



International
Nitrogen Initiative

Developing global and regional performance indicators

Stakeholder engagement and Future Earth

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EU
Nitrogen
Expert Panel

EU-NEP

UNECE
Task Force on
Reactive
Nitrogen

TFRN



GPNM

UNEP/GPA
Global Partnership on
Nutrient Management

CBD

Conv. on
Biological Diversity

OECD

Organisation for Economic
Cooperation and Development

The European Nitrogen Assessment

Sources, Effects and Policy Perspectives

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Bruna Grizzetti



CAMBRIDGE

COMMENT

Vervuiling met stikstof kost miljarden

Nitrogen taint alert

Warning over nitrogen footprint

Pollution à l'azote : une lourde facture pour l'Europe

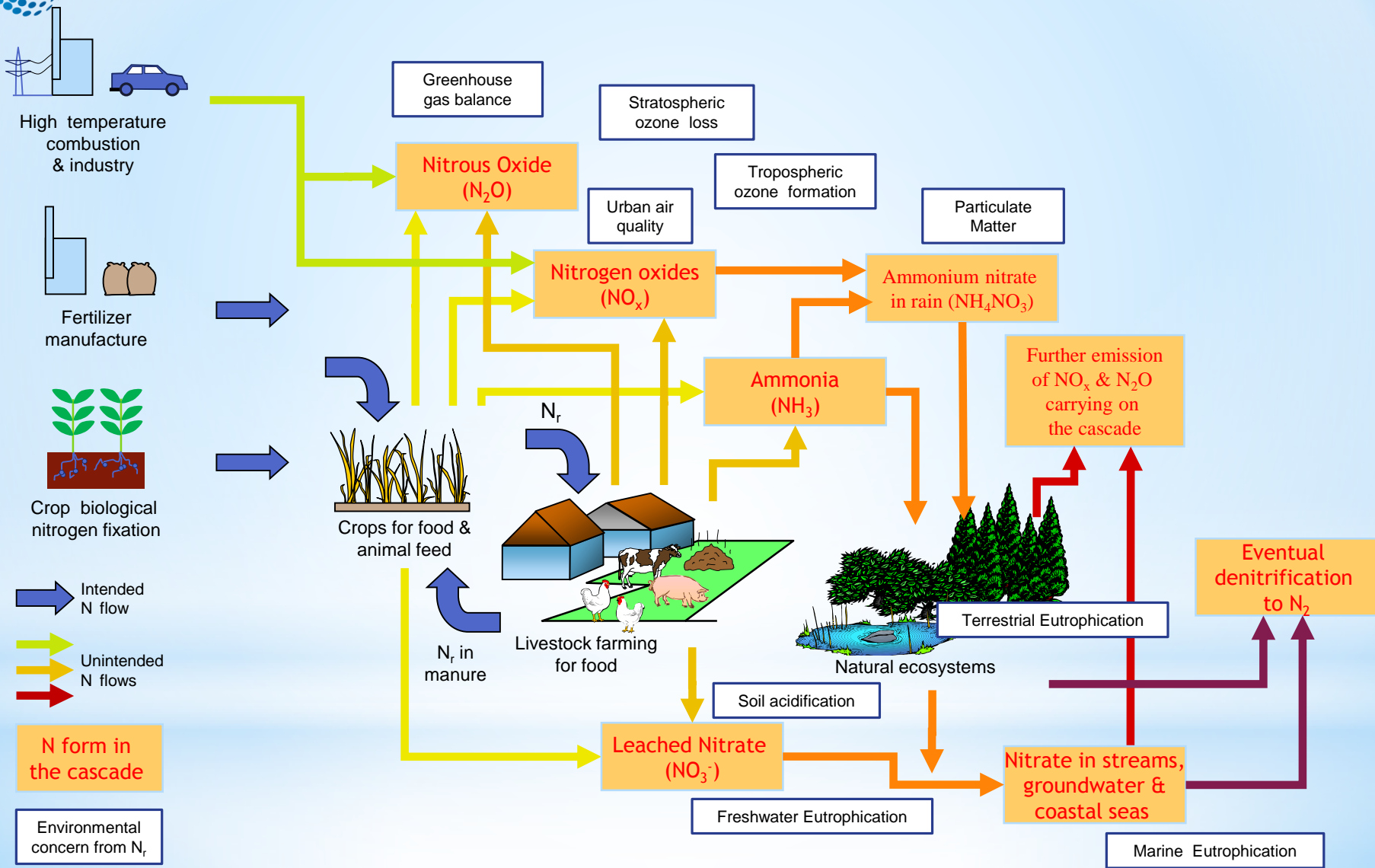
Too much of a good thing

Curbing nitrogen emissions is a central environmental challenge for the twenty-first century, argue Mark Sutton and his colleagues.

Nature 14 April 2011

Union defends use of nitrogen in high-octane climate change debate

www.nine-esf.org/ENA

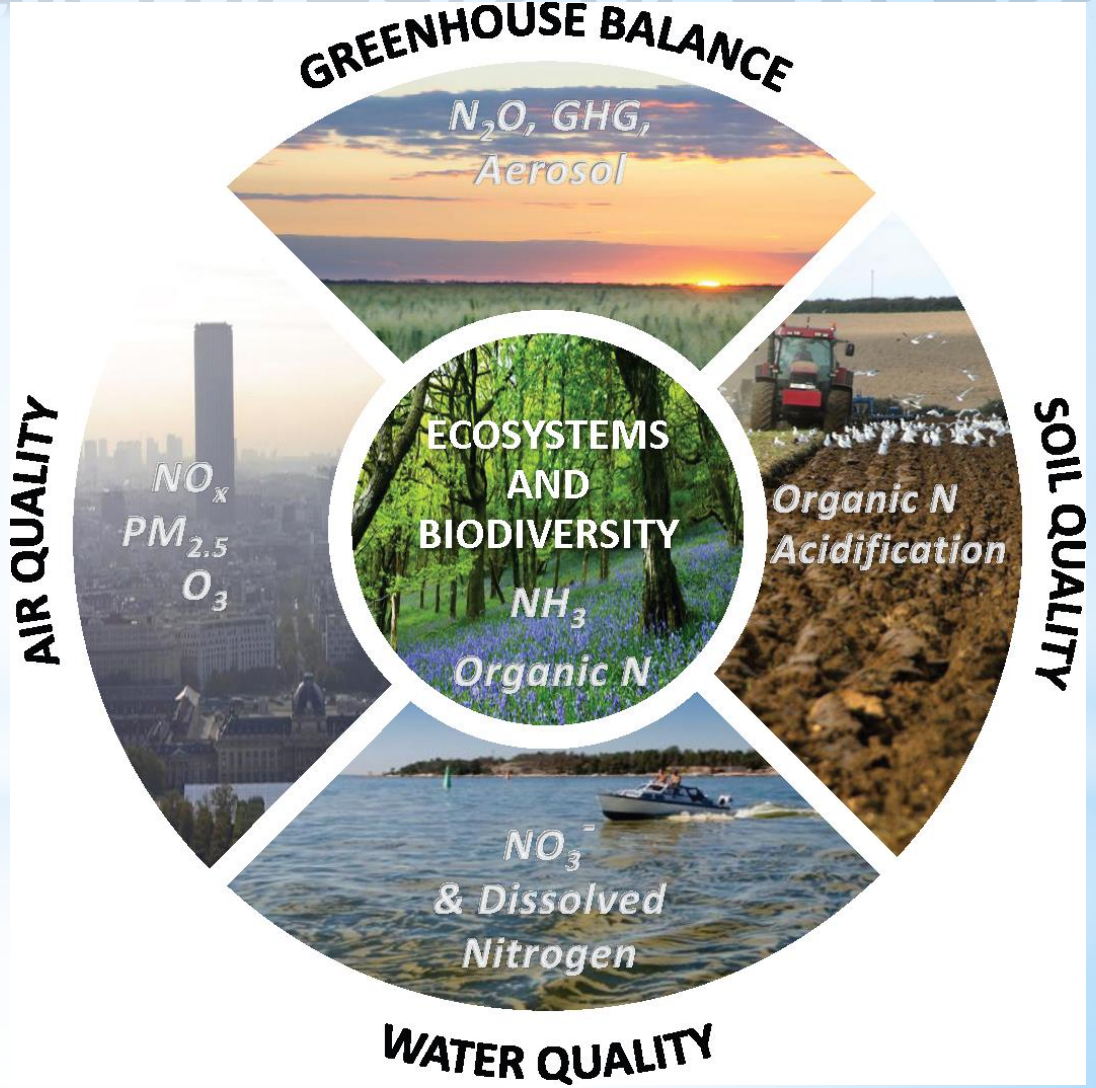


Simplified view of the Nitrogen Cascade

The five key threats of excess Nitrogen

The WAGES of too much nitrogen

- Water quality
- Air quality
- Greenhouse balance
- Ecosystems
- Soil quality



Total NO_x emissions [kg N km⁻²yr⁻¹]

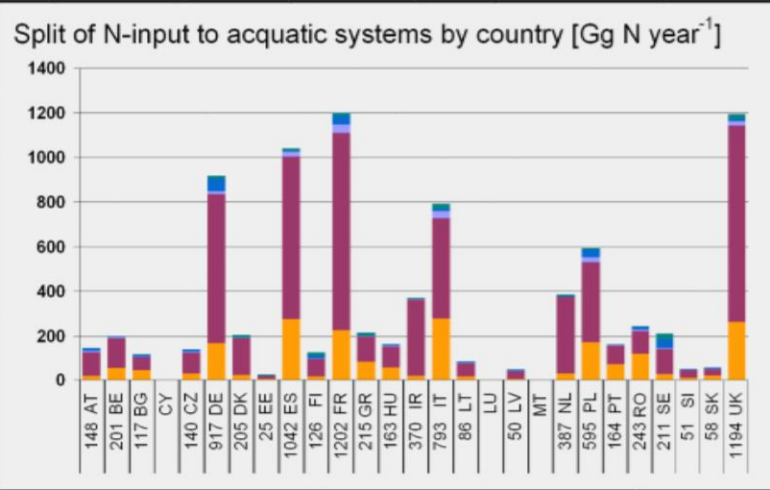
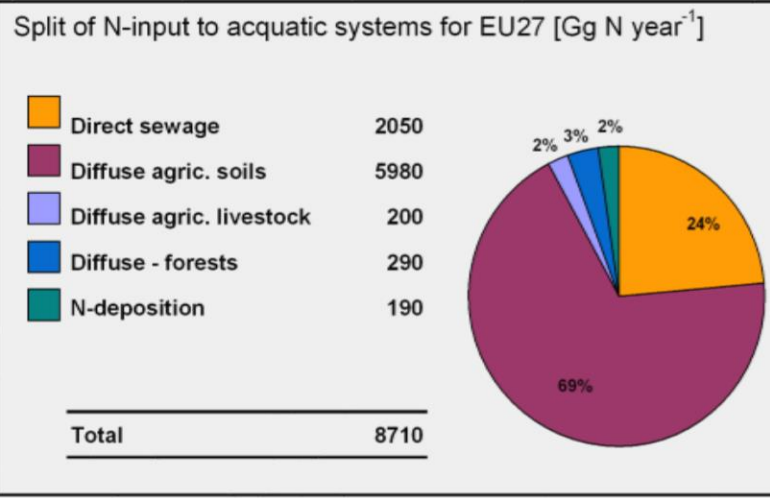
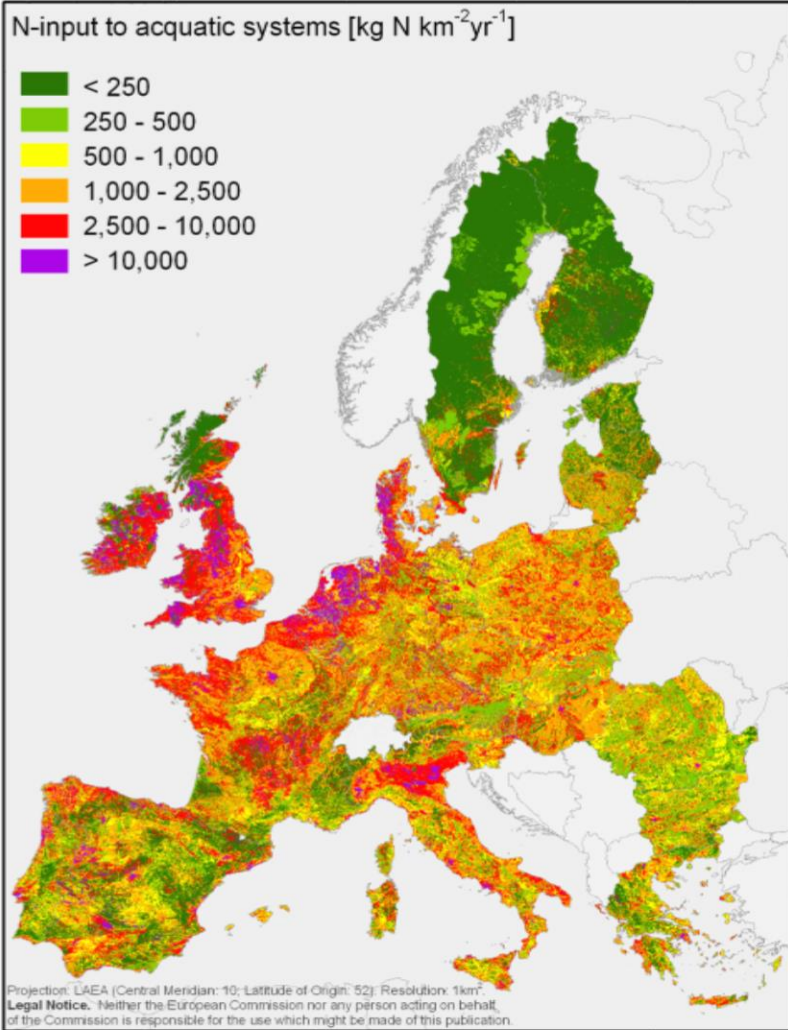
Split of total NO_x emissions for EU27 [Gg N year⁻¹]

Total NH₃ emissions [kg N km⁻²year⁻¹]

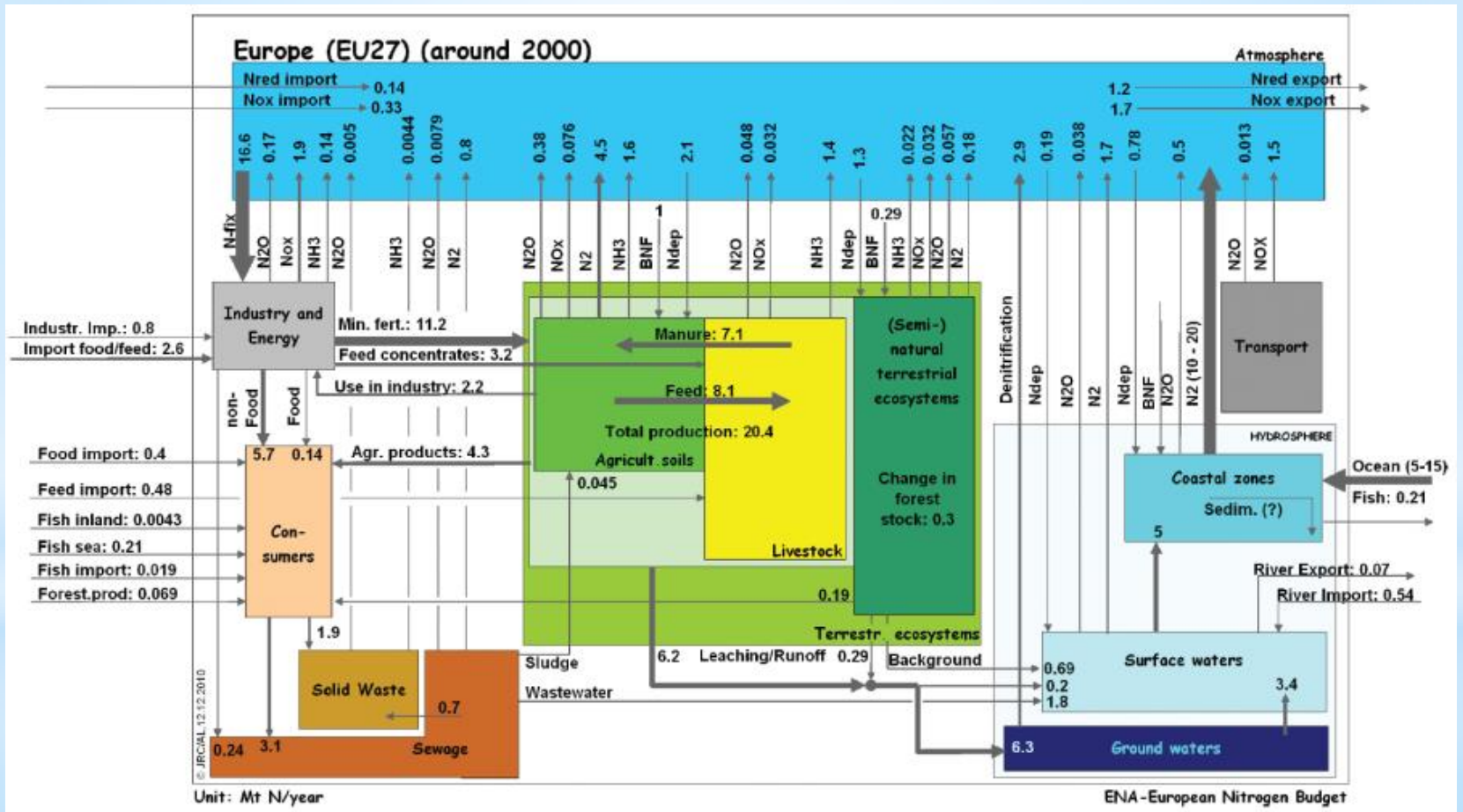
Split of total NH₃ emissions for EU27 [Gg N year⁻¹]

Total N₂O emissions [kg N km⁻²year⁻¹]

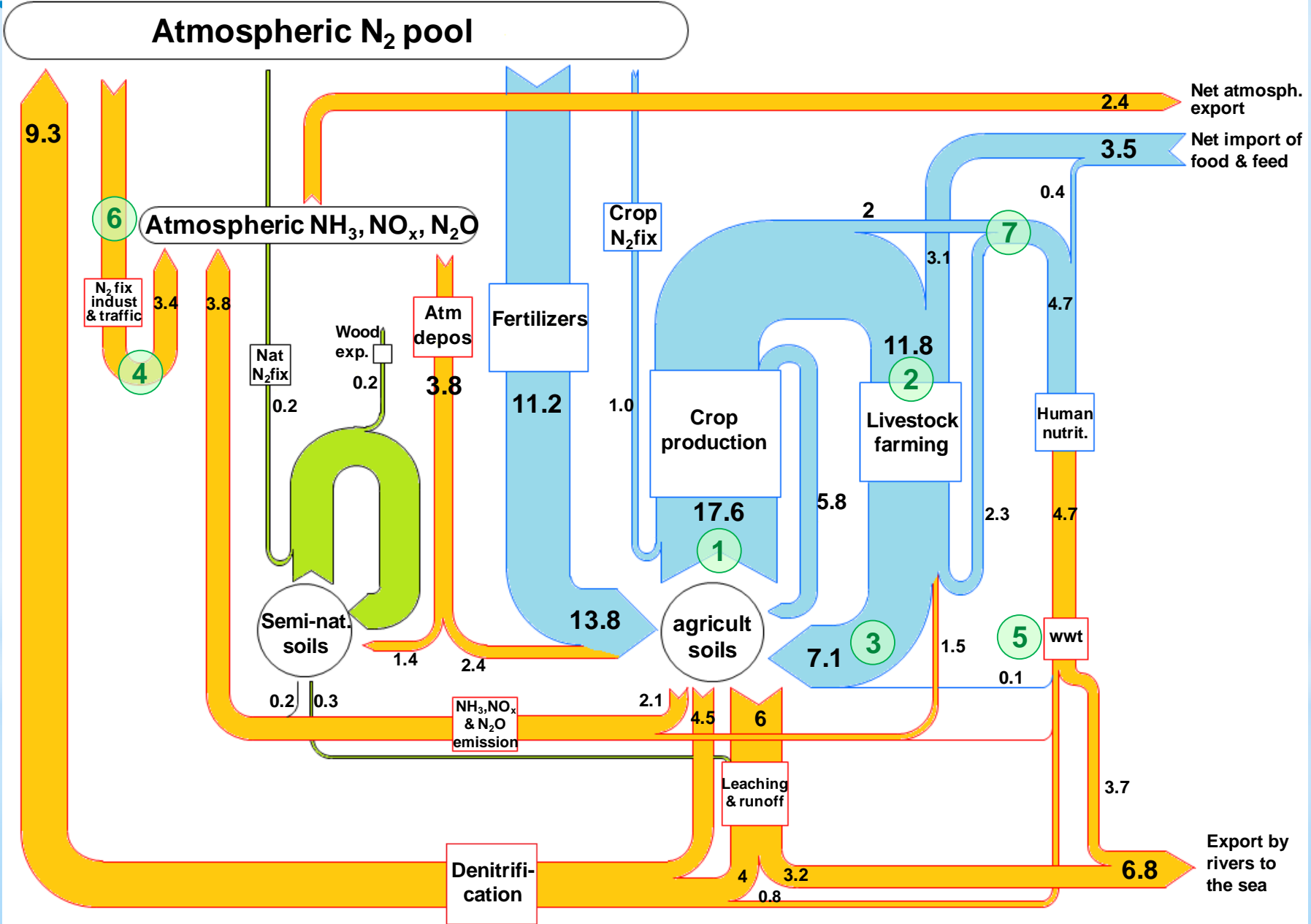
Split of total N₂O emissions for EU27 [Gg N year⁻¹]



Construct Nitrogen Budget



Summary of N flows in Europe



Nitrogen Indicators

Building on Nitrogen Budget

Using information from the Nitrogen Budget, indicators can be derived, e.g.:

- * Trend in emissions/release by compound/sector
- * Trend in application/deposition per area
- * Nitrogen Use Efficiency per country/production state
- * Nitrogen Loss per capita/km²/country
- *



UN-ECE CLRTAP Task Force on Reactive Nitrogen

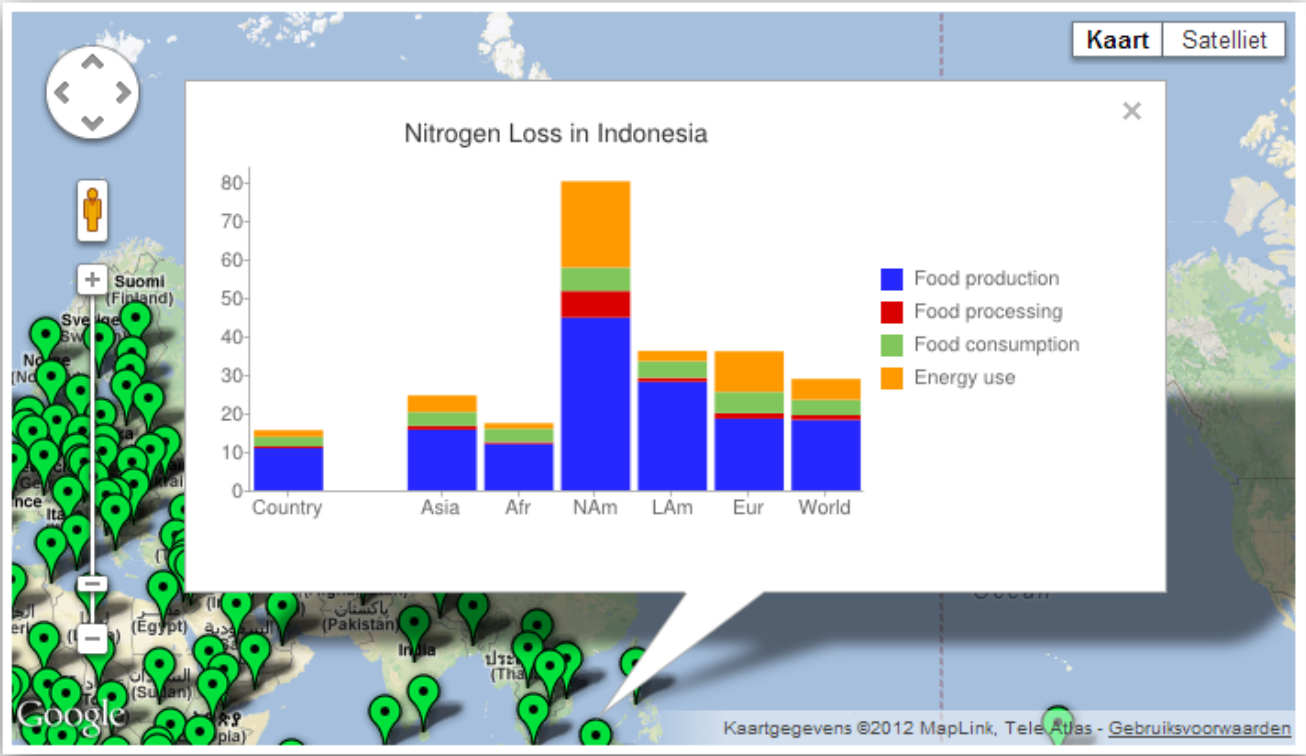
- *“developing technical and scientific information, and options which can be used for strategy development to encourage coordination of air pollution policies on nitrogen in the context of the nitrogen cycle”*
- Expert Panel on Nitrogen Budgets (EPNB)
 - Guidance to the TFRN in providing mass-consistent information of the fate of N in the environment
 - Co-chaired by: W.Winiwarter (IIASA) & A.Bleeker (ECN)
 - Upcoming meeting: April 30 (Lisbon)

Convention on Biological Diversity (CDB)

- 2 INI Nitrogen (Pressure) Indicators (www.bipindicators.net)
 - Nitrogen Deposition
 - Nitrogen Loss



Nitrogen Loss Indicator



Information for individual countries available via:
www.initrogen.org

OECD N Indicator(s)

- Runs via the OECD Working Party on Environmental Information (WPEI)
- OECD has the nitrogen soil balance indicator in agri-env suite of indicators
- Now looking for more integrated (economy wide) indicators
- Indicator again based on:
 - European Nitrogen Budget
 - Nitrogen loss work

UNEP: Global Partnership on Nutrient Management (GPNM)

Focus on agriculture, linking N P and other nutrients

Chaired by Greg Crosby (USDA)

Emphasis on practice improvement, and sharing between stakeholders globally (industry, science, UN).

Our Nutrient World

The challenge to produce more food and energy with less pollution



UN says fertiliser crisis is damaging the planet

Scientists urge rich world to halve its meat consumption

The shape of nitrogen to come

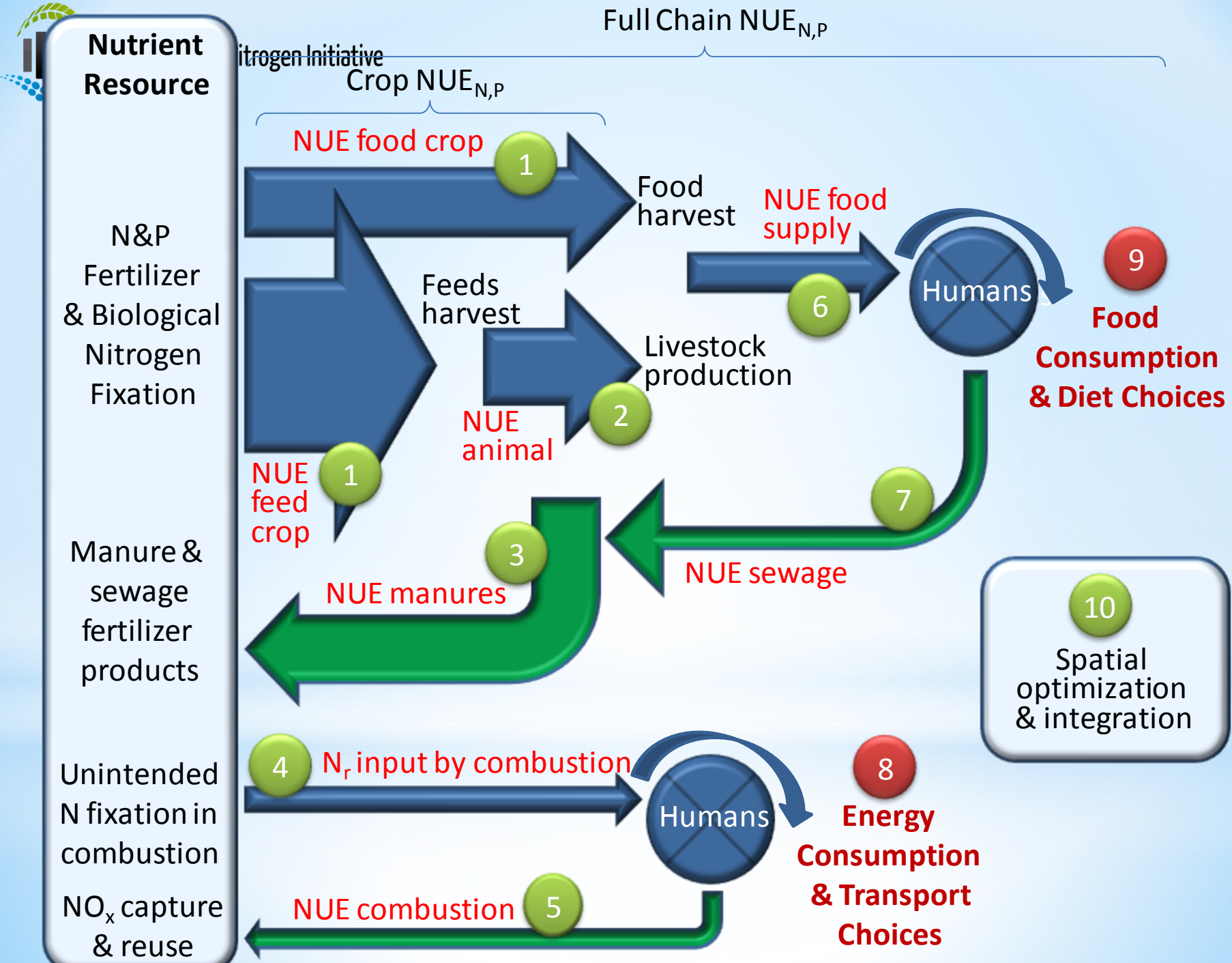
An analysis reveals the huge impact of human activity on the nitrogen cycle in China. With global use of Earth's resources rising per head, the findings call for a re-evaluation of the consumption patterns of developed societies.

Nature doi:10.1038/nature11954

Global Overview on Nutrient Management

18 Feb 2013: *Independent*, *Guardian*, *Herald Tribune*, *Times of India* and **300 articles worldwide**

Prepared by the Global Partnership on Nutrient Management in collaboration with the International Nitrogen Initiative



Nutrient Resource

Full Chain $NUE_{N,P}$

Nitrogen Initiative

Crop $NUE_{N,P}$

NUE food crop

1

Food harvest

NUE food supply

6

Humans

9

Food Consumption & Diet Choices

N&P

Fertilizer & Biological Nitrogen Fixation

Feeds harvest

NUE animal

2

Livestock production

7

NUE sewage

Manure & sewage fertilizer products

NUE feed crop

1

NUE manures

3

10

Spatial optimization & integration

Unintended N fixation in combustion

N_r input by combustion

4

Humans

8

Energy Consumption & Transport Choices

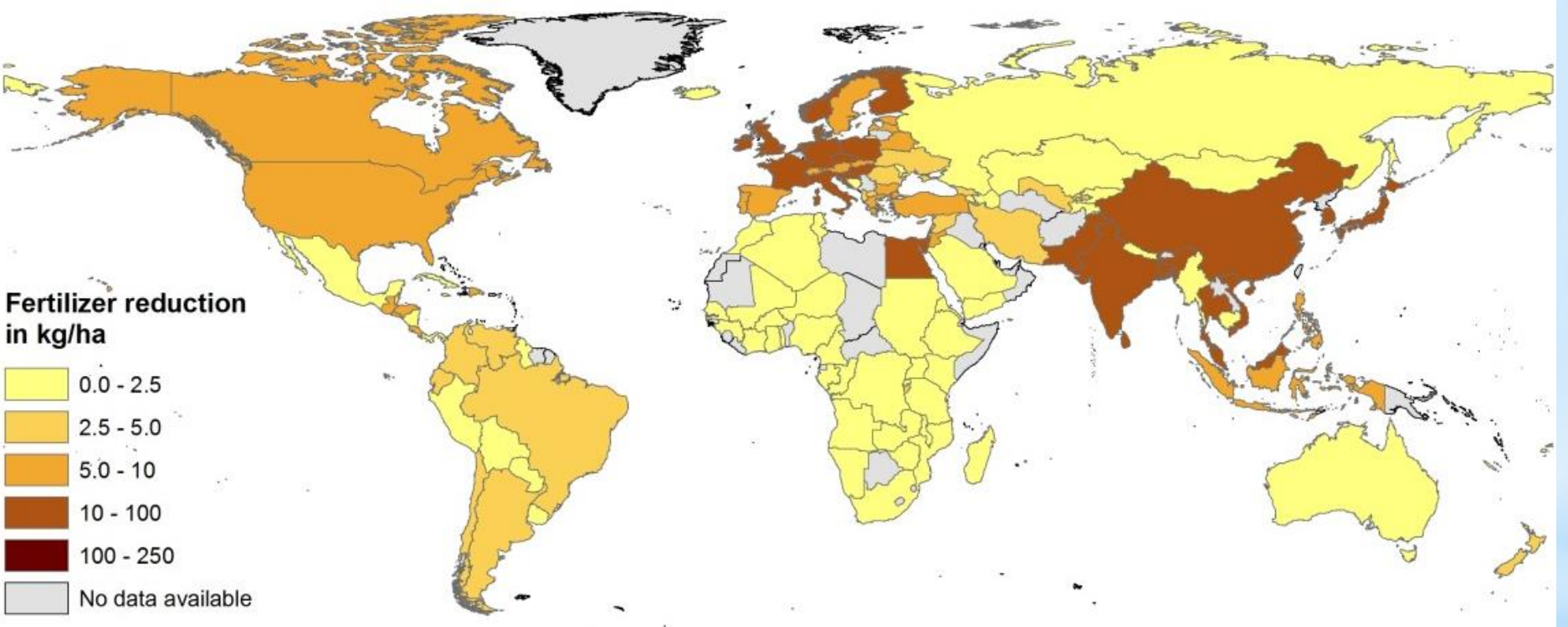
NO_x capture & reuse

NUE combustion

5

“20:20 for 2020”

20% better NUE: saving 20 Mt N per yr by 2020

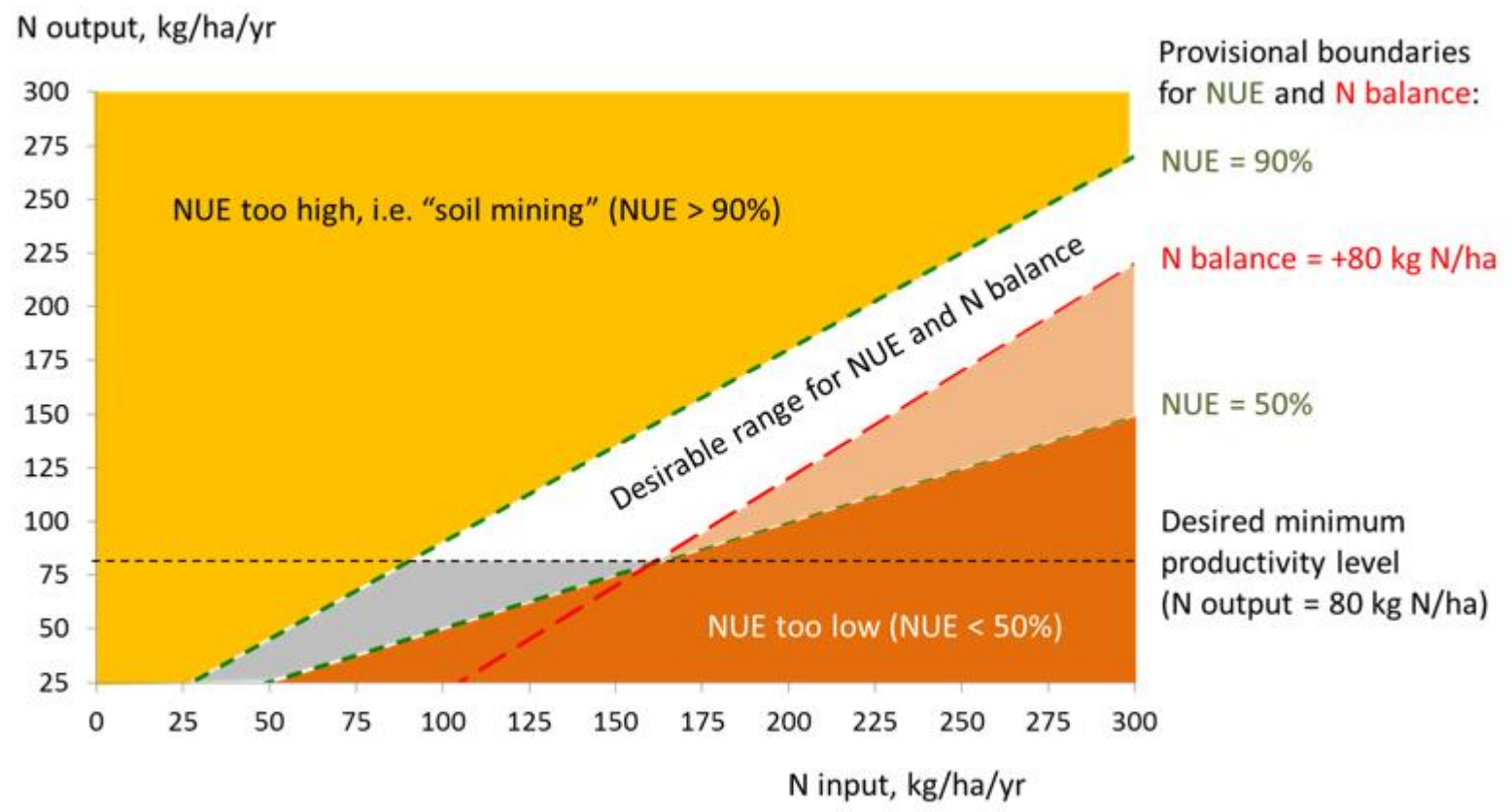


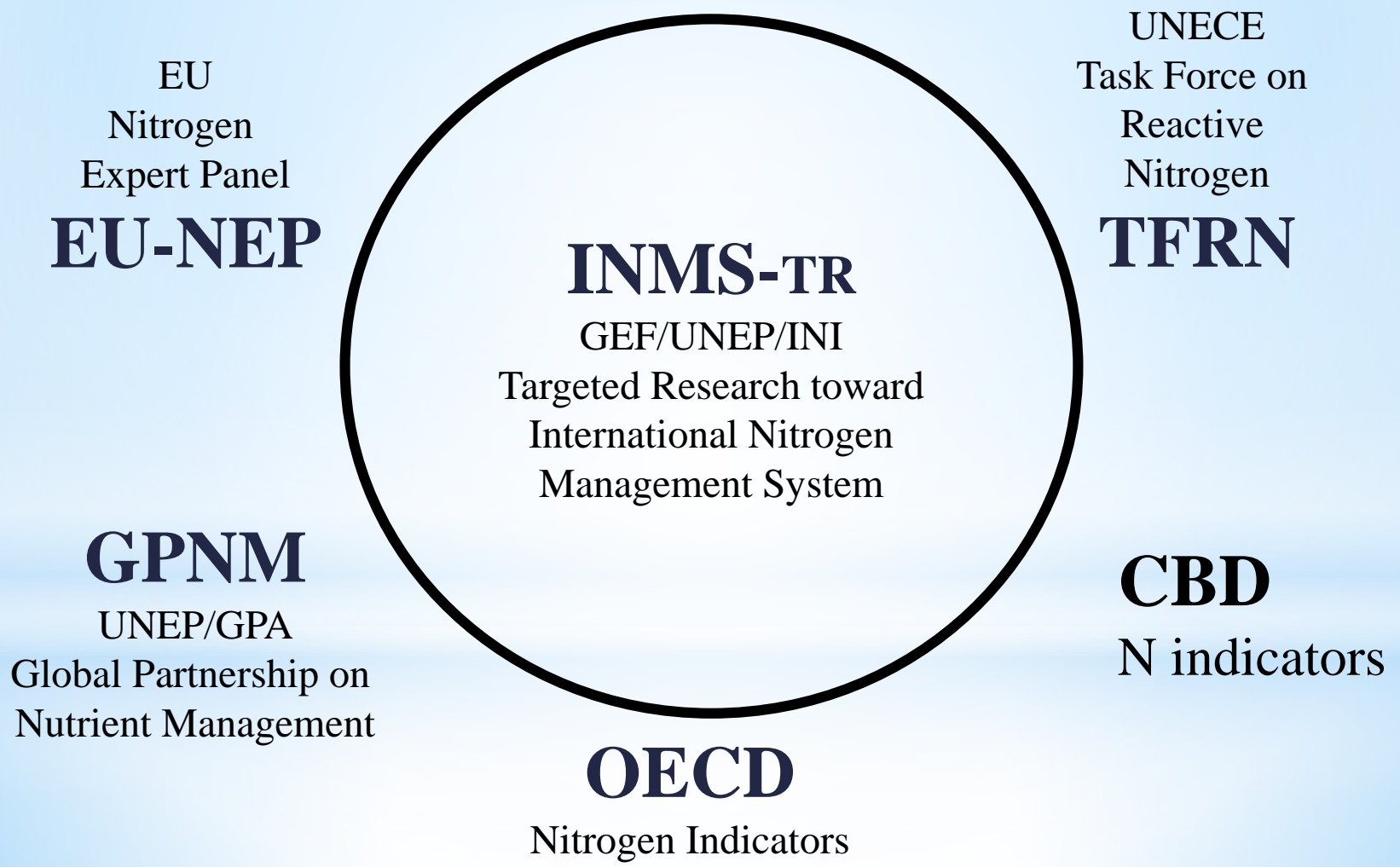
Benefits expressed here as N saving / ha per year (Full-chain NUE)

GPNM Task Team

- Task Team on Nutrient Performance Indicators and Nutrient Use Efficiency
 - Author a science-based document on nutrient use efficiency and associated indicators
 - Develop mutual agreement as an official position of GPNM

EU Nitrogen Expert Panel





Link with Future Earth

Future Earth is the global research platform providing knowledge and support to accelerate transformations to a sustainable world.

Future Earth is a ‘federation’ of projects and other initiatives related to Global Environmental Change.

The projects were launched under the umbrella of four global environmental change programmes

- DIVERSITAS
- International Geosphere-Biosphere Programme (IGBP)
- International Human Dimensions Programme (IHDP)
- World Climate Research Programme (WCRP)

How to link?

- INI runs a Future Earth Cluster Activity for exploring the possibilities for including Nitrogen as a cross-cutting theme in the Future Earth structure
- Future Earth representatives are present at this INMS meeting providing input into the INMS process from their field of expertise

Summary

- Many regional/global activities ongoing on the subject of nitrogen indicators
- Only a specific set (budgets / NUE) shown here: much more work ongoing
- ‘Towards INMS’ project needs to bring all this together
- Link with stakeholders important to come to agreement on the different indicators
- Link with Future Earth important to explore the nitrogen issue in a wider context

Thank you

www.initrogen.org

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