Green Week 2013

Air quality and agriculture in the EU

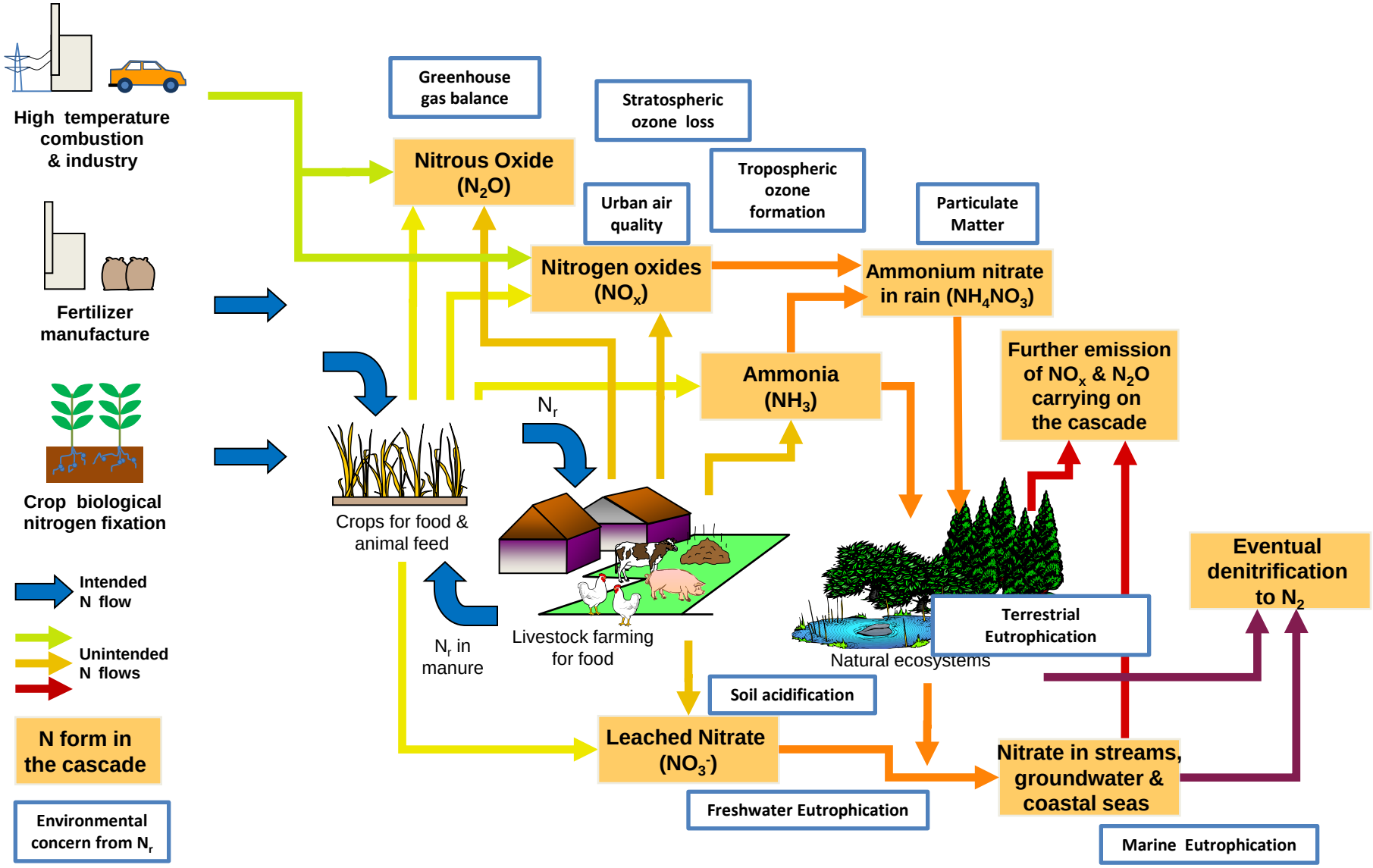
Air Quality and Agriculture

Why worry about ammonia, and what can we do about it?

Mark Sutton
NERC Centre for Ecology & Hydrology, UK.

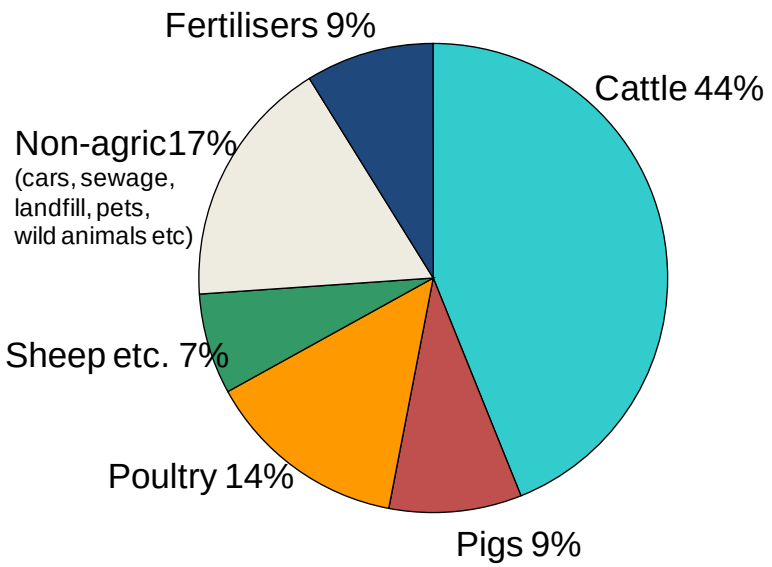
Effects of climate change on air pollution impacts and response strategies for European ecosystems

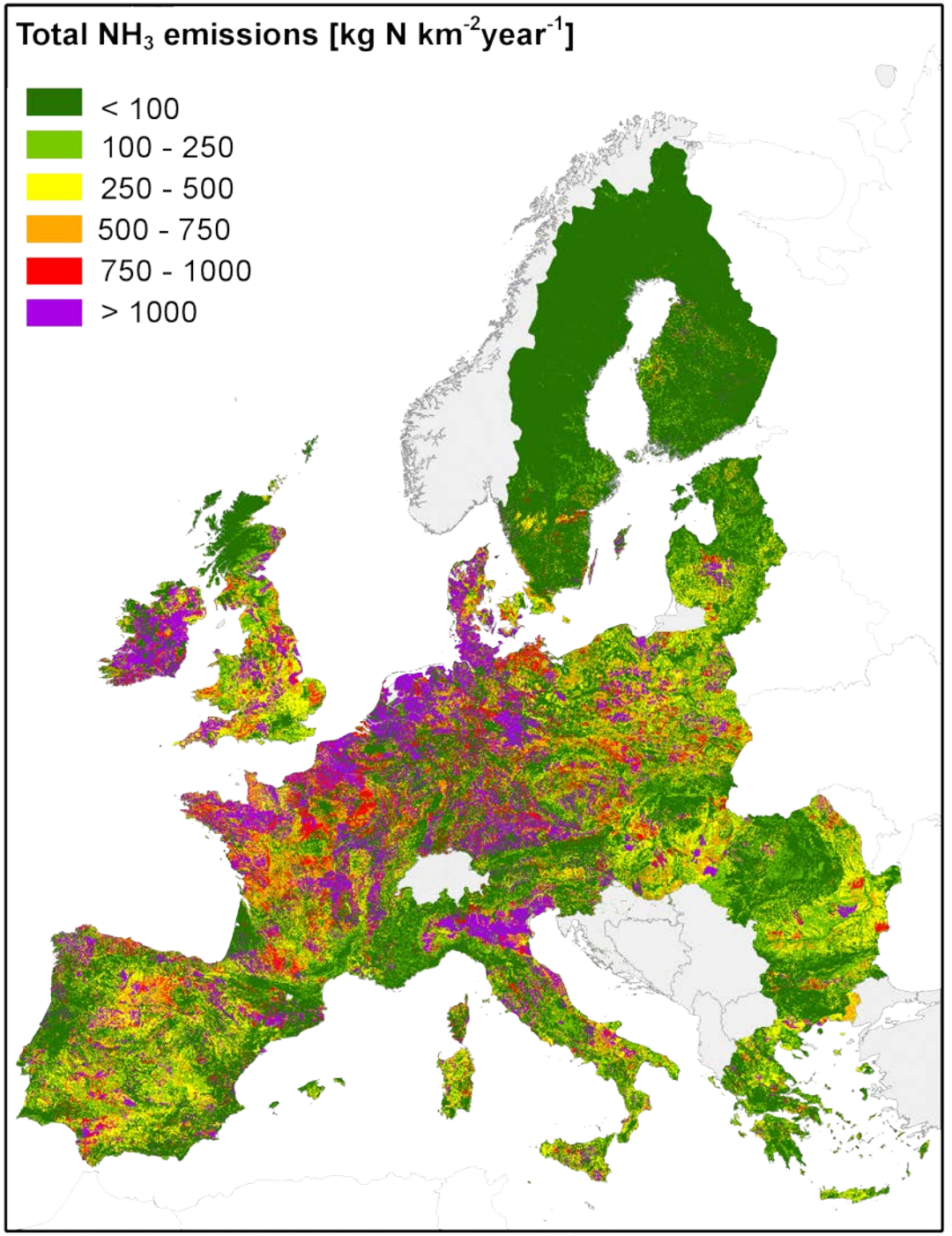
Simplified view of the Nitrogen Cascade



Ammonia in Europe

Proportions for the UK

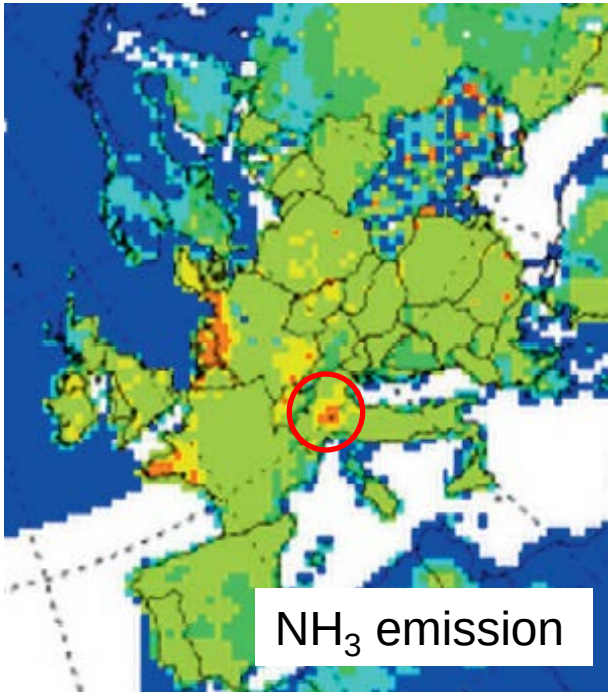




Indicator Database for European Agriculture V1_20090415, INTEGRATOR and EDGAR_DRAFT

Ammonia contributes substantially to particulate matter (PM) concentrations

- Reduced visibility
- Human heath impacts



Parma, Emilia Romagna, Italy

Nitrogen reduces the abundance of woodland flowers

Wood sorrel (*Oxalis acetosella*)

60% of Natura 2000 sites across the EU exceed critical loads for nitrogen deposition

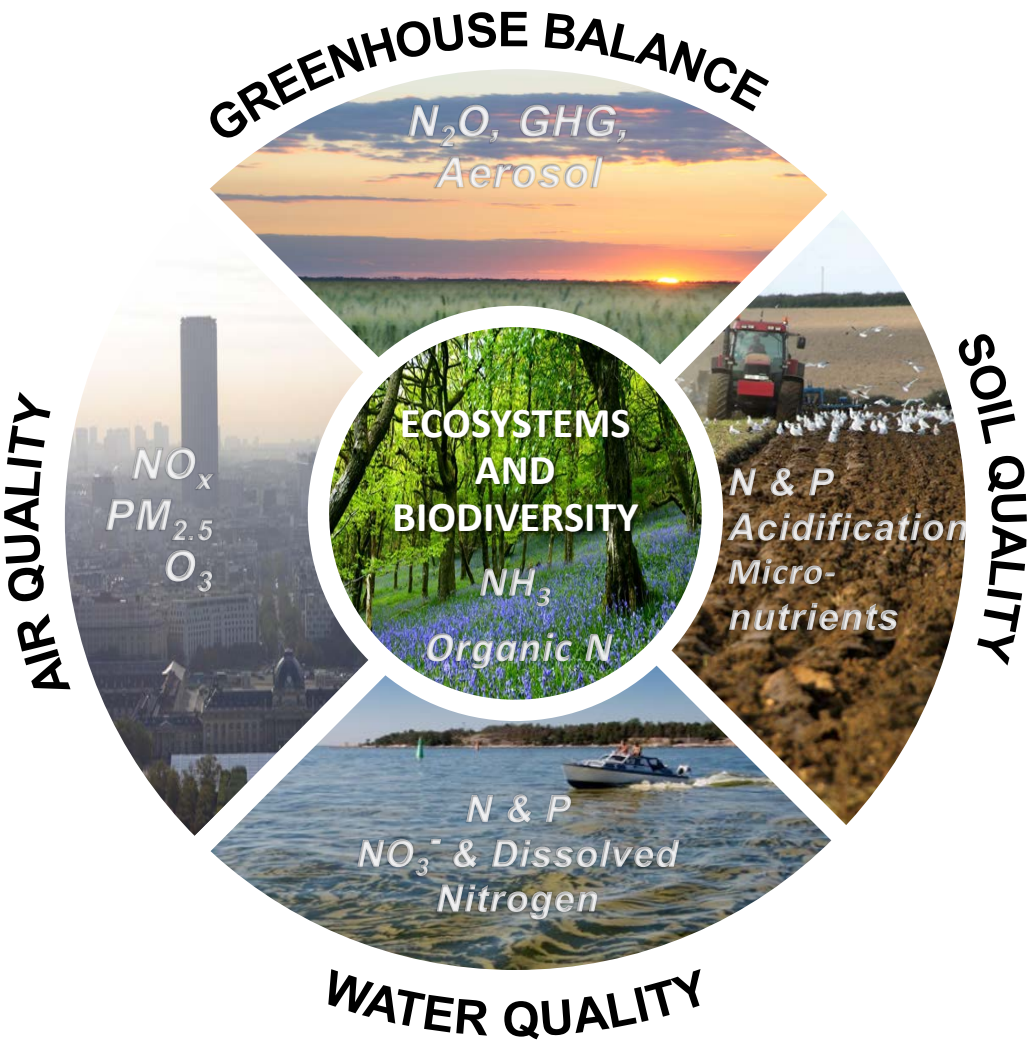
Lost at the expense of:

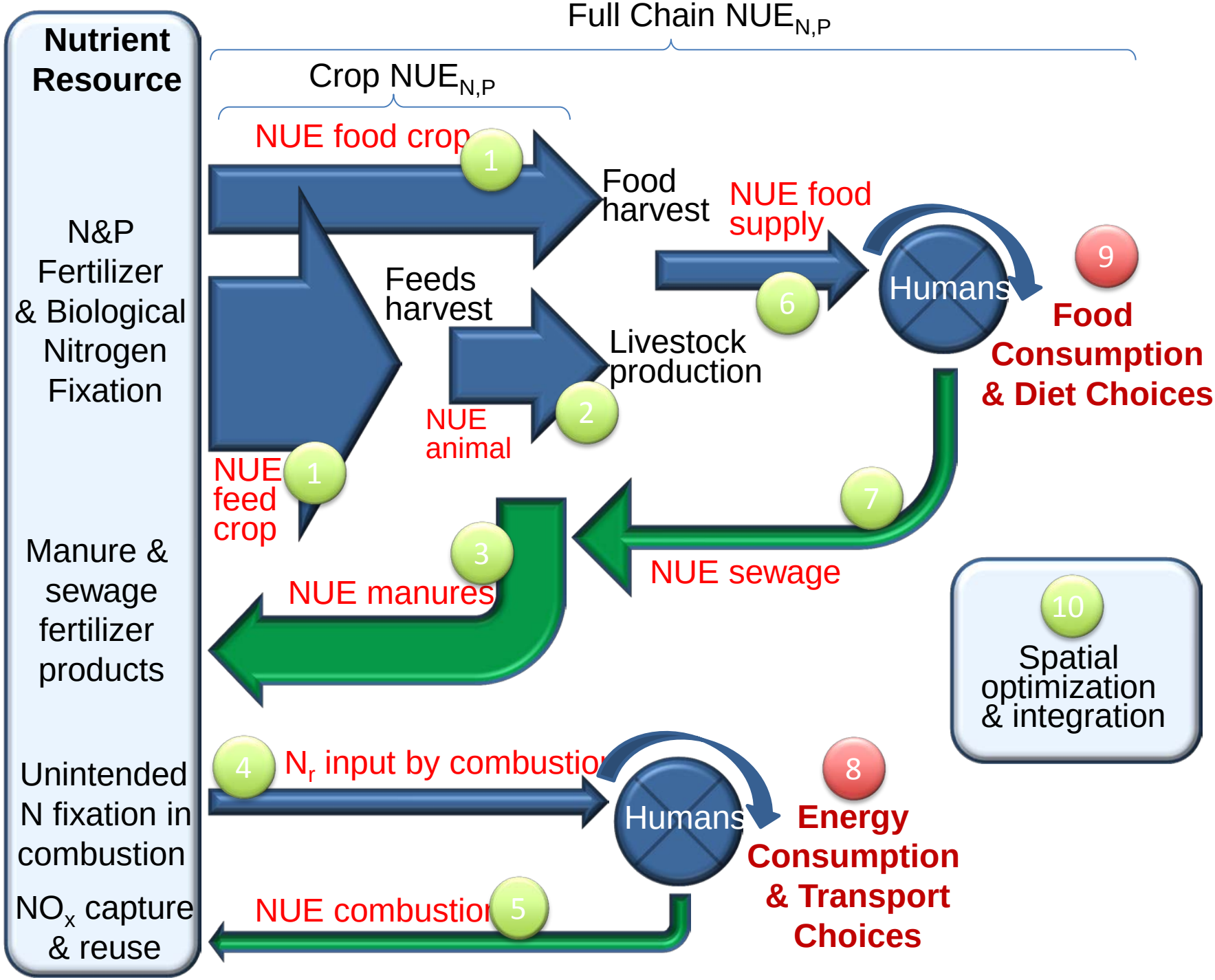
Velvet grass (*Holcus lanatus*)

The five key threats of excess nitrogen

The WAGES of too much nitrogen:

Water quality
Air quality
Greenhouse balance
Ecosystems
Soil quality




Nutrient Resource
N&P Fertilizer & Biological Nitrogen Fixation
Manure & sewage fertilizer products
Unintended N fixation in combustion
NOx capture & reuse
Full Chain NUEN,P
Crop NUEN,P
NUE food crop
1
Food harvest
NUE food supply
6
Humans
9
Food Consumption & Diet Choices
Feeds harvest
Livestock production
2
NUE animal
NUE feed crop
1
7
3
NUE manures
NUE sewage
10
Spatial optimization & integration
4
Nr input by combustion
Humans
8
Energy Consumption & Transport Choices
NUE combustion
5

Key nitrogen opportunities for the farmer

UNECE Task Force on Reactive Nitrogen:

5 top priorities for ammonia mitigation

1. Low-emission **land application** of manure & fertilizer:
   a) Application of cattle, pig & poultry slurry & solid manure
   b) Low emission use of urea fertilizer (ban is not proposed)
2. **Animal feeding strategies** to reduce N excretion, from cattle, pig & poultry.
3. Low-emission techniques for all ***new* stores** for cattle and pig slurries and poultry manure.
4. Strategies to improve N use efficiencies and reduce N surpluses, with **N balances on *demonstration farms***,
5. Low-emission techniques in new and largely rebuilt pig & poultry **housing**.

Slurry spreading:

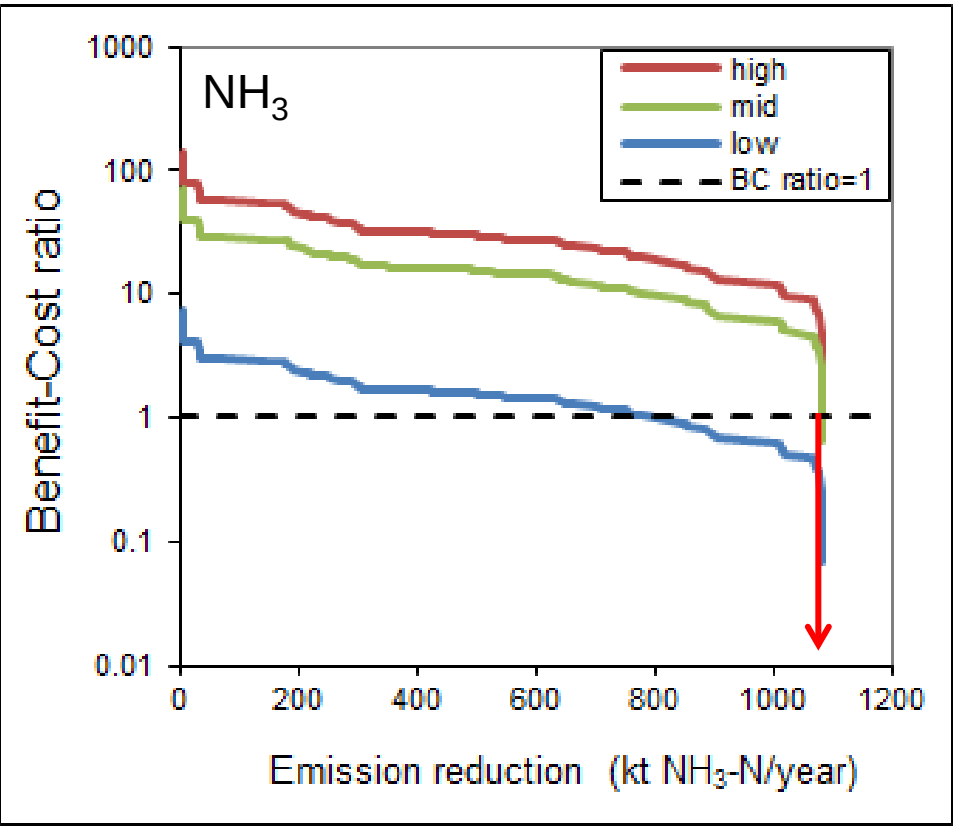
a wide range of low-emission techniques are available

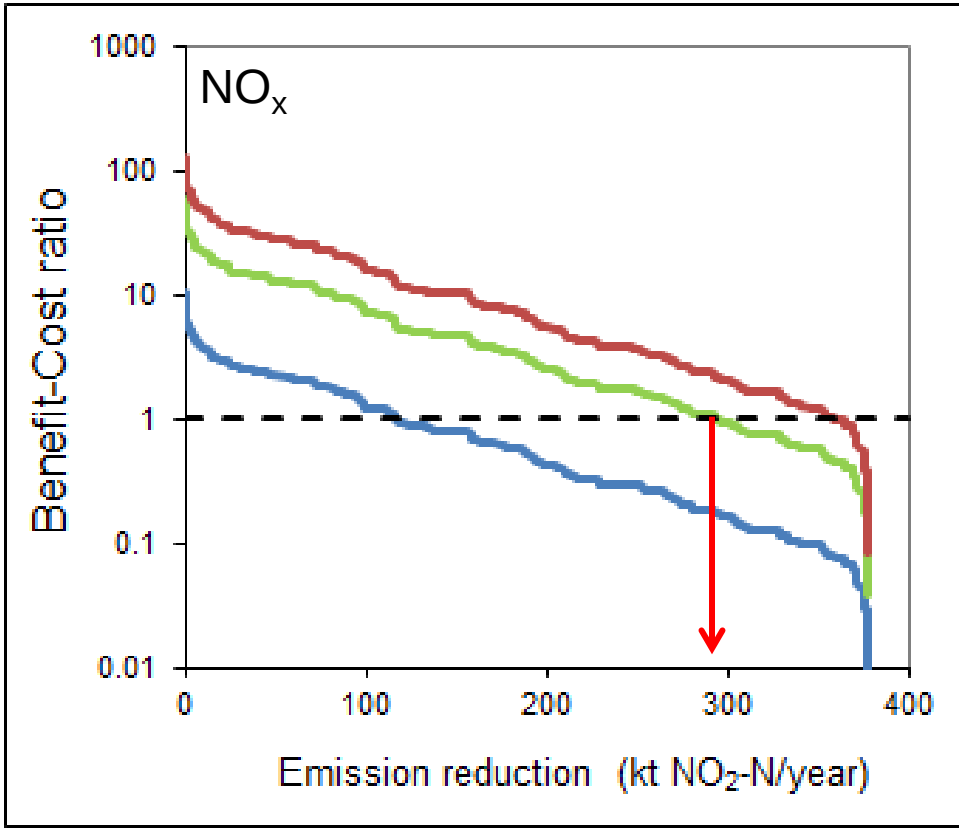
Requirement:
Netherlands, from 1993
Denmark, from 2003

Reduced emissions nationally by 50%

The car and the exhaust pipe…

EU benefit-cost ratios for NH_3 and NO_x mitigation

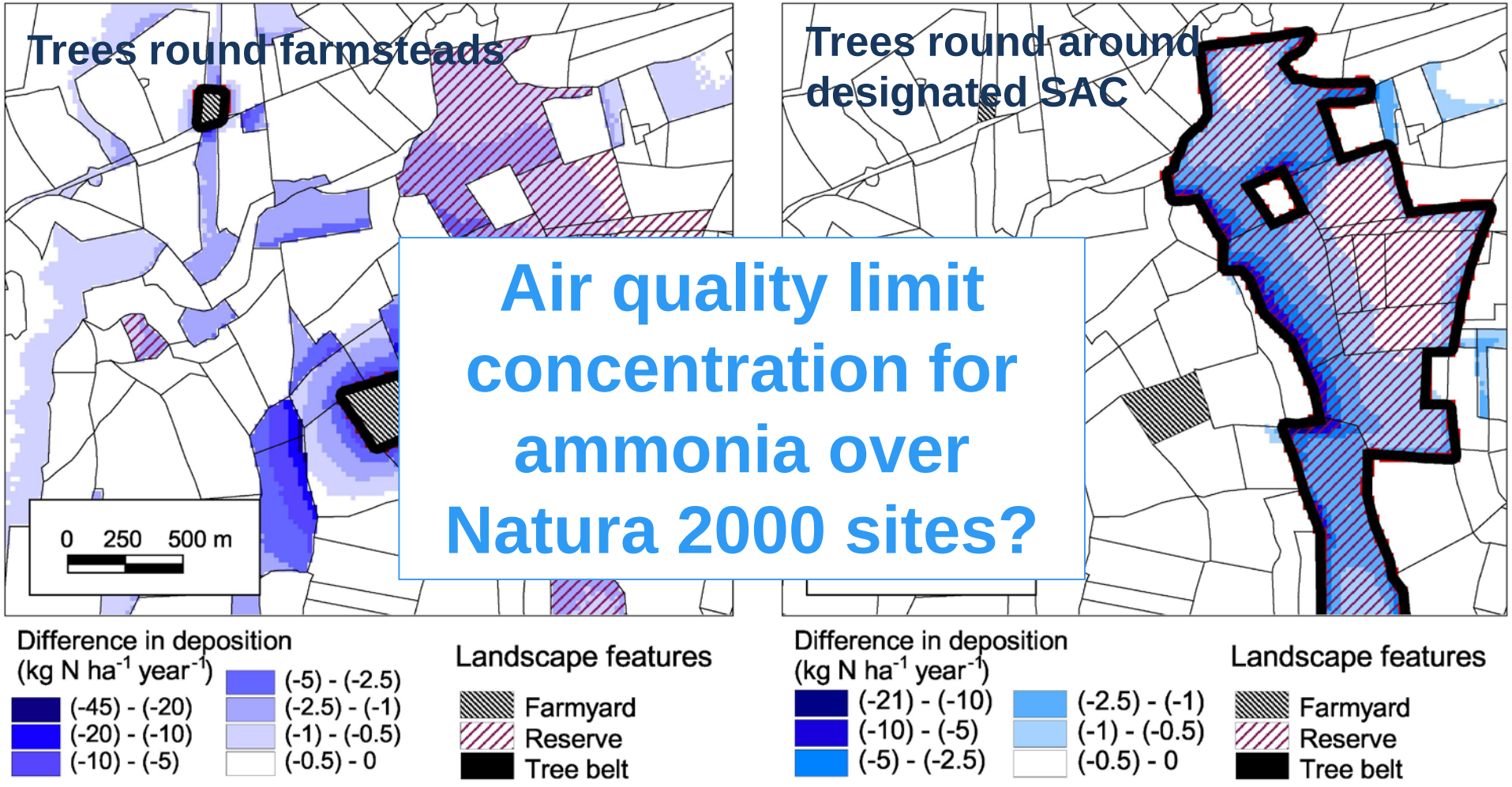




Van Grinsven et al. (2013, *Environ Sci & Technology*)

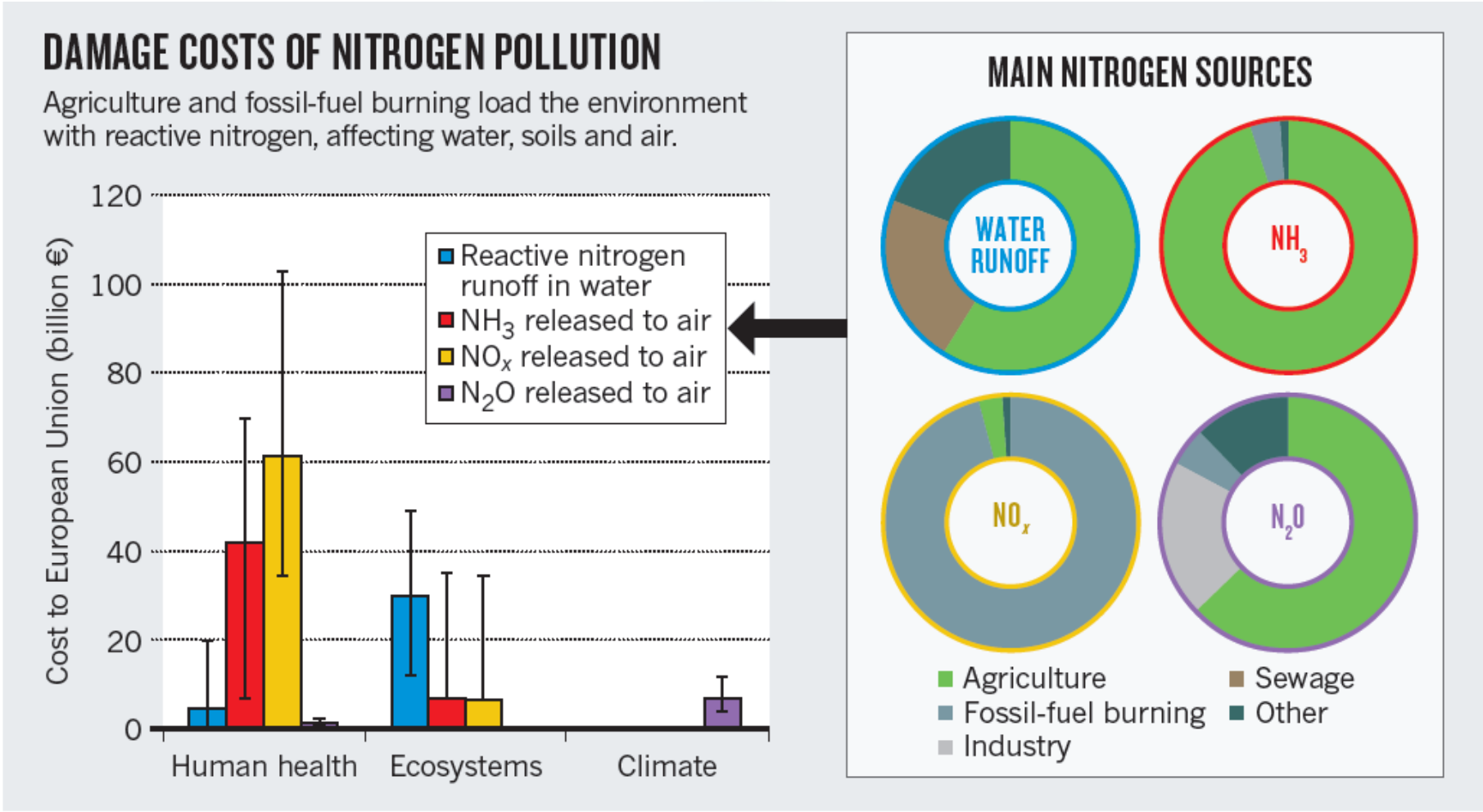
Landscape planning scenarios: Effect of tree-belts on nitrogen deposition

Two farms, two hypothetical SACs; 50 m belts of trees



Key nitrogen opportunities for the citizen

Ammonia a major societal cost in EU



EU Damage cost: 70 - 320 billion € / year

Nature 14 April 2011

£650-a-year nitrogen pollution 'could be reduced by eating less meat'

Press Comment on the *European Nitrogen Assessment*

***Metro* 10 April 2011:**

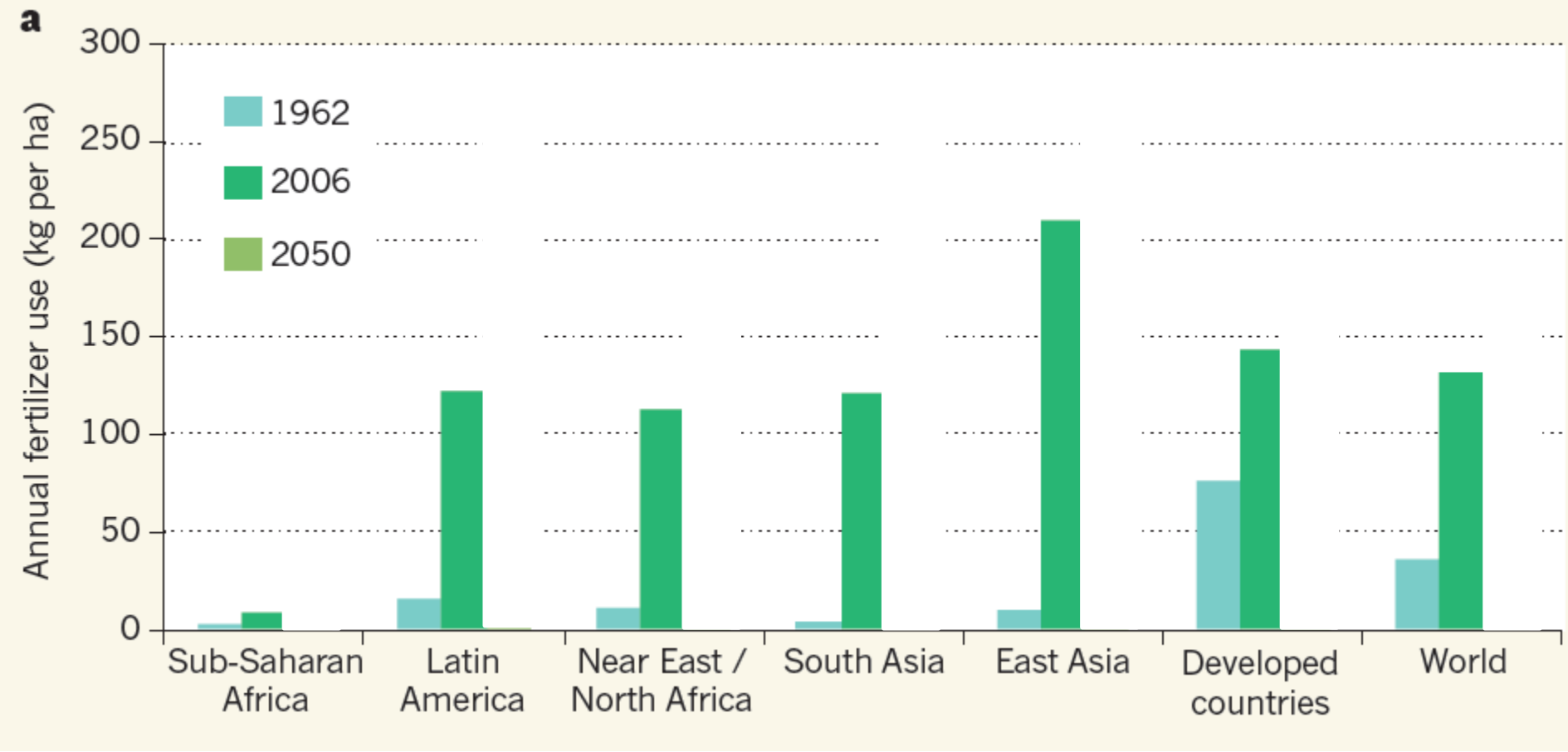
In Europe 85% of harvested N goes to feed livestock

Right food choices:

- Better Environment
- Better Health
- Better Price

Past change future risks

Global fertilizer use



"The shape of nitrogen to come" (*Nature*, 20 Feb 2013)

Options for AQ Revision

- Tighter NH_3 emissions ceilings
- Low emission requirements for:
  - Manure spreading (by 30%)
  - Urea fertilizer application (by 30%)
  - New manure stores (by 30%)
  - 70% of cattle but only 12% of farms, with more than 50 LU
  - Tanker size thresholds for requirements
- Air quality limit for NH_3 over Natura sites
- NH_3 in Rural Development Programmes.
- Target to improve overall NUE by 20%

More info at Stand 8: "*Menu for a better environment*"