



# **Task Force on Reactive Nitrogen (TFRN)**

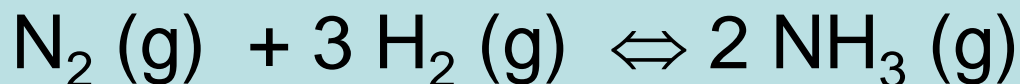
**Report of TFRN-1, Wageningen NL**

Mark Sutton and Oene Oenema

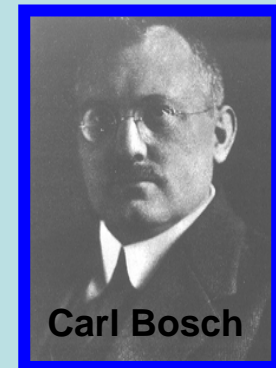
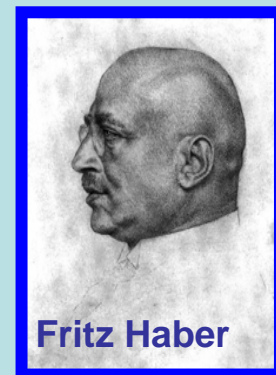
WGSR-42, 1 September 2008

# Haber Process Centenary 2008

- Limited natural supply of N<sub>r</sub> from mined nitrate and guano
- Needed for agriculture and military security
- Haber-Bosch: 200 atmos; 450-500 °C



- Patented 1908 by Fritz Haber
- Commercialized by Carl Bosch
- Basis of the 20<sup>th</sup>C 'green revolution'



# Global N production & dispersion

## Human Nr Production:

(Tg yr<sup>-1</sup>)

1860: 15

1995: 156

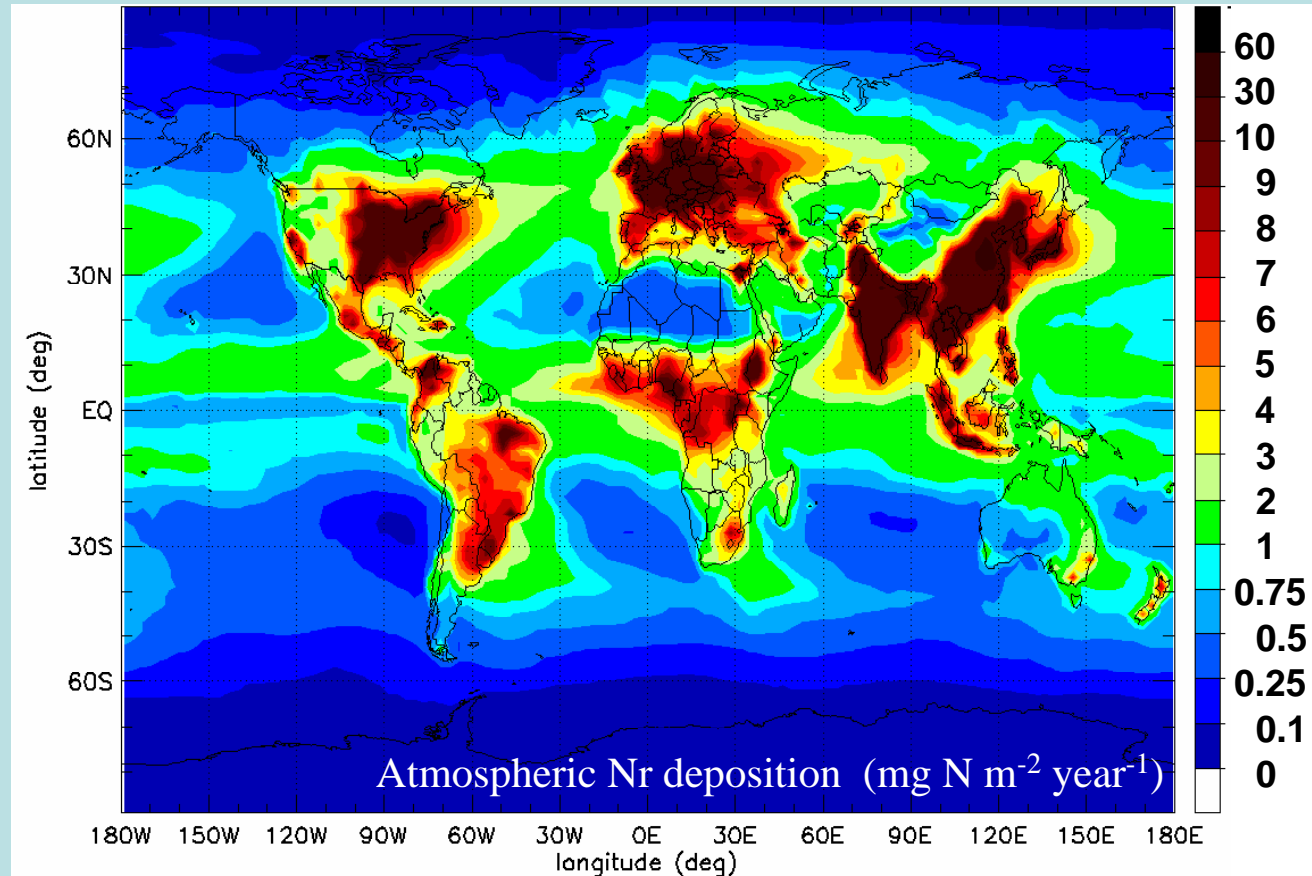
2005: 191

## 2005 sources:

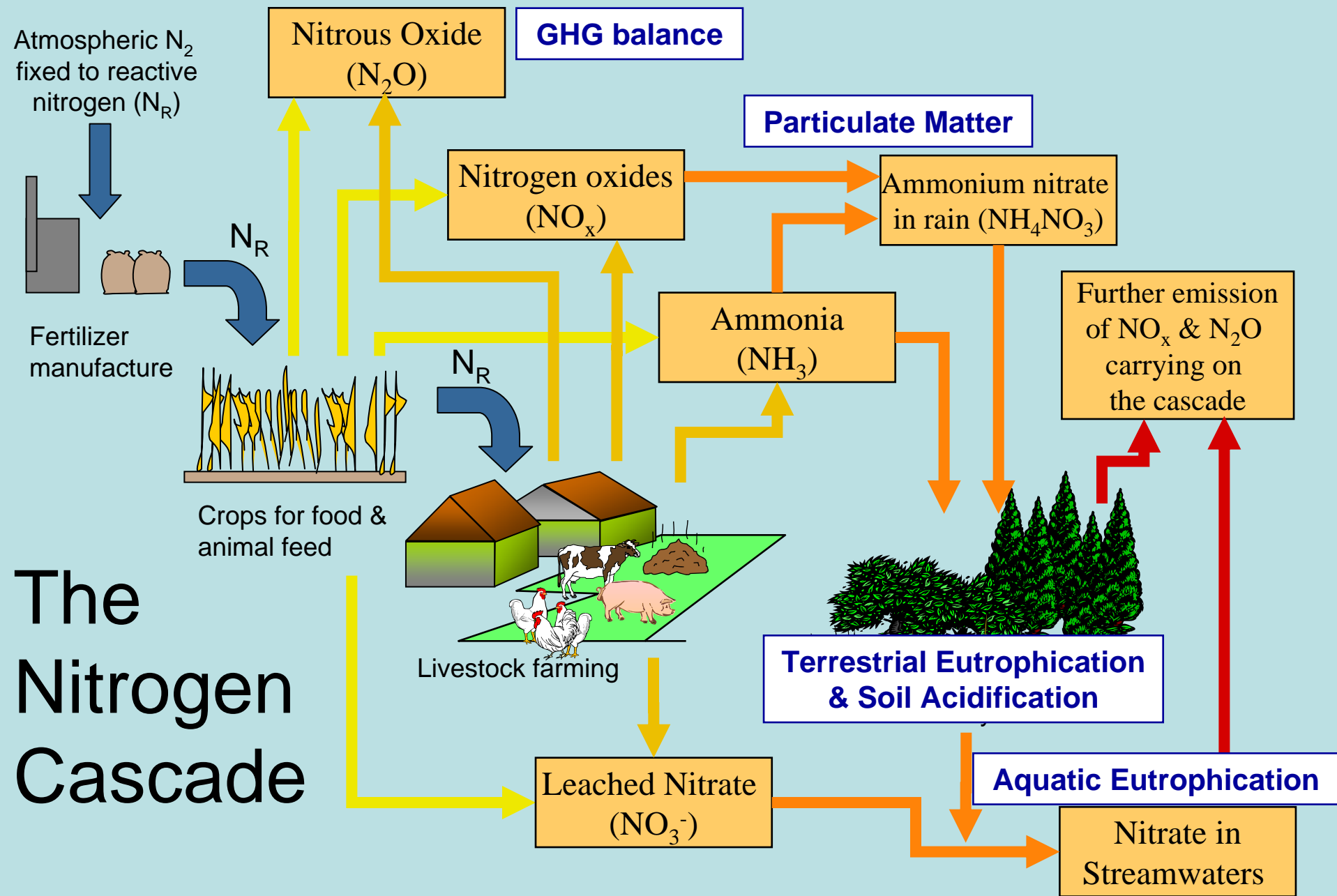
Haber Bosch: 121

Biol N fixn: 45

NO<sub>x</sub> emission: 25



Galloway et al. *Science* (15 May 2008)





## Developing the work plan of the TFRN

### **Long-term:**

- To provide technical information to be able
  - to develop an integrated vision and approach to abatement of Nr emissions and effects;
  - to improve coordination on the development of integrated Nr policies;
  - to search for synergies between policies on air pollution and other policies;

## Developing the work plan of the TFRN

### **Short-term activities:**

- a) Expert Panel on N balances and budgets
- b) Expert Panel on mitigation of agricultural nitrogen
- c) European Nitrogen Assessment (ENA)
- d) Analyse the linkages across Convention, plus Convention Biological Diversity and Marine Conventions
- e) Develop Nr related options for revision of the Gothenburg Protocol



# Expert Panel on N balances and budgets (EPNBB)

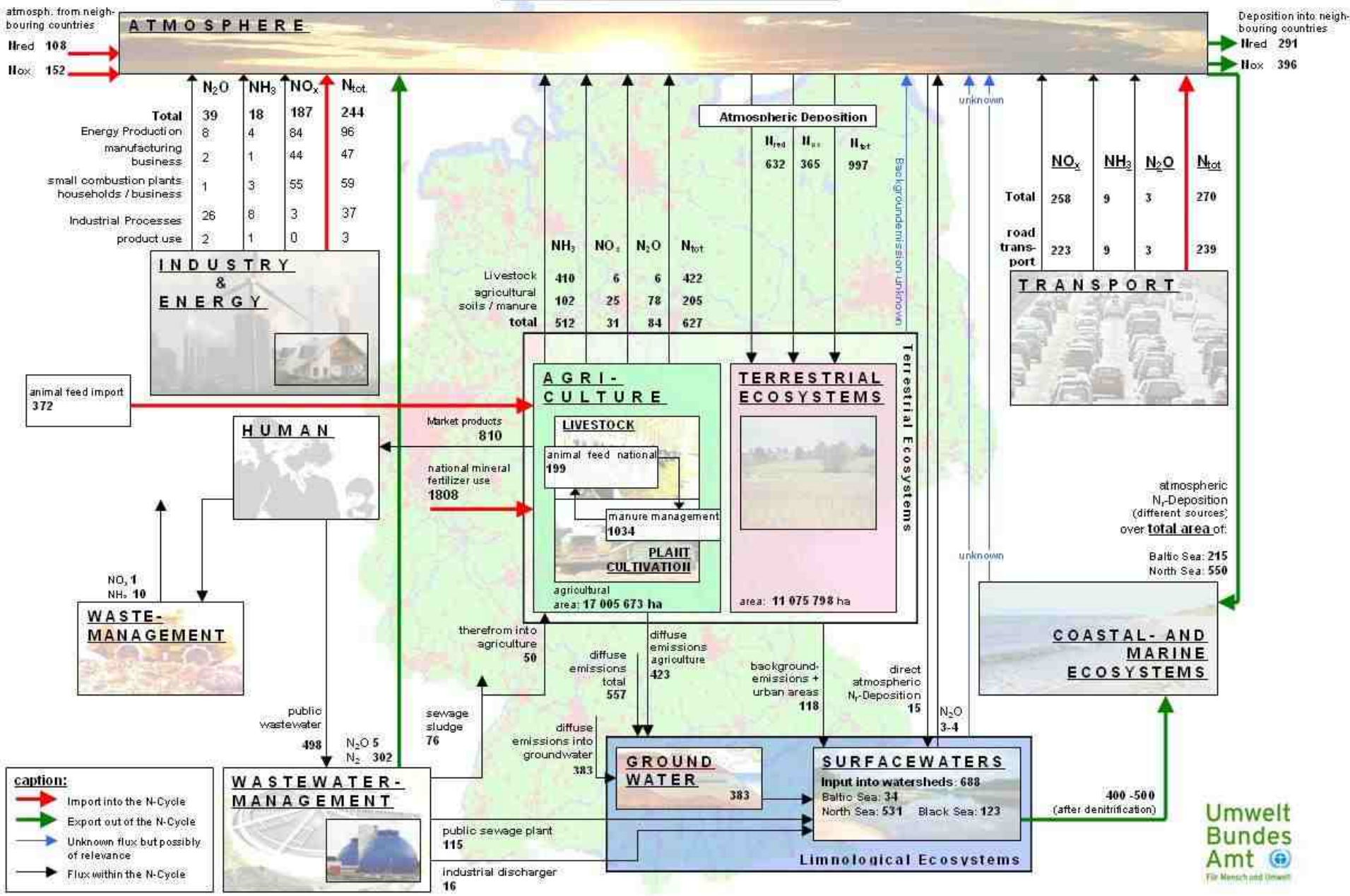
## **Objectives**

- to provide overviews of existing approaches;
- to identify weaknesses in current N balances, and provide suggestions for improvements;
- to analyze N flows and to derive key indicators, which may help policy makers to set priorities.

**IMPORT**

**NITROGEN-FLUXES IN GERMANY**

**EXPORT**







# Expert Panel on N balances and budgets (EPNBB)

## Approach

- Chair: Wilfried Winiwarter, Austria ([winiwarter@iiasa.ac.at](mailto:winiwarter@iiasa.ac.at));
- Organization of workshop in spring 2009
- Review paper will be first deliverable;
- Evaluation of progress and future plans in next TFRN meeting in April 2009;



## Expert Panel on Mitigation of Agricultural Nitrogen emissions (EPMAN)

### **Objectives**

- To develop options for a more integrated approach to mitigate Nr emissions from agriculture;
- To continue work of the former Ammonia Expert Group;
- To contribute Gothenburg Protocol revision;
  - Code of Good Agricultural Practice, Annex IX, Guidance Document



# Expert Panel on Mitigation of Agricultural Nitrogen emissions (EPMAN)

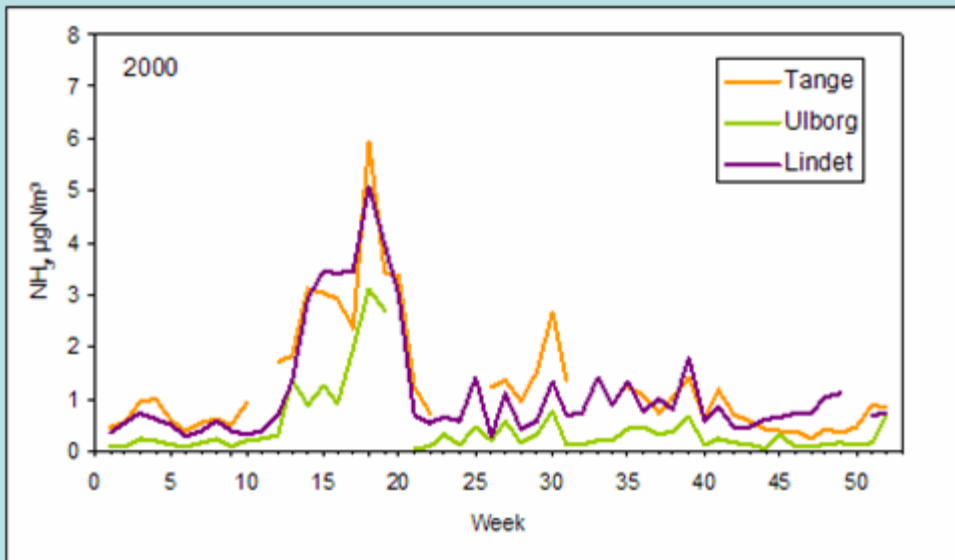
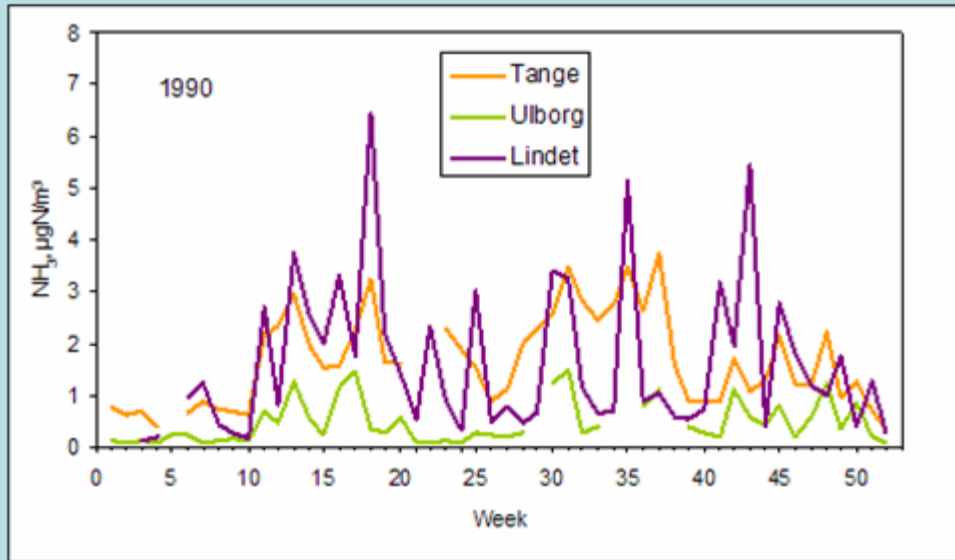
## Approach

- Chair appointed: Shabtai Bittman, Canada ([bittmans@agr.gc.ca](mailto:bittmans@agr.gc.ca))
- Workshop to support GP revision (tbc. Nov 2008)

## Key issues

- Links to emissions of other Nr forms
- Seasonality of NH<sub>3</sub> emissions (particulate matter impacts)
- Possible farm NH<sub>3</sub> emission cap for application of BAT

# Effect of Danish nitrogen mitigation policy on ammonia levels



- Implemented measures reducing ammonia and nitrate.
  - Ammonia measures reduced overall concentrations.
  - Nitrate measures provided new spring peak in ammonia.
- Question:** What is the environmental impact of this new peak?

New technology & market development has potential to reduce costs





# European Nitrogen Assessment (ENA) (2007-2010)

## Goal

- To review current scientific understanding of nitrogen sources, impacts and interactions across Europe,
- taking account of current policies and the economic costs and benefits, as a basis to
- inform the development of future policies at local to global scales.



# European Nitrogen Assessment (ENA) (2007-2010)

## Workshops (2008-2009):

- *ENA 1 (05/08) Multiple nitrogen problems & current policy measures*
- *ENA 2 (06/08) Nitrogen processing in the biosphere*
- *ENA 3 (11/08) Dispersion, budgets & impacts of N on different scales*
- *ENA 4 (05/09) Managing nitrogen in relation to key societal threats*
- *ENA 5 (09/09) European nitrogen policies and future challenges*

# Nr & Society

## The NitroNet Poll



In collaboration with  
The Green Room, BBC News.

**If one molecule of reactive nitrogen has multiple effects in the environment, what priority would you give to minimizing the following threats? (Score each 1-5)**

- **Water quality**
- **Air pollution**
- **Greenhouse gas balance**
- **Ecosystems and biodiversity**
- **Soil quality**

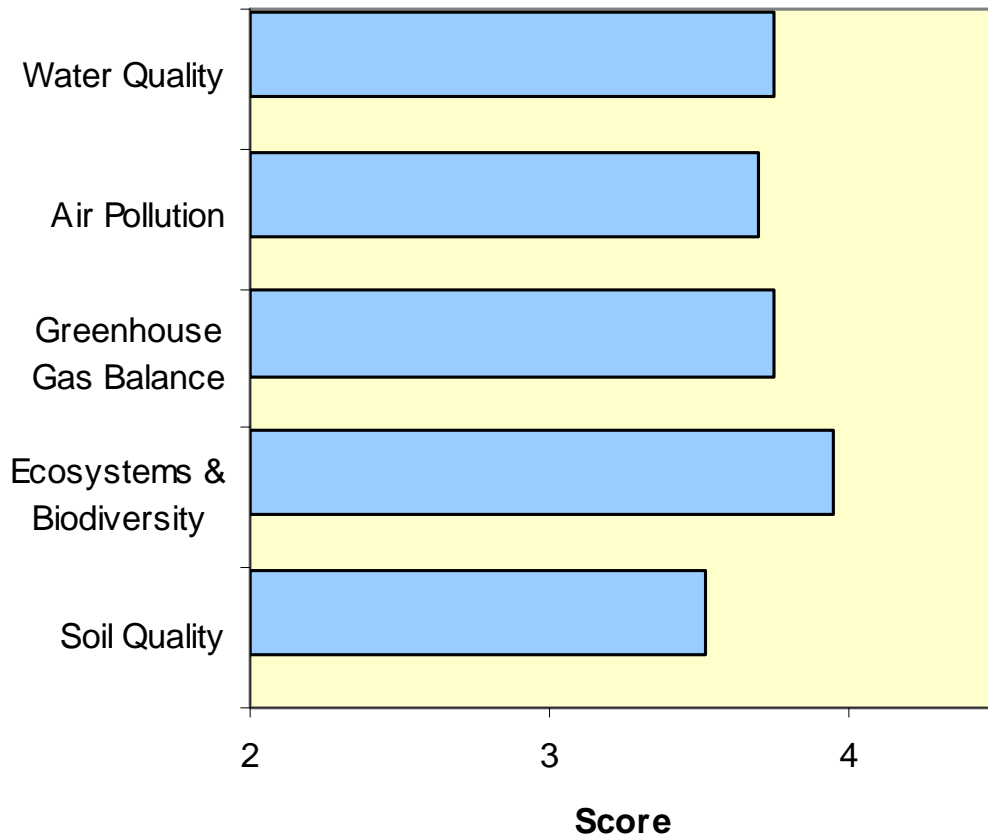


# Nr & Society

## The NitroNet Poll



In collaboration with  
The Green Room, BBC News.



- The public view reflects a wide range of Nr priorities
- All Nr issues must be addressed
- Ecosystems and biodiversity rated highest

**NitroNet Poll**  
[www.nine-esf.org/?q=nitronet\\_poll](http://www.nine-esf.org/?q=nitronet_poll)

**BBC News Article**

<http://news.bbc.co.uk/1/hi/sci/tech/7496036.stm>

# Role of diet choice in managing Nr

- “The choice of food diet had considerable effect on the N cycle.
- The consequences of changes in diets should be explored further in order to estimate its significance for the N cycle”

TFRN-1 Report (Paragraph 17b)

- Need to consider relationship to WHO protein intake guidelines and the health co-benefits of reducing human Nr intake.



## Possible contributions of TFRN to the revision of Gothenburg Protocol (1)

### **To provide technical information related to:**

- New insights and information related to  $\text{NH}_3$  abatement measures, including possible synergies and trade offs;
- Integrated measures for decreasing  $\text{NO}_x$ ,  $\text{NH}_3$  and  $\text{N}_2\text{O}$  emissions to air and  $\text{NO}_3$ -leaching to water;
- Highlight interactions between the measures in Gothenburg Protocol and Climate Change Policy;



## Possible contributions of TFRN to the revision of Gothenborg Protocol (2)

### **To provide technical information related to:**

- the roles of managerial measures and structural measures on  $\text{NH}_3$  emissions;
- integrative indicators for N use efficiency in agriculture;
- economic instruments for effective implementation of policies aimed at decreasing N emissions;

### **Tasks**

- Annex IX on  $\text{NH}_3$ , Code of Good Practice, Guidance Doc.

# http://www.clrtap-tfrn.org



## Task Force on Reactive Nitrogen

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### Welcome to the TFRN website

This is the website of the Task Force on Reactive Nitrogen (TFRN) under the *Working Group on Strategies and Review* of the UNECE Convention on Long-range Transboundary Air Pollution

TFRN is co-led by the **United Kingdom** and the **Netherlands**.

The Co-Chairs are M

**Action for Parties to provide details of their National Focal Points to the Secretariat**

### 1<sup>st</sup> Task Force meeting

The first meeting of TFRN has taken place on **21-23 May 2008** at the Wageningen International Conference Centre (WICC), the Netherlands.

### Documents

- [Decision ECE/EB.AIR/91/Add.1: Establishment of the Task Force on Reactive Nitrogen](#)
- [Note of the chairs on the 1999 Gothenburg protocol, to be discussed during the late](#)

### Upcoming events

- [3rd Workshop of the European Nitrogen Assessment \(ENA-3\)](#) (64 days)
- [Workshop on costs of excess nitrogen \(ENA5a\)](#) (92 days)
- [Europe IP Annual Meeting](#) (147 days)
- [TFRN 2nd Meeting \(pending confirmation\)](#) (240 days)

  
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