

The dynamic Integrated Budget tool

dynIB



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Adrian Leip (JRC) Juerg Heldstab (INFRAS)

> Serving society Stimulating innovation Supporting legislation



"Quantification of all major nitrogen fluxes across all sectors and media within given boundaries, and fluxes across these boundaries, on an annual basis" European Nitrogen Assessment, 2011

• <u>Pools</u>

- Energy and fuels
- Material and products in industry (processes)
- Humans and settlements
- Agriculture

- Forest and semi-natural vegetation including soils
- Waste
- Atmosphere
- Hydrosphere

UNECE 2013: Guidance document on national nitrogen budgets



Purpose of integrated Nitrogen Budgets (iNBs)

- (a) NBs are an efficient instrument for visualizing the N
 cascade and its potential impact;
- (b) NBs provide policymakers with information for **identifying intervention points**;

European Commission

- (c) NBs can provide a tool for **monitoring** the impact and environmental integrity of implemented policies;
- (d) NBs are useful for **comparisons** across countries;
- (e) NBs can help **pinpoint knowledge gaps** and thus contribute to improving the scientific understanding of the N cascade

iNBs cannot be used to evaluate the impact of a measure!!!!



Dynamic iNBs







Dynamic Integrated Budget - Approach



Constraints:

- Data sources and methods are divers
- Inconsistencies reflect current state of knowledge

Postulates:

- Use as little additional information as possible on top of existing iNBs
- Do not re-invent the wheel (no new bottom-up model)



Methods: ENB mainly model-based





Leip et al., 2011 – European Nitrogen Assessment



Methods: NNB-UK mix of data sources





Johnes et al. (2011) – European Nitrogen Assessment. Annex 16A

Unit: kt N/year



Situation around 1995-2008



How can National Nitrogen Budgets be used for assessment of future scenarios or mitigation options?

European Commission





Excel-user-interface

22



+ (m f_x 019 В С D Е F G н κ Μ Ν 0 Ρ Q Α L. 1 2 Legende: Mode (calib for calibration / proj for scenario calculation) neue Flüsse (ggü. ursprünglichem CH N-Modell): Nummer ab 50 aufw **EXPORT DATA** 3 proj aus Landw. 4 1994 Year to start calibration U aus Umwelt Flüsse aufgesplittet in Nrct und N2 FOR GAMS 5 P Ist hier ein Fehler? 2005 Year for calibration/use as base year for scenario aus Produktion 6 2020 Year for validation aus Abfall Flüsse aufgeteilt in mehrere Teilflüsse 7 8 *Short name (z.B. L14) *Beschreibung des Flusses flows INSPECT ▼ from ▼ to 9 comp v type Short name 19 🔻 20 🔻 20 v shock v Long name Comments 46.5 mineral fertilizer from industry to crop production 10 1 indu minf 14_2 67.0 52.5 46.5 crop Ntot RESULTS L4 20.7 22.9 21.0 0.0 emissions from livestock to air 11 2 anim atmo Ntot emis 12 L1 117.3 95.9 94.6 manure from storage to crop production 3 anim crop Ntot manu Nrct emissions from crop production to air (denitrification) 13 4 crop atmo Nrct emis L6 64.9 56.5 53.1 5 crop indu food ٤9 10.0 9.8 10.3 crop products to consumers 14 Ntot 15 6 crop anim Ntot feed L8 157.3 142.0 138.1 fodder from crop production to livestock 16 7 outs feed 13 21.8 32.9 36.6 imported fodder for livestock anim Ntot 17 L3 14.8 20.8 21.1 animal products to consumers 8 anim indu Ntot prod 18 9 atmo crop Ntot depo U4 35.3 27.2 22.3 deposition on crop production 19 L5 35.7 33.9 34.3 leaching from crop production to water 10 crop hydr Ntot emis 20 A5 26.3 29.3 sewage discharge and overflow from sewage treatment to water 11 indu hydr Ntot wast 29.4 37.5 21 12 atmo Ntot nfix U1 34.5 40.3 fixation by crops (legumes) crop 22 13 outs indu minf 14_1 72.6 54.3 47.6 47.6 total imports to industry (mainly mineral fertilizer) Ntot



Development of the dynIB-tool



Idea: TFRN-5 in Paris, October 2010 (during dinner...)

First implementation: TFRN-7 in Sankt Petersburg, February 2012

- implementation in excel
- application to CH-budgets 1994, 2005, projection 2020
- promising results, but showed limits of excel

Second implementation: TFRN-9 in Madrid, March 2014

- implementation in GAMS
- application to CH (full) budget and *simplified* budgets
- test on further budgets ... later this week

More details & training during

- EPNB session (Wednesday afternoon) and
- dynIB training session (Thursday morning)

