225	751	63
BAS	17967	11868	51

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Proposition: separate out the major transboundary rivers

NEMUNAS: **LT**, BY

BARTA+VENTA: **LV**, LT

LIELUPE: **LV**, LT

DAUGAVA: **LV**, LT, BY, RU

ODER: **PL**, DE, CZ

VISTULA: **PL**, BY, UA

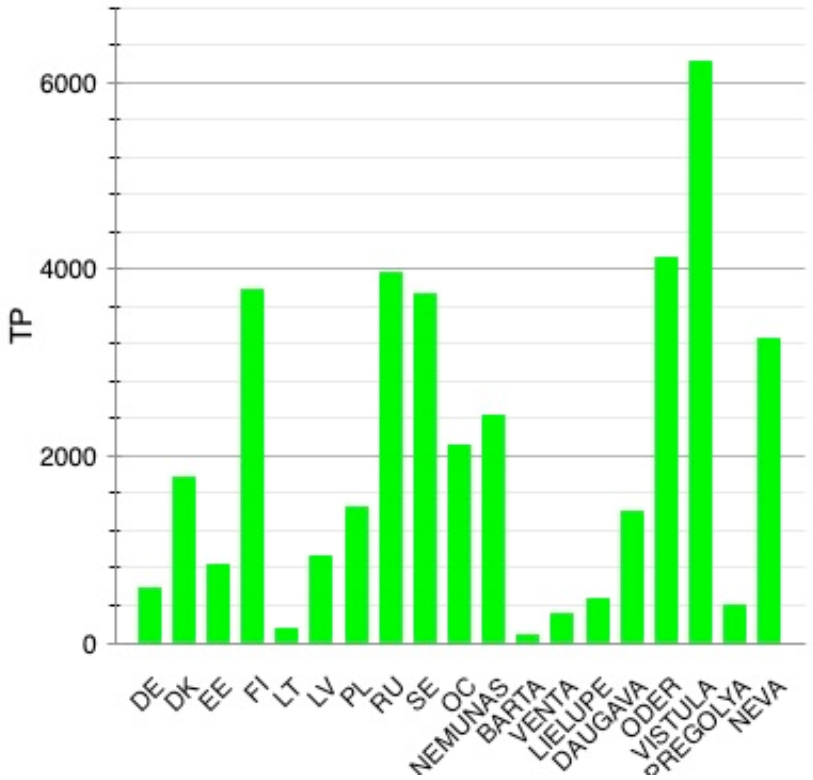
PREGOLYA: **RU**, PL

NEVA: **RU**, FI

NB! This is the same transboundary rivers and countries considered in the 2013 MD CART

These rivers contribute with approximately 50% of the waterborne (and 33% of total TN) inputs to Baltic Sea

TP inputs to Baltic Sea in the reference period, the rivers are not included in countries



Proposition: separate out the major transboundary rivers

- Assign specific NIC to each of the transboundary rivers
- The rivers are not included in the country NIC in the main tables
- Make separate allocation of NIC between the countries of the transboundary river

Advantages:

- The joint responsibility of the rivers are highlighted, which would promote cooperation within the river catchments
- NICs in the main table will not be dependent on the very uncertain determinations of transboundary share, so updates of, e.g., retention estimates will only affect the countries within the specific river catchment

How to calculate NIC

1. Note that the sum of all NICs for a basin should equal MAI

$$\sum_j NIC_{i,j} = MAI_i$$

index j corresponds to Sources/Country

index i corresponds to basin

2. NIC for shipping and OC atmospheric deposition is set already which means that the whole MAI is not available to share between CPs and rivers but only:

$$\sum_{CPs+Rivers} NIC_{i,j} = MAI_i - NIC_{i,OC} - NIC_{i,BSS} - NIC_{i,NOS}$$

How to calculate NIC

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3. The remaining part of MAI is shared by CPs and Rivers in proportion to their respective share of the inputs in the reference period

$$NIC_{i,j} = \frac{REF_{i,j}}{\sum_{CPs+Rivers} REF_{i,j}} (MAI_i - NIC_{i,OC} - NIC_{i,BSS} - NIC_{i,NOS})$$

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First example: TP Bothnian Bay

Country	Reference inputs
FI	1790
SE	863
OC	181
All	**2835**

MAI = 2675

1. OC will not change so we have left MAI – OC = 2675 – 181 = 2494 to allocate
2. NIC_{FI} will then be given according to the proportion of Finnish loads to the sum of Finnish and Swedish loads, i.e.,

$$NIC_{FI} = \frac{1790}{1790 + 863} \times 2494 = 1683$$

3. Correspondingly, the Swedish proportion of the loads will provide the Swedish NIC, i.e.,

$$NIC_{SE} = \frac{863}{1790 + 863} \times 2494 = 811$$

Second example: TN Daugava

Country	Reference inputs
DE	1737
DK	460
EE	13022
FI	293
LT	459
LV	12151
PL	1586
RU	658
SE	522
OC	4169
BSS	776
NOS	414
LIELUPE	15771
DAUGAVA	38574
All	**90593**

MAI = 88417

NIC_{OC} = 2188

NIC_{BSS} = 345

NIC_{NOS} = 150

1. Remaining NIC to allocate is MAI – NIC_{OC} - NIC_{BSS} - NIC_{NOS} = 88417 – 2188 – 345 -150 = 85734
2. $NIC_{DAUGAVA}$ will be given according to the proportion of Daugava loads to the sum of all other CPs and Lielupe. Using the table we can find the sum by subtracting OC, BSS and NOS from the total, i.e.

$$NIC_{DAUGAVA} = \frac{38574}{90593 - 4169 - 776 - 414} \times 85734 = 38801$$

NIC tables - TN

	BOB	BOS	BAP	GUF	GUR	DS	KAT	BAS
DE	946	3923	32281	1645	1747	23647	4662	68852
DK	281	1149	9026	420	463	28067	28525	67931
EE	113	404	1478	11330	13099	22	24	26471
FI	35086	28677	1827	15627	295	76	89	81677
LT	108	495	3620	305	462	65	80	5135
LV	74	330	2789	246	12223	31	34	15727
PL	668	3127	35486	1406	1595	1481	1444	45206
RU	839	1994	7321	22875	662	238	246	34175
SE	17718	32651	30691	625	525	6056	32810	121076
OC	1375	5008	26947	2985	2188	4933	4502	47938
BSS	284	1141	5180	675	345	651	701	8978
NOS	131	475	2427	196	150	729	884	4992
NEMUNAS			29338					29338
BARTA			957					957
VENTA			6033					6033
LIELUPE					15864			15864
DAUGAVA					38801			38801
ODER			49298					49298
VISTULA			74808					74808
PREGOLYA			5494					5494
NEVA				43462				43462
MAI	57622	79372	325000	101800	88417	65998	74000	792209

NIC tables - TP

	BOB	BOS	BAP	GUF	GUR	DS	KAT	BAS
DE			71			401		472
DK			21			979	815	1815
EE			9	225	185			418
FI	1683	1245		297				3224
LT			50					50
LV			62		499			560
PL			543					543
RU			146	1531				1677
SE	811	1134	318			116	754	3133
OC	181	394	1046	150	93	105	118	2087
NEMUNAS			914					914
BARTA			25					25
VENTA			106					106
LIELUPE					302			302
DAUGAVA					942			942
ODER			1554					1554
VISTULA			2350					2350
PREGOLYA			147					147
NEVA				1398				1398
MAI	2675	2773	7360	3600	2020	1601	1687	21716

Each transboundary river has a “separate” allocation of NIC

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Total Nitrogen

RIVER	NIC	DE	FI	LT	LV	PL	RU	BY	CZ	UA
NEMUNAS	29338			18934				10404		
BARTA	957			377	581					
VENTA	6033			2896	3137					
LIELUPE	15864			7255	8608					
DAUGAVA	38801			1103	22244		2634	12820		
ODER	49298	1796				43951			3551	
VISTULA	74808					70063		3052		1693
PREGOLYA	5494					2498	2995			
NEVA	43462		4855				38607			

Total Phosphorus

RIVER	NIC	DE	FI	LT	LV	PL	RU	BY	CZ	UA
NEMUNAS	914			628				286		
BARTA	25			5	20					
VENTA	106			20	86					
LIELUPE	302			135	167					
DAUGAVA	942			40	395		99	407		
ODER	1554	38				1459			57	
VISTULA	2350					2240		63		47
PREGOLYA	147					51	96			
NEVA	1398		20				1378			

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The main and transboundary sharing tables can be combined to a national net NIC as we use today

For example for Lithuania

RIVER	NIC	DE	FI	LT	LV	PL	RU	BY	CZ	UA
NEMUNAS	914			628				286		
BARTA	25			5	20					
VENTA	106			20	86					
LIELUPE	302			135	167					
DAUGAVA	942			40	395		99	407		
ODER	1554	38				1459			57	
VISTULA	2350					2240		63		47
PREGOLYA	147					51	96			
NEVA	1398		20				1378			

Net NIC to Baltic Proper = 50 + 628 + 5 + 20 = 703

	BOB	BOS	BAP	GUF	GUR	DS	KAT	BAS
DE			71			401		472
DK			21			979	815	1815
EE			9	225	185			418
FI	1683	1245		297				3224
LT			50					50
LV			62		499			560
PL			543					543
RU			146	1531				1677
SE	811	1134	318			116	754	3133
OC	181	394	1046	150	93	105	118	2087
NEMUNAS			914					914
BARTA			25					25
VENTA			106					106
LIELUPE					302			302
DAUGAVA					942			942
ODER			1554					1554
VISTULA			2350					2350
PREGOLYA			147					147
NEVA				1398				1398
MAI	2675	2773	7360	3600	2020	1601	1687	21716

Changes from current to new net nutrient input ceilings

Generally nitrogen net NIC increase due to the higher atmospheric deposition

Some major changes also due to waterborne transboundary updates

Total Nitrogen, change in %

	BOB	BOS	BAP	GUF	GUR	DS	KAT	BAS
DE	16	24	24	25	19	8	42	19
DK	21	27	14	26	21	-7	-3	-2
EE	19	27	5	1	1	23	21	1
FI	0	-3	16	-1	16	19	16	-1
LT	-2	1	-22	17	52	21	33	-10
LV	17	21	7	35	-20	30	37	-17
PL	4	12	-6	21	17	32	31	-4
RU	18	29	11	-2	31	37	41	2
SE	-1	-2	-1	25	17	-3	-4	-2
OC (INCL NOS)	-20	-17	-11	-8	-17	-4	-3	-11
BSS	294	291	261	359	208	295	371	278
BY			84		102			92
CZ			32					32
UA			-13					-13
MAI	0	0	0	0	0	0	0	0

Changes from current to new net nutrient input ceilings

Some major changes in connection with transboundary rivers

LV corrected TP loads adding further to changes

Relatively large percentage changes between the countries draining to DS

Total Phosphorus, change in %

	BOB	BOS	BAP	GUF	GUR	DS	KAT	BAS
DE			8			14		13
DK			-1			-6	-2	-4
EE			9	-5	-23			-13
FI	1	-1		-2				0
LT			-15		6			-12
LV			126		96			100
PL			0					0
RU			-13	1	-47			-3
SE	-2	1	3			11	2	1
OC	0	0	0	0	0	0	0	0
BY			43		-49			-27
CZ			-47					-47
UA			43					43
MAI	0	0	0	0	0	0	0	0

Conclusions

- No changes to MAI or the allocation principles from MD2013
- Except addition of expected reduction from North Sea shipping by implementation of NECA
- Separate ceilings for the major transboundary rivers
  - Gives more robust reduction scheme, less sensitive to uncertain upstream division of nutrient inputs
  - Facilitate discussions with river basin management
  - Still possible with transparent and simple calculation of national NIC
  - Communicative advantage of follow-up of the progress of input reduction for these rivers
- A consistent recalculation with improved data sets

Personal reflection on assessment

Split into 2 parts:

- Make country-wise assessment using the national net NIC, i.e., including the transboundary parts of rivers in the country loads as today.
- Make an indicator-like separate assessment on the progress of the individual rivers. (Extension of the “Big river report”)