Nitrogen, the Circular Economy and the potential for NO\textsubscript{x} recapture and utilization

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Building the case for change

• Hard times: period of little commitment
• How can we all benefit from a joined up nitrogen approach?
  – **WAGES**: Water, Air, Greenhouse, Ecosystems, Soils
  – **Win-wins**: environment, food & energy security
  – **Nitrogen Use Efficiency**: a positive approach
  – **Nitrogen Green/Circular Economy**: innovation & jobs
  – **Addressing the Barriers**: gravity of common cause
Planetary Boundaries
A safe operating space for humanity

Steffen et al. 2015
Science

Task Force on Reactive Nitrogen
Key Topics

- Mitigation of agricultural nitrogen, with special attention to ammonia. (*Ammonia Framework Code*)
- Development of regional nitrogen budgets to inform full N optimization strategies
- Assessment of the relationships between nitrogen and food choices
- Awareness and knowledge building on nitrogen in EECCA countries.
- Catalytic activity on nitrogen for use by other bodies outside the convention.
Two documents to know:

1. UNECE Ammonia Guidance Document
   New
   Russian language version

Ammonia Framework Code
Lessons from the Edinburgh Workshop

A. General consensus that it is doable.
   Range of measures; BAT included;
   voluntary approach

B. Confusion over the term ‘code’ for
   some countries (=measures here are
   voluntary)

C. Having a National Ammonia Code is
   mandatory (<10 of 25 signatory
   countries have done it)

D. Framework Code a support for
   countries to make or update their
   National Ammonia Code

EB adopted it Dec 2014 & now
published (May 2015)
EU benefit-cost ratios: NH₃ & NOₓ mitigation
UNECE Air Convention: Task Force on Reactive Nitrogen

Van Grinsven et al.
*Environ Sci. & Tech* 2013

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 published in *Nature* reveals the huge impact of human activity on the nitrogen cycle in China. It calls for a re-evaluation of consumption patterns and developed countries.

More environment-friendly nutrient use could save $170bn a year

18 Feb 2013: *Independent*, *Guardian*, *Herald Tribune*, *Times of India* and 300 articles worldwide
Unintended N fixation in combustion

NO\textsubscript{x} capture & reuse

NUE combustion

Humans

Nutrient Resource

N\&P Fertilizer & Biological Nitrogen Fixation
Import
Manure & sewage fertilizer products
Unintended N fixation in combustion
NO\textsubscript{x} capture & reuse

Crop NUE\textsubscript{N,P}

NUE food crop

Food harvest

Feeds harvest

Livestock production

NUE animal

Humans

Food Consumption & Diet Choices

See ONW p 67
Key Action 5

Component 1
Tools for understanding & managing the global N cycle
(data, methods, models, indicators; biophysical, economic, social)

Component 2
Quantification of N flows, threats, benefits (management, CBA, scenarios, barriers & opportunities)

Component 3
Regional demonstration of Full N approach (priority identification, linkage of N opportunities, application of tools, regional policy links)

Component 4
Awareness raising and knowledge sharing (communication tools, policy & other stakeholder engagement, public understanding of N)

Global Environment Facility (GEF) & GEF Secretariat
Implementing Agency (IA) UNEP
Executing Agency (EA) CEH for INI
Project Management Board (PMB)
Project Coordination Unit (PCU)
Stakeholder & Policy Advisory Group (SPAG)
Other Users (internal & external, policy, business, CSOs, public)

Towards INMS

Project Communication & Governance Structure

V3.1. April 2015
Component 2
Quantification of N flows, threats & benefits

Activity 2.1
Quantifying N flows, threats and benefits at global and regional scales

Activity 2.2
Preparation of global assessment of N fluxes, pathways & impacts

Activity 2.3
Integrating methods, measures & good practices to address N, issues

Activity 2.4
Future N storylines & scenarios with management/ mitigation options & CBA

Activity 2.5
Collation & synthesis of experience & measures adopted by GEF and others

INMS status

- More detailed project outline now available:

- Basis to see where you fit into the project
  - Complete Excel Spreadsheet (before end June)
  - Model Commitment Letter (Cofinance)