



Future Policy Directions for Improving Nitrogen Management & how science may support them

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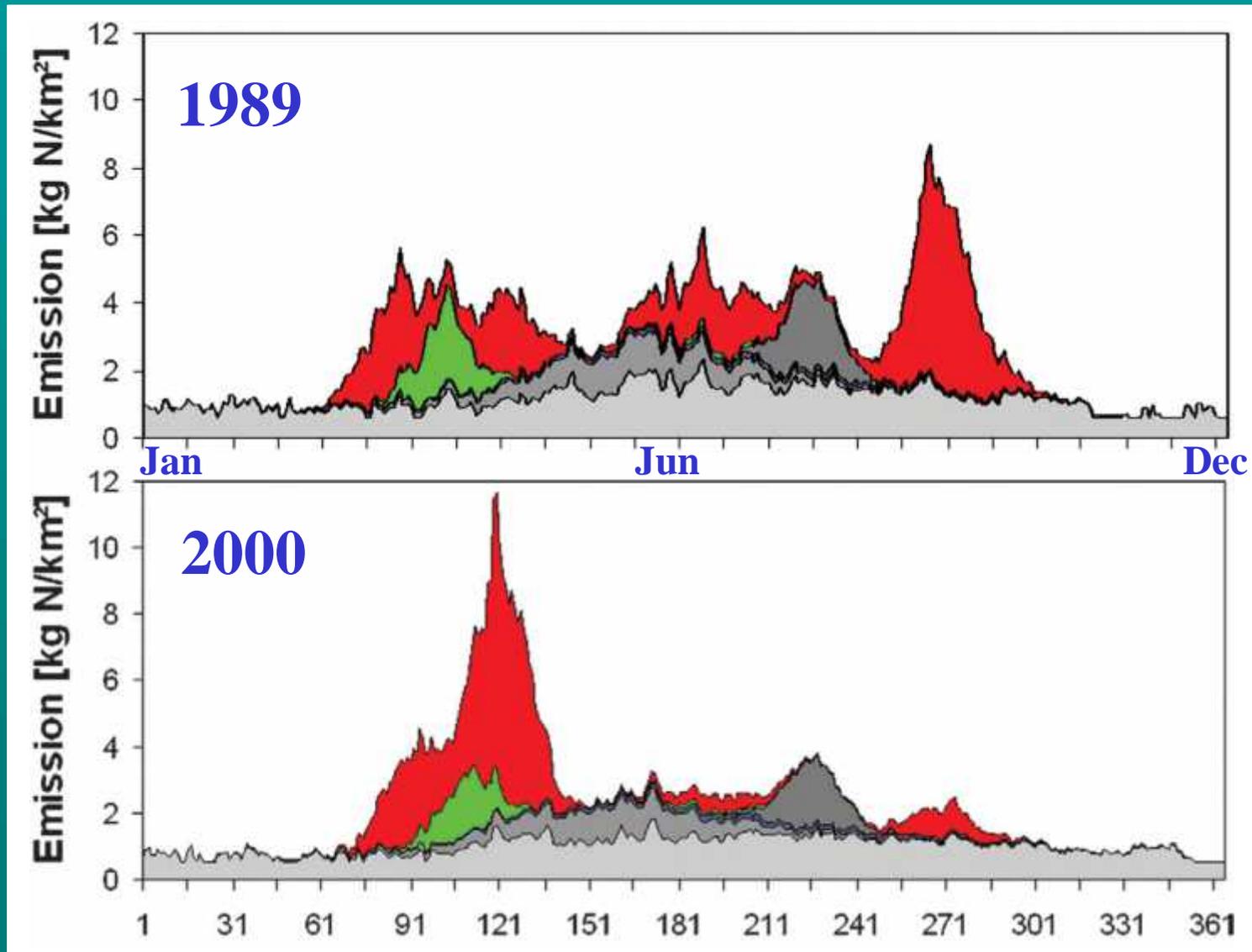
Melbourne
8 December
2016



Core Challenges

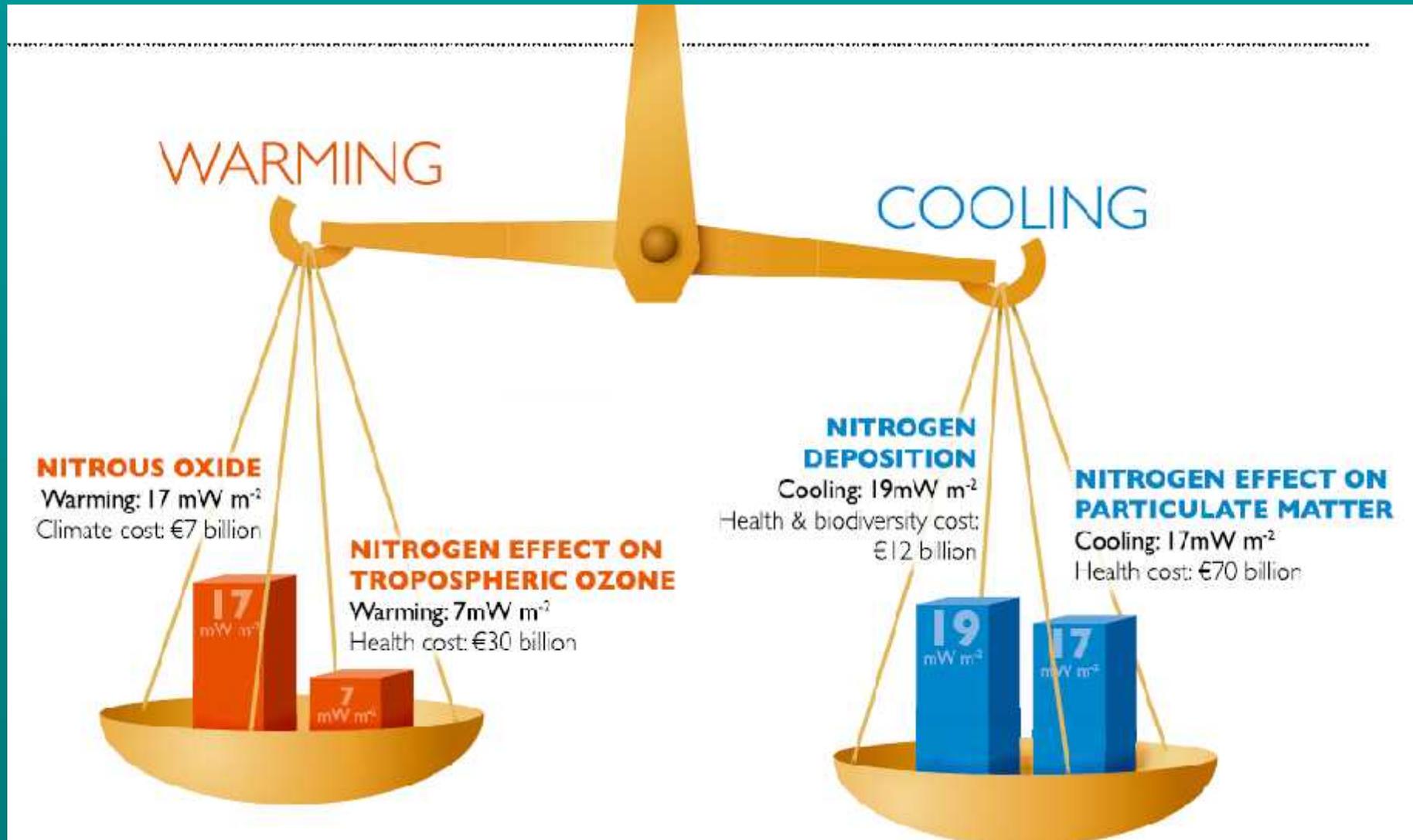
- Fragmented policies between different nitrogen-related threats and benefits
- **No lead nitrogen policy to address all others**
- Major barriers to change for each of the different nitrogen policies
- **Insufficient mutual awareness between policy makers among different issues**
- Trade-offs, synergies and innovation opportunities often missed

Example: Nitrate policy increased springtime ammonia emission



Example for Denmark: Hertel et al. 2011 ENA

Example: Not all climate effects of Nitrogen included in the UNFCCC



Character of the decades...

- 1950s Global food challenges being addressed
- 1970s Awareness of water pollution & acid rain
- 1990s International climate, air & water agreements
- 2000s Countries find it hard to meet commitments
- 2010s Few new commitments & weakening will
- 2020s ...

The present for N science-policy action

- Nitrogen is a solution, not another problem
- Nitrogen can help overcome barriers to meeting existing commitments
- Nitrogen value can demonstrate the profits to be made
- Mobilize why anyone should care

INI as a science community must lead the way in being more joined-up

Economics for a more joined up Nitrogen Approach?

Loss as N_r to air:	8 M tonne/yr
Loss as N_r to water:	5 M tonne/yr
Loss as N_2 :	9 M tonne/yr
Total N loss:	<u>22 M tonne/yr</u>
At €0.8/kg N =	€18 billion /year
Agric. share	€14 billion/ year

Values for EU27 from ENA.

Component N losses to air:

NH_3 : 3.2 NO_x : 3.5 N_2O : 1.2 (M tonne/yr)

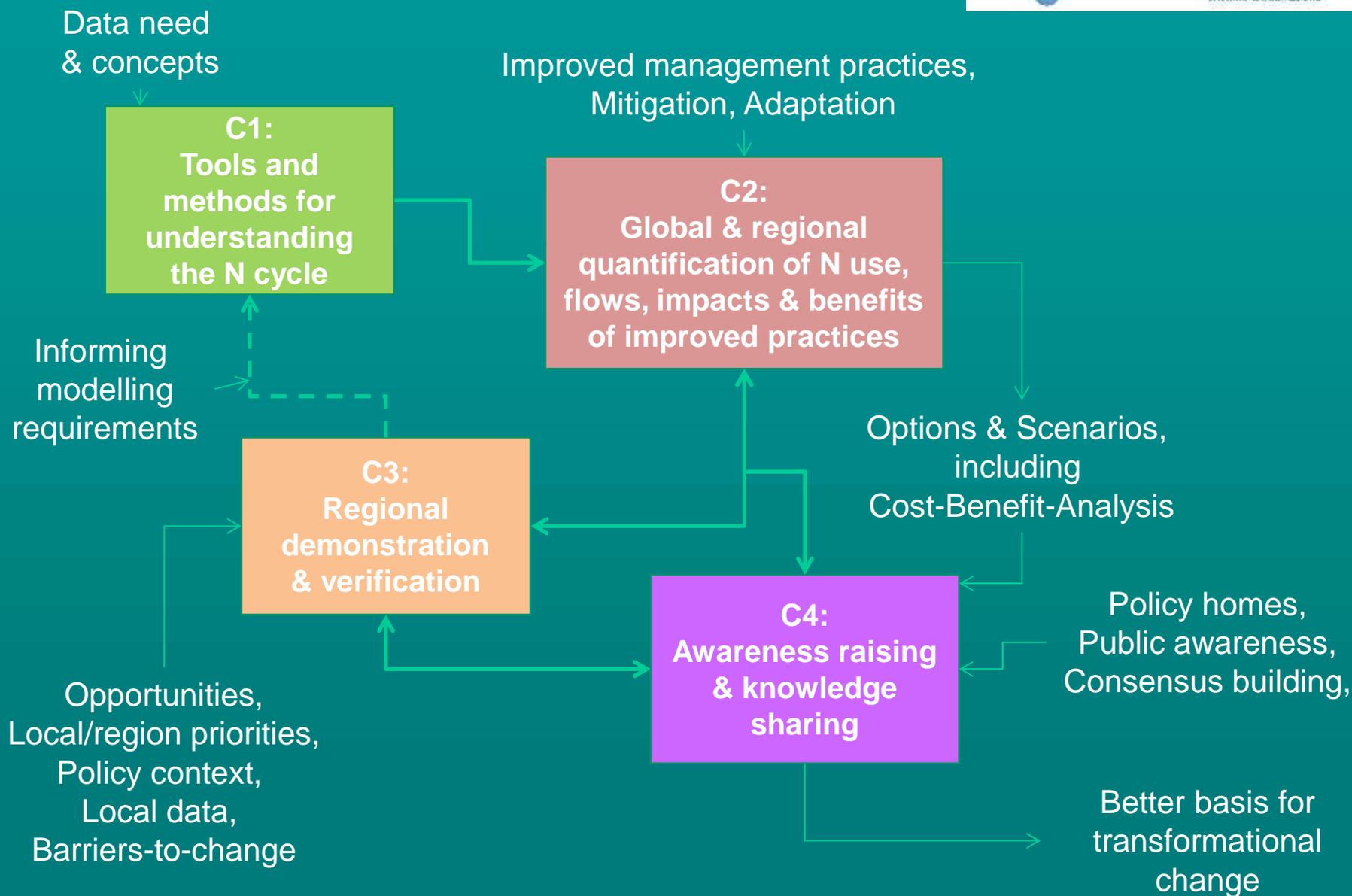
25% of CAP



- UNEP and INI this week launch a global international process with funding from the Global Environment Facility (GEF) for the project “*Towards INMS*”
- **INMS will bring scientific evidence together to inform policies and the public on the multiple benefits & threats of reactive nitrogen**
- \$6M cash + \$60M partner contributions



Scope and Approach



Like an IPCC for nitrogen... with key differences

- IPCC 1988 came before UNFCCC 1992
 - IPCC and UNFCCC now mature processes
- INMS just starting 2016/2017
 - No international nitrogen convention
 - An array of different policy processes
 - Plan closer INMS engagement with policy
 - Science driven, but multi-actor with business, inter-governmental organisations & civil society

From conflict of interest to community of innovation

What do policy makers need from science?

- To understand the nature of the challenge
- Evidence of threats & degree of uncertainty
- Scale of risks if nothing is done
- Quantify the opportunity from doing better
- Innovation in how to move forward
- **Harmonized indicators to measure progress**
 - Environment, food, energy
 - Different indicators for different audiences

Options for Ammonia M

Guidance from the UNEP
Reactive Nitrogen



United Nations Economic Commission for Europe
Framework Code for
Good Agricultural Practice
for Reducing Ammonia



DRAFT

National Code of Good Agricultural
Practice for Ammonia Abatement

Kingdom of Nitroland

Less than 10 of 25 countries comply with
requirement to publish a code...

First Element of INMS



C1:
Tools and methods for
understanding the N
cycle

Development of N system
indicators

Threat assessment
methodology

Methodology for N fluxes
and distribution

Approaches for N threat-
benefit valuation

Flux-impact path models
for assessment, scenarios &
strategy evaluation

Barriers to achieving
better N management

National N
budgets

Farm N
budgets

NUE
approaches

Relating
different N
indicators

Second Element of INMS



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

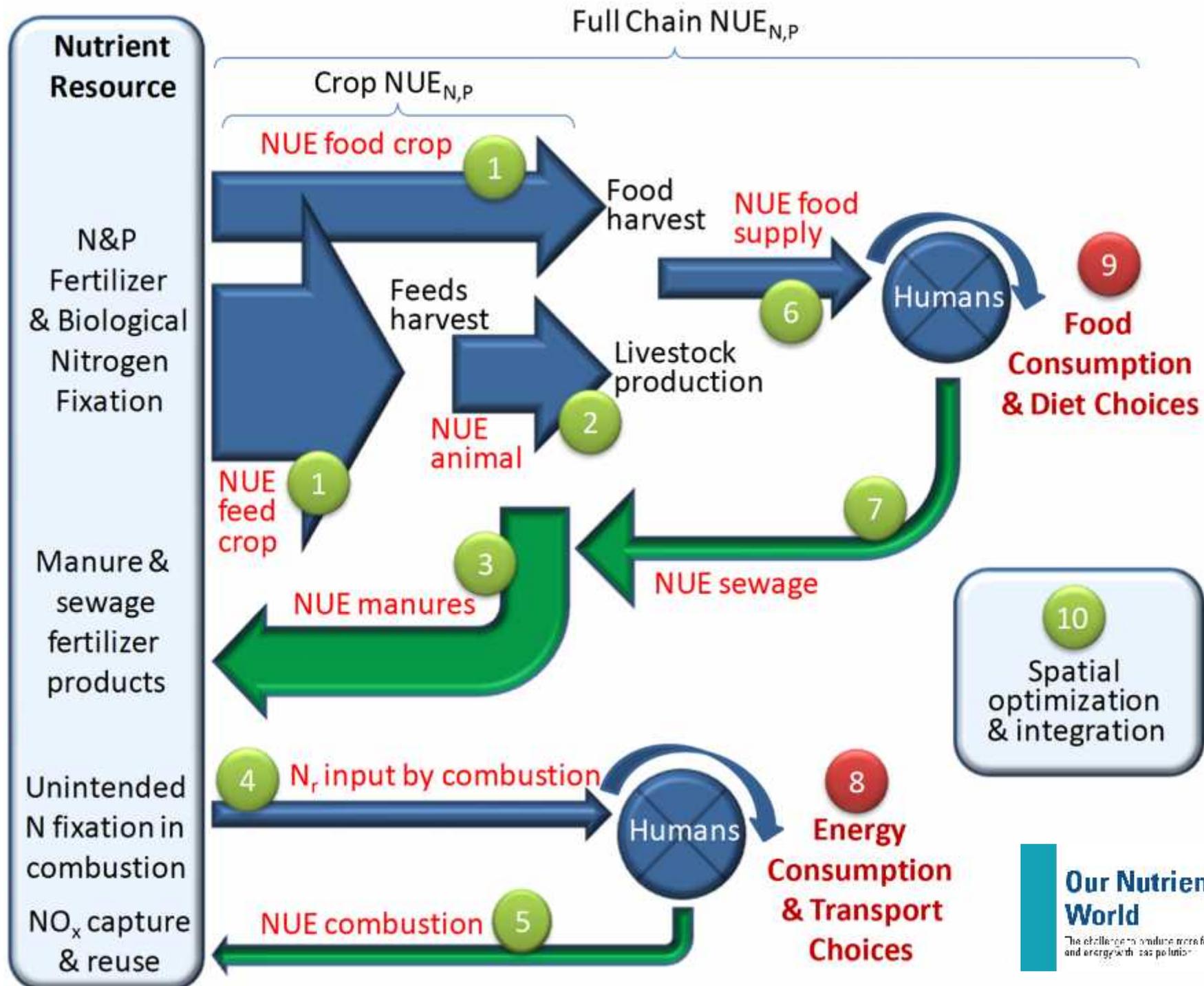
Preparation of Global Nitrogen Assessment flows, impacts, opportunities

Integrating methods, measures & good practices to address N_r issues

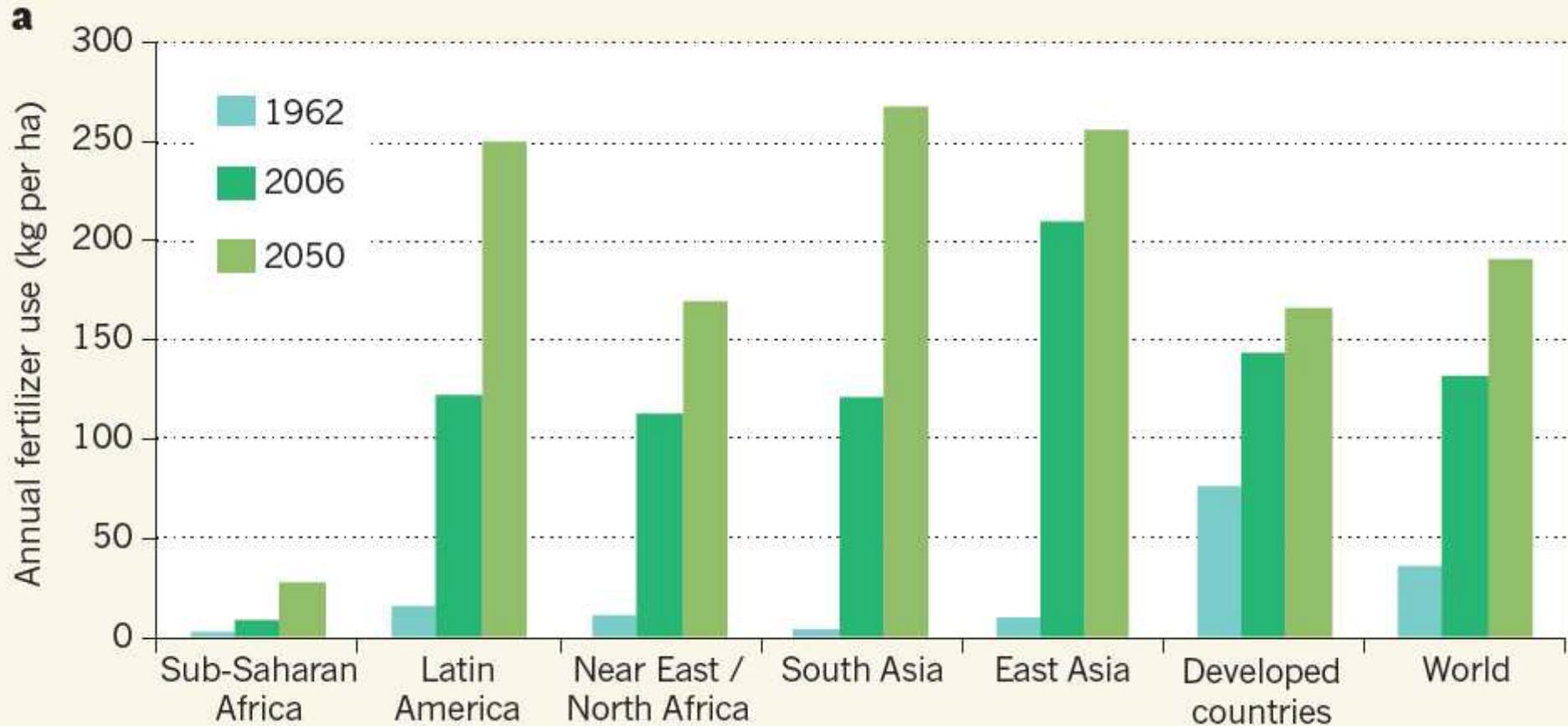
Future N storylines & scenarios with management / mitigation options & CBA

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

C2:
Global & regional quantification of N use, flows, impacts & benefits of improved practices



Future nitrogen: should we worry?



Total fertilizer use

Sutton and Bleeker *Nature* 2013
based on FAO projections

Third Element of INMS



**C3:
Regional demonstration
& verification**

Design methodology & conduct demos on **regional N_r assessments**

Workshop to synthesize outcomes from demonstration activities

Build regional **consensus on benchmarking** N indicators

Demonstrating the benefits of joined up regional N management

INMS Regions & Partners



Country clusters: Major N sources, N flows, opportunities, NUE, barriers, sharing successes in country clusters

South Asia: India, Sri Lanka, Bangladesh, Nepal, Maldives

East Asia: China, Japan, South Korea, Philippines

East Africa: Lake Victoria basin Kenya, Uganda, Tanzania, Rwanda, Burundi

Latin America: La Plata basin Brazil, Paraguay, Uruguay, Argentina, Bolivia

East Europe: Black Sea Diester, Prut & Lower Danube

Initiatives developing for West Europe, North America, Australasia

Fourth Element of INMS



C4:
Awareness raising &
knowledge sharing

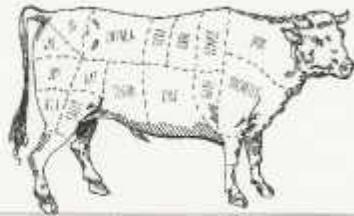
Establishment and operation of
INMS communications hub

Training, diffusion & **international
relations**, inc. N footprinting

**Support to policy frameworks
& long-term strategy**

Harmonization, publication &
dissemination of guidance docs

Support to IW-LEARN &
engagement with GEF & STAP



EATYMOLOGY

(EET-UH-MOL-UH-JEE, *noun*)

the dictionary of
modern gastronomy

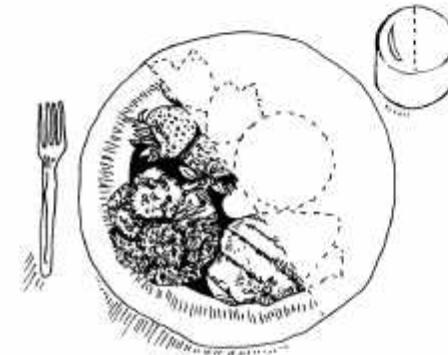
JAMES BEARD AWARD-WINNING CREATOR OF WHUTHOODS

JOSH FRIEDLAND

DEM•I•TAR•I•AN

(*adjective*): Of or relating to a diet limiting meat consumption to half the standard portion eaten at regular meals.

D



≡ BARSAC DECLARATION ≡

The term appeared in 2009 in the Barsac Declaration, developed in Barsac, France, at the combined workshop of Nitrogen in Europe and Biodiversity in European Grasslands: Impacts of Nitrogen: "We declare our commitment to: a. Encourage the availability of reduced portion sizes of meat and animal products, compared with current standards in developed countries, for the preparation of healthy meals, b. Implement this commitment through promotion of the 'demitarian' option, which we define as a meal containing half the amount of meat or fish compared with the normal local alternative, combined with a correspondingly larger amount of other food products..."

≡ ENVIRONMENTAL IMPACT ≡

A 2014 report by the UN Economic Commission for Europe, *Nitrogen on the Table*, found that if a demitarian diet was adopted throughout Europe and meat and dairy intake was cut by 50 percent, it would reduce greenhouse gas emissions by 25 to 40 percent and lower soybean imports (mostly used to feed livestock) by 75 percent.

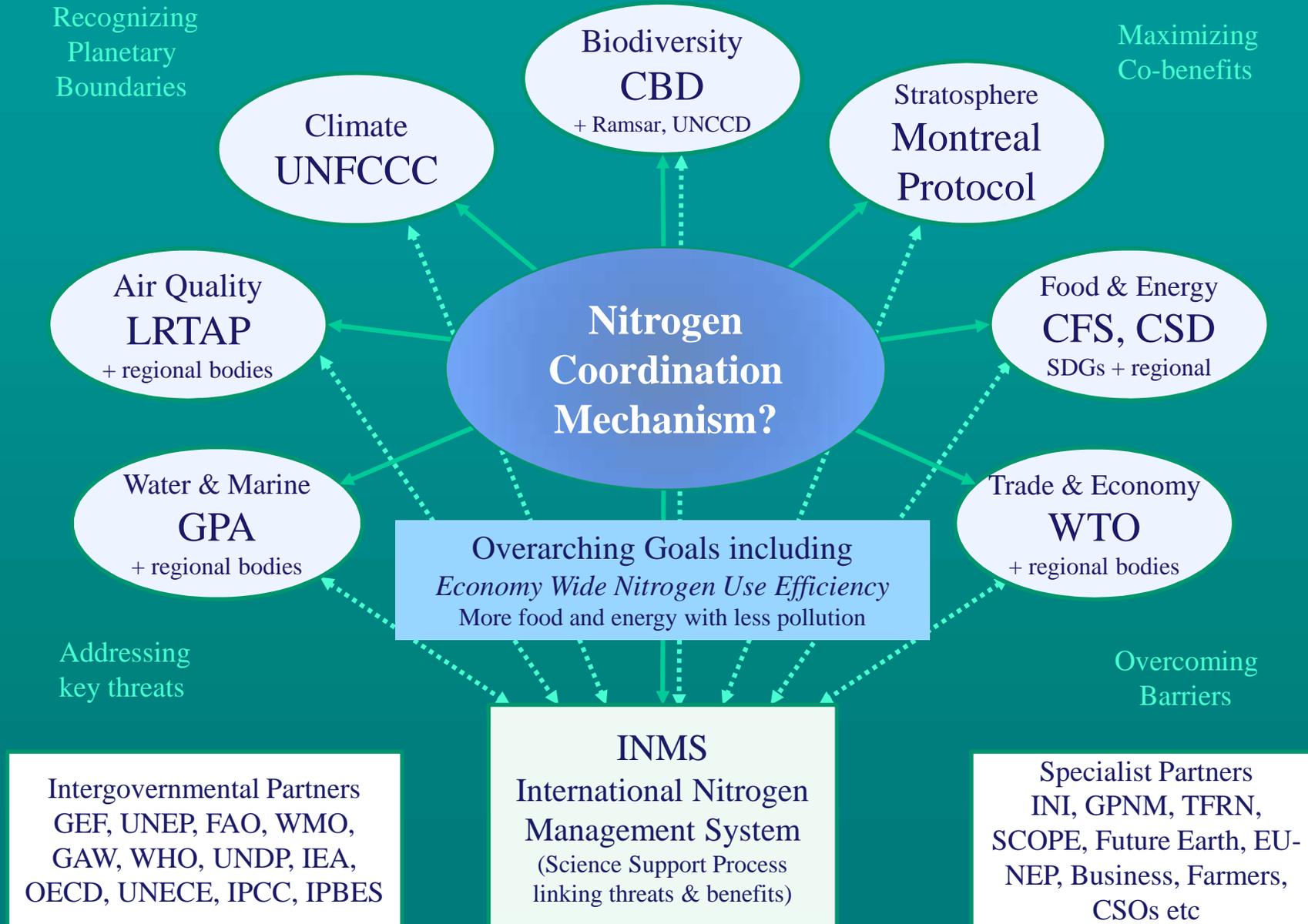
Linking-up fragmented policy frameworks



Key INMS policy engagements 2017

- **UNECE Air Convention** (May, Geneva)
 - Agriculture & Air Quality Policy
- **DNmark & UNECE TF Reactive N** (June, Aarhus)
- **Global Program Action** (IGR-4 Marine-Land Activities) (September, Indonesia)
 - INMS support to country goal setting
- **Montreal Protocol** (provisional side event)
 - N₂O and stratospheric ozone depletion
- **United Nations Environment Assembly** (UNEA-3) (December, Nairobi)
 - INMS support to framing the Nitrogen Policy Arena

Linking International Nitrogen Policy Frameworks



What could be common goals?

- UNECE Gothenburg Protocol 2012 (agreed):
Reduce NO_x (55%) & NH₃ (38%) 1990 to 2020
- Proposal for Manila Declaration 2012 (not agreed):
“Aspiration to increase NUE by 20% by 2016”
- Our Ocean Action Plan 2014 (agreed):
“Reduce nutrient pollution by 20% by 2025”
- **Future?**
 - Build consensus that N savings must be accompanied by more yield or less input to realise the benefits
 - Review evidence on priorities, e.g. avoid N₂ formation
 - Financial mechanisms to support Nitrogen Innovation in the Circular Economy... NICE!
 - Nitrogen and dietary optimization

Summary: How will INMS support N policy?

- **A global assessment** of the threats and benefits of human alteration of the nitrogen cycle and the opportunities for improvement.
- **A forward look** of what may happen if the problem is ignored.
- **Guidance on joining up** mitigation and adaptation options and strategies, linked to circular and green economy thinking.
- **A platform for better cooperation** across science and policy helping to overcome the barriers.

A mechanism to improve public awareness

UN says fertiliser crisis is damaging the planet

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

Vervuiling met stikstof kost miljarden

Pollution à l'azote : une lourde facture

The International Nitrogen Assessment

From multiple challenges to joined-up solutions

CAMBRIDGE
UNIVERSITY PRESS
www.cambridge.org

International Nitrogen Assessment Launch

November 2020

N2020 Conference...

Nitrogen taint alert

Warning over nitrogen footprint

INA Authorship

500 experts,
50 countries &
100 organizations

Global scientific consensus for the nitrogen world
...ally independent

www.inms.international