NitroEurope IP

The nitrogen cycle and its influence on the European greenhouse gas balance

Context: Resource and delivery

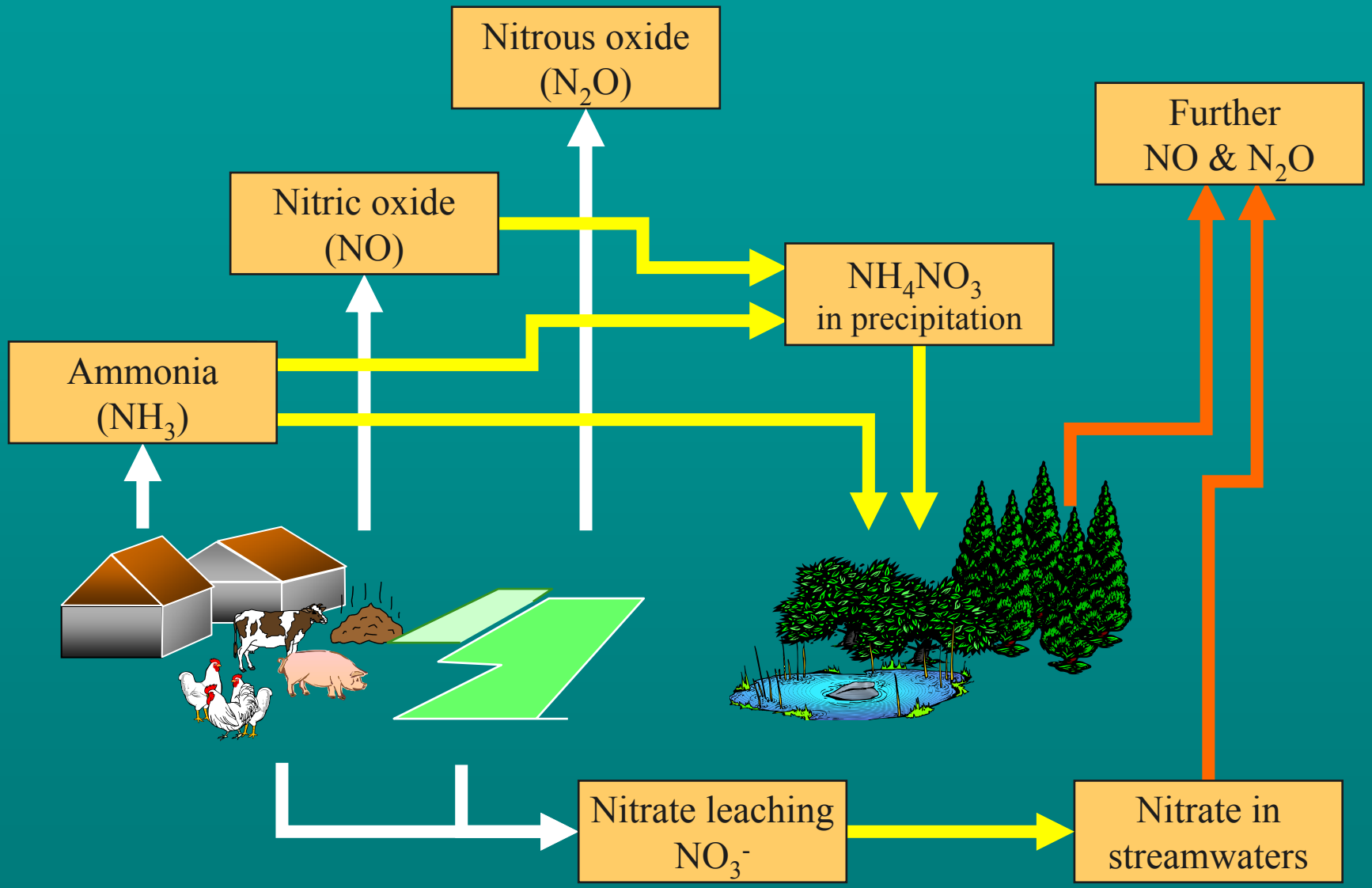
The Resources

- NEU, COST 729, ESF, …
- Cluster: European Transboundary Nitrogen Activity (ETNA)

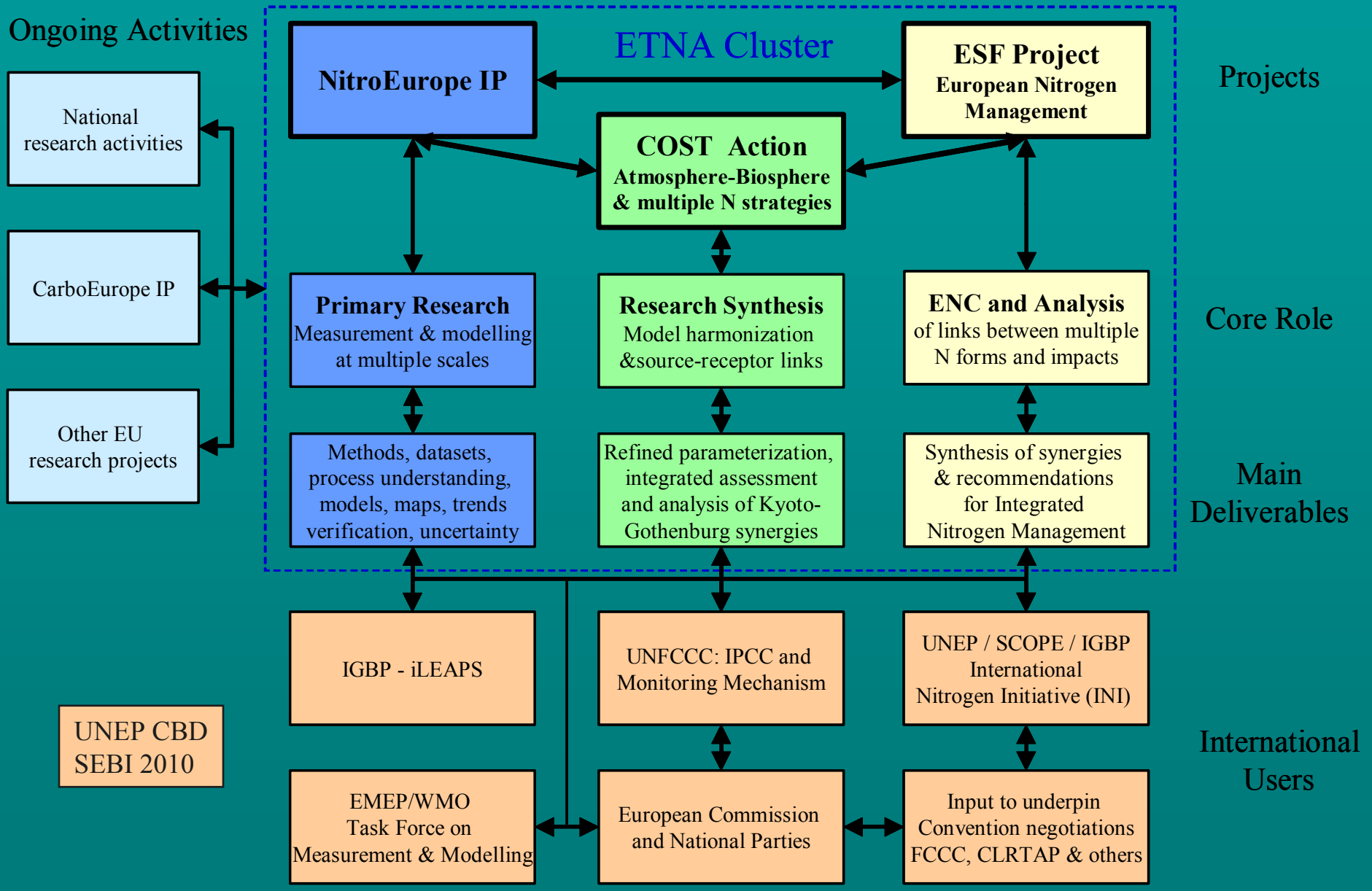
Delivery targets

- European Commission
- International Conventions: WGs and negotiations
- International Nitrogen Initiative (INI): European Nitrogen Centre (ENC)
- Education and local stakeholders

Multi-pollutant interactions for nitrogen



Abatement may swap one pollutant for another in the nitrogen cascade


Ongoing Activities
National research activities
CarboEurope IP
Other EU research projects
ETNA Cluster
NitroEurope IP
ESF Project
European Nitrogen Management
COST Action
Atmosphere-Biosphere & multiple N strategies
Primary Research
Measurement & modelling at multiple scales
Research Synthesis
Model harmonization &source-receptor links
ENC and Analysis
of links between multiple N forms and impacts
Methods, datasets, process understanding, models, maps, trends verification, uncertainty
Refined parameterization, integrated assessment and analysis of Kyoto-Gothenburg synergies
Synthesis of synergies & recommendations for Integrated Nitrogen Management
Projects
Core Role
Main Deliverables
IGBP - iLEAPS
UNFCCC: IPCC and Monitoring Mechanism
UNEP / SCOPE / IGBP International Nitrogen Initiative (INI)
UNEP CBD SEBI 2010
EMEP/WMO Task Force on Measurement & Modelling
European Commission and National Parties
Input to underpin Convention negotiations FCCC, CLRTAP & others
International Users

NitroEurope IP

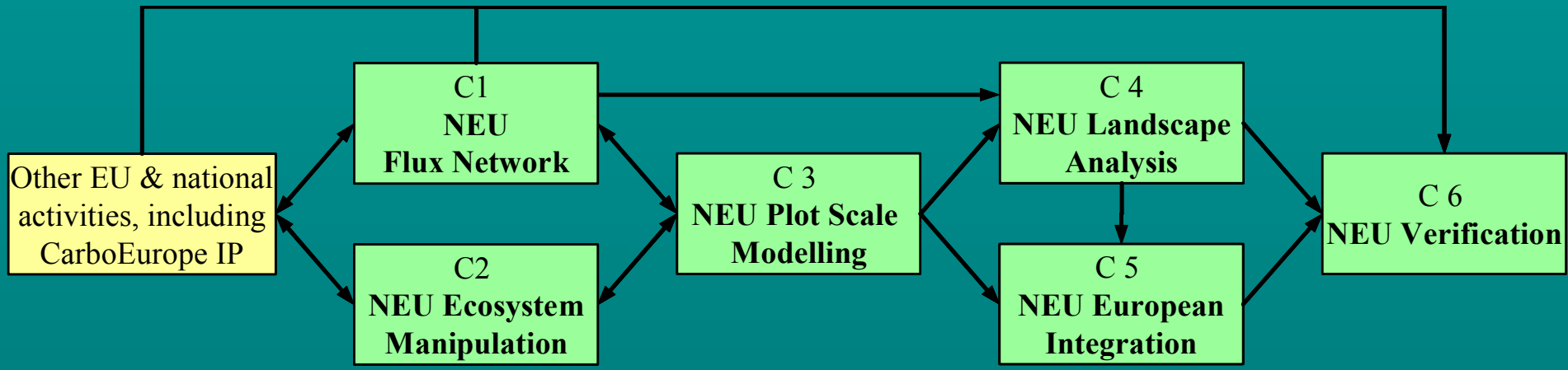
- *What is the effect of reactive nitrogen supply on the direction and magnitude of net greenhouse gas budgets for Europe?*

- **Effect of N on GHG balance:**

Positive effect	Unclear	Negative effect
N_2O (inc. 2' sources)	Cattle CH_4	C uptake in plants
CH_4 wetlands	SOM decomposition	

- *To what extent would a more-integrated management of the N-cycle and its interactions with the C-cycle have potential to reduce greenhouse gas and N_r emissions simultaneously?*

NitroEurope
Overal Science Structure



Plus four supporting components:

C7. Standards and Data Management

C8. NEU Management

C9: NEU Training

C10: NEU Dissemination

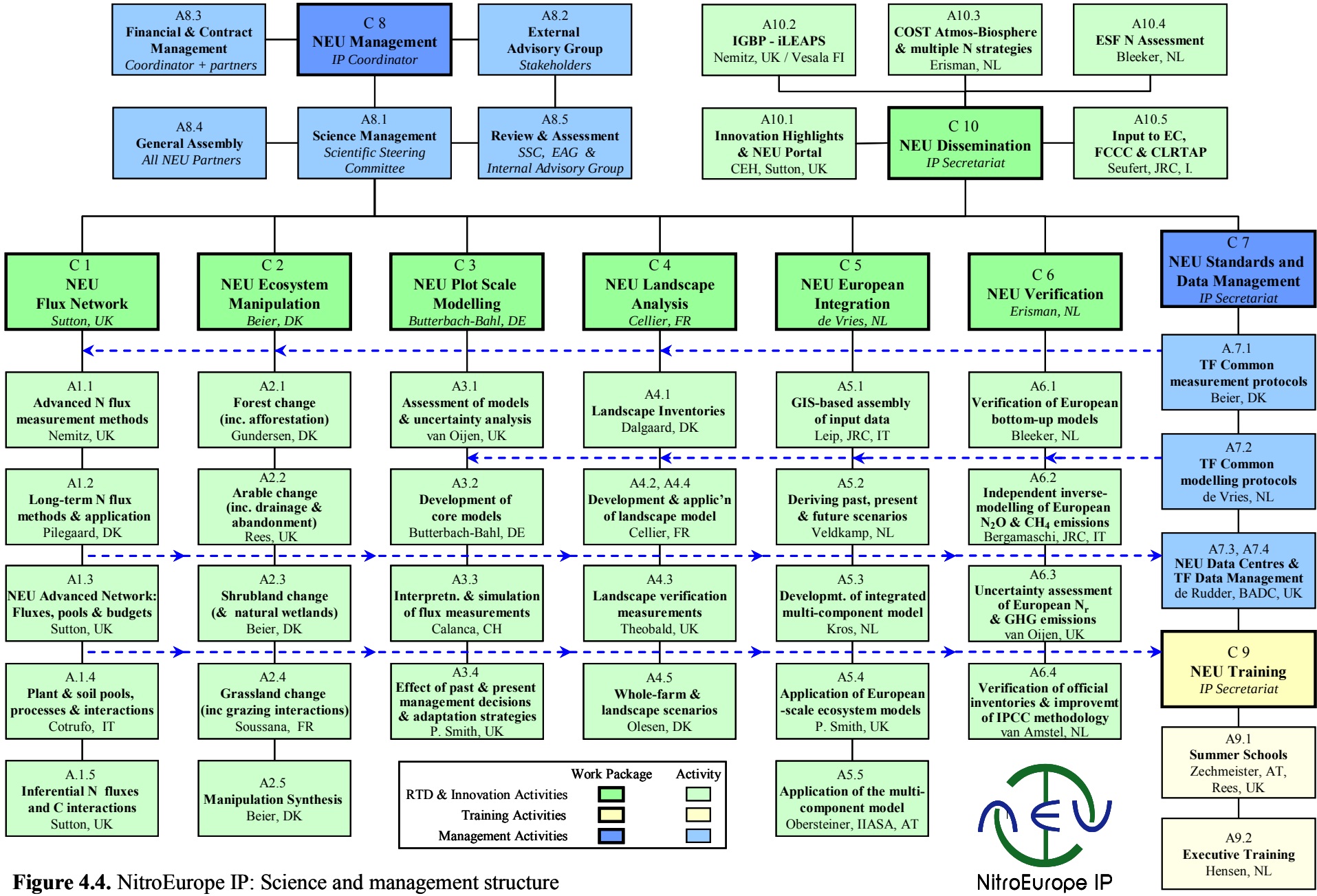


Figure 4.4. NitroEurope IP: Science and management structure

Partner Involvement

- Funded partners: 65 institutions, inc 7 INCO.
  - Steering and Core Partners (leading groups, integration)
  - Major Partners (key deliverables)
  - Funded Associate Partners (extend the ERA)

- Involvement of unfunded associate partners
  - Mutual sharing of information
  - Clear acceptance criteria, by Activity
  - Associate Partners not unlimited: to maintain manageability and science excellence
  - Obvious interaction with COST 729

Component 1: NEU Flux Network

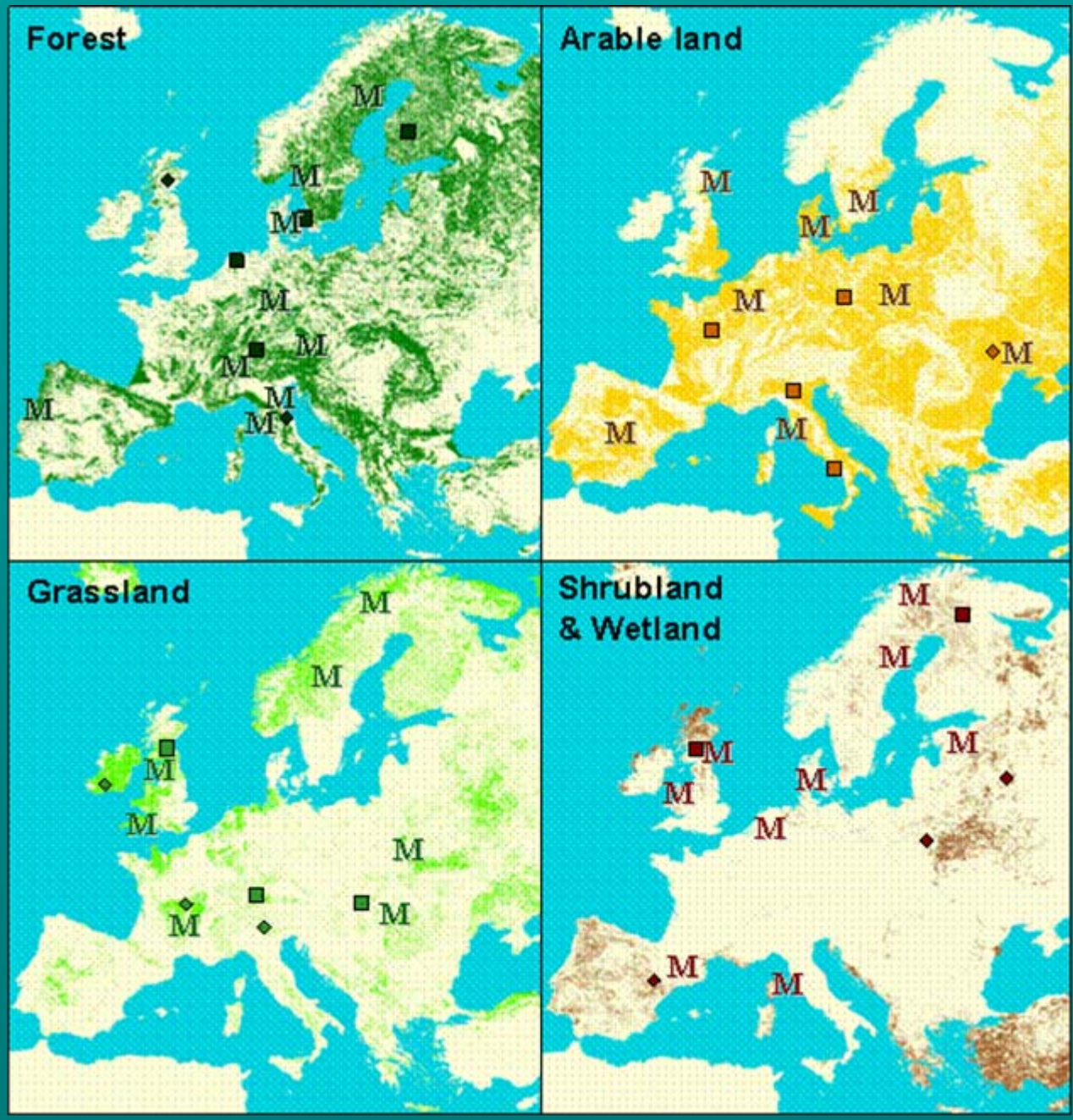
- Flux methods development
  - A1.1. Advanced micrometeorological methods (for process analysis)
  - A1.2. Low cost micrometeorological methods
  - (for flux monitoring)
- Flux network measurements
  - Three tier network
- Plant and soil processes
  - Advanced process studies (A1.4)
  - Supporting the micromet network

34 Partner Institutes: €6.5 million from EC

Tiered structure of NEU Flux Network

- Level 3 ("Super Sites"): N and GHG fluxes: Core Measurements + Special Topics. Includes high cost micromet methods and process analysis.
- Level 2 ("Regional Sites"): Basic N and GHG flux monitoring, e.g. COTAG, simple cuvettes
- Level 1 ("Inferential Sites"): Basic N air concentration measurements at 50 CO_2 flux sites. e.g. DELTA low cost denuders.

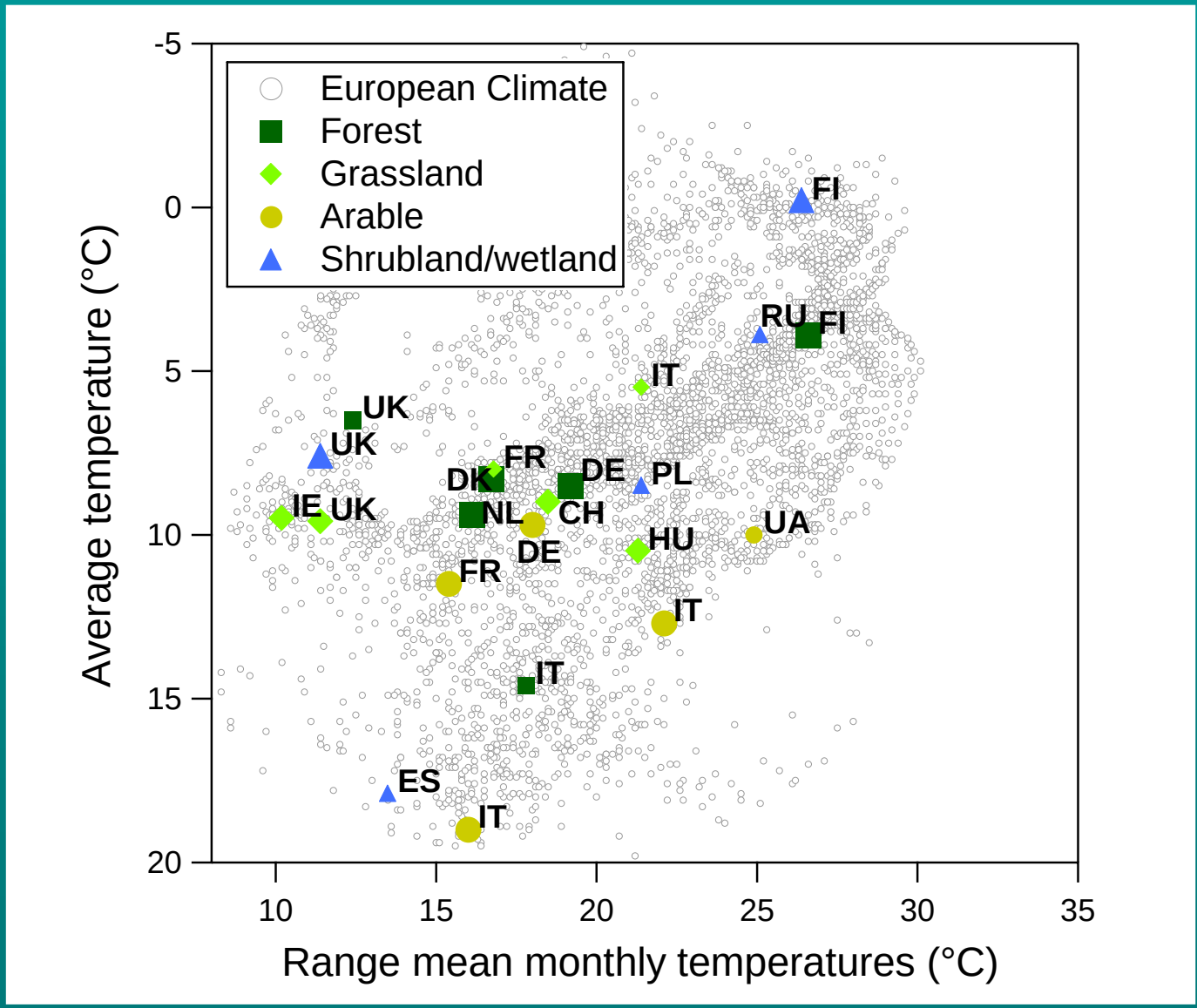
NEU Flux & Manipulation Networks



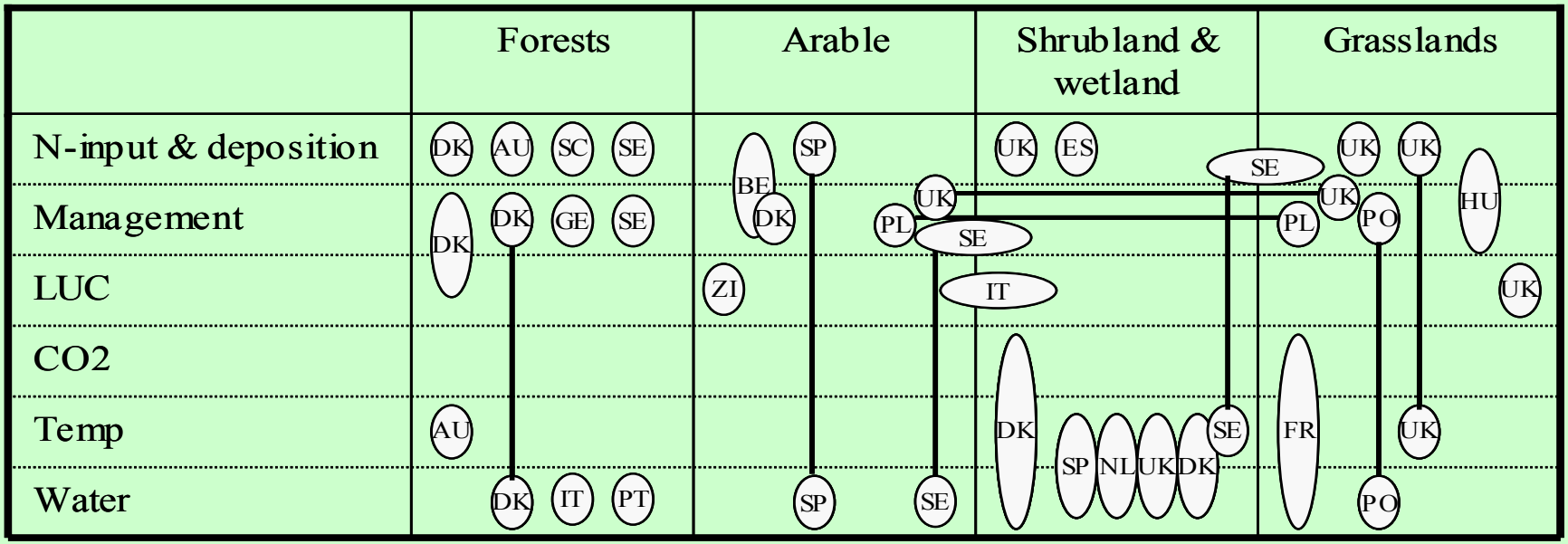
13 Level 3 Super Sites
9 Level 2 Regional Sites
50 Level 1 Inferential Sites

22 Core Manipulation Sites
14 Assoc. Manipulation Sites

NEU Flux Network Sites in Climate Space



Component 2: NEU Manipulation



25 Partner Institutes: €2.8 million from EC
Plus significant input of Associate Partners

Component 2: Grasslands & Shrub/wetlands

Site	Climate, ecosystem, soil	Treatments	Network
Crichton, UK	Atlantic, grassland, clay loam	N input	National
Theix, FR	Medit., Grassland/Shrub, brown soil	Climate & CO_2	National
Gödöllő, HU	Continental, Grassland, Sandy	Management, CO_2 and N input	GREENGRASS
Plynlimon, UK	Atlantic, Acid grassland, peaty podzol	Temperature and N deposition	National
Rzecin/Demmin, PO	Atlantic, Acid grassland, peaty podzol	Draining/flooding	National
Stordalen & Fäjemyren, SE	Subarc. & temp., mire, peat	CNP & N depos.	C-EUROPE, NECC
Nafferton, UK (Chrono)	Atlantic, Grassland/riparean	Land use chronosequence	National

Site	Climate, ecosystem, soil	Treatments	Network
Whim, UK	Atlantic, Calluna heath bog, peat	N deposition (N forms; wet/dry NH_x/NO_y, PK)	National
Brandbjerg, DK	Atlantic, Grassland/shrubland, sandy podzol	Climate & CO_2	National
Stordalen, SE	Subarctic, mire, peat	CNP & N depos. vs CH_4	C-Europe, NECC
Fäjemyren, SE	N. temperate, mire, peat	CNP & N depos. vs CH_4	INSTIGATE, NECC
Mols, DK	Atlantic, calluna shrub & grass, sandy podzol	Climate	VULCAN, CLIMOOR
Männikjärve, EE	Atlantic, bog, peat	NP addition	National
Clocaenog, UK	Atlantic, Calluna heathland, Peaty podzol	Climate	VULCAN, CLIMOOR
Garraf, ES	Mediterranean shrubland, Calc. Cambisol	Climate	VULCAN, CLIMOOR
Oldebroek, NL	Atlantic, calluna shrubland, Podzol	Climate	VULCAN, CLIMOOR

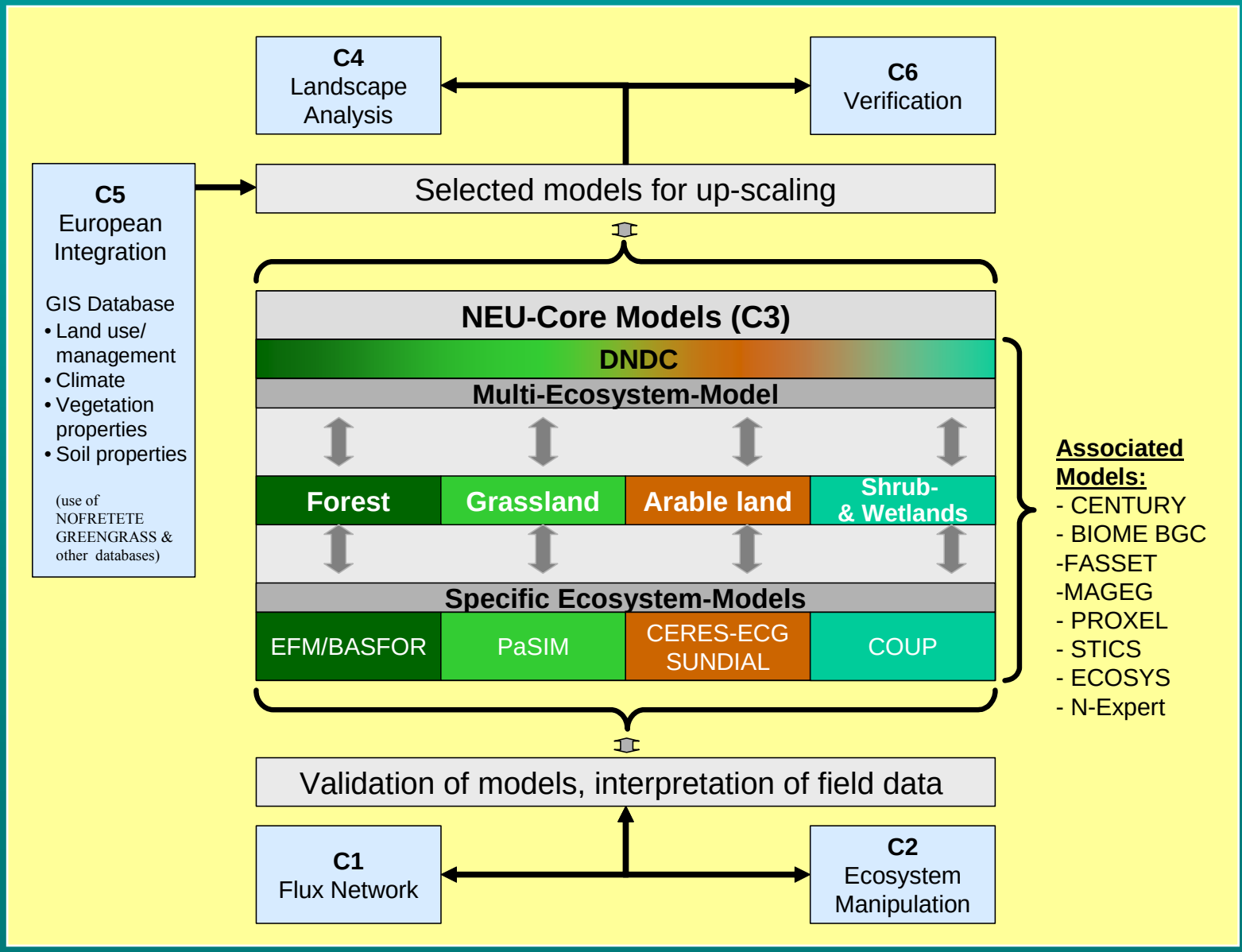
Component 3: Plot Scale Ecosystem Models

Activities

- A3.1: Prior assessment of model uncertainties
- A3.2: Development of selected core models
- A3.3: Simulation of measured fluxes (C1, C2 + additional datasets)
- A3.4: Scenarios on effect of management decisions

13 Partner Institutes: €1.4 million from EC
+ Significant input of Associate Partners

Component 3: NEU Plot Modelling

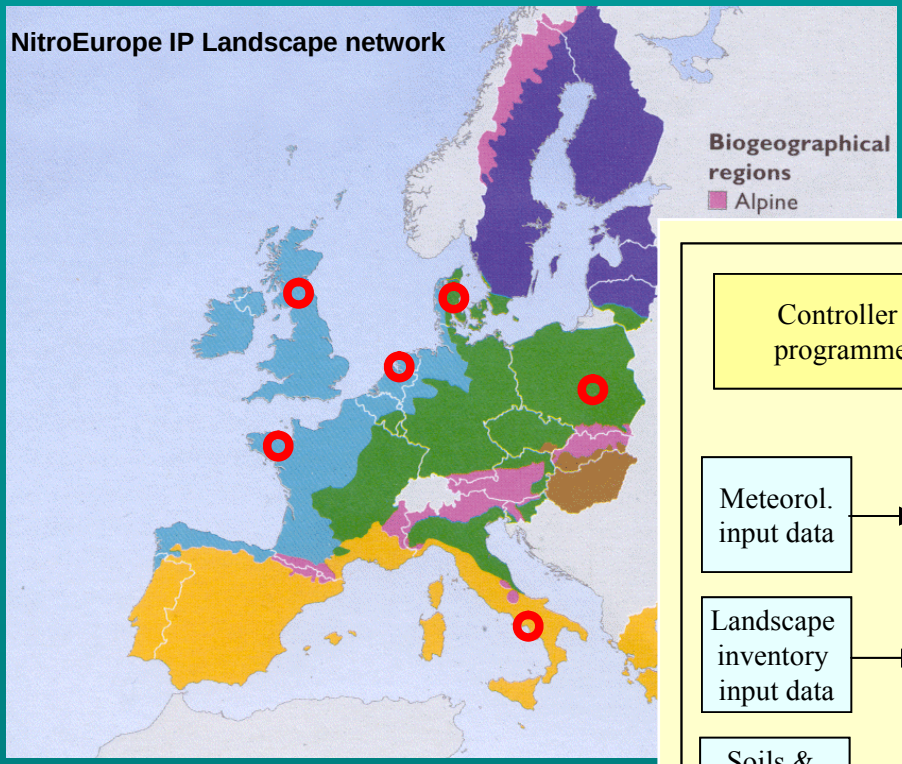


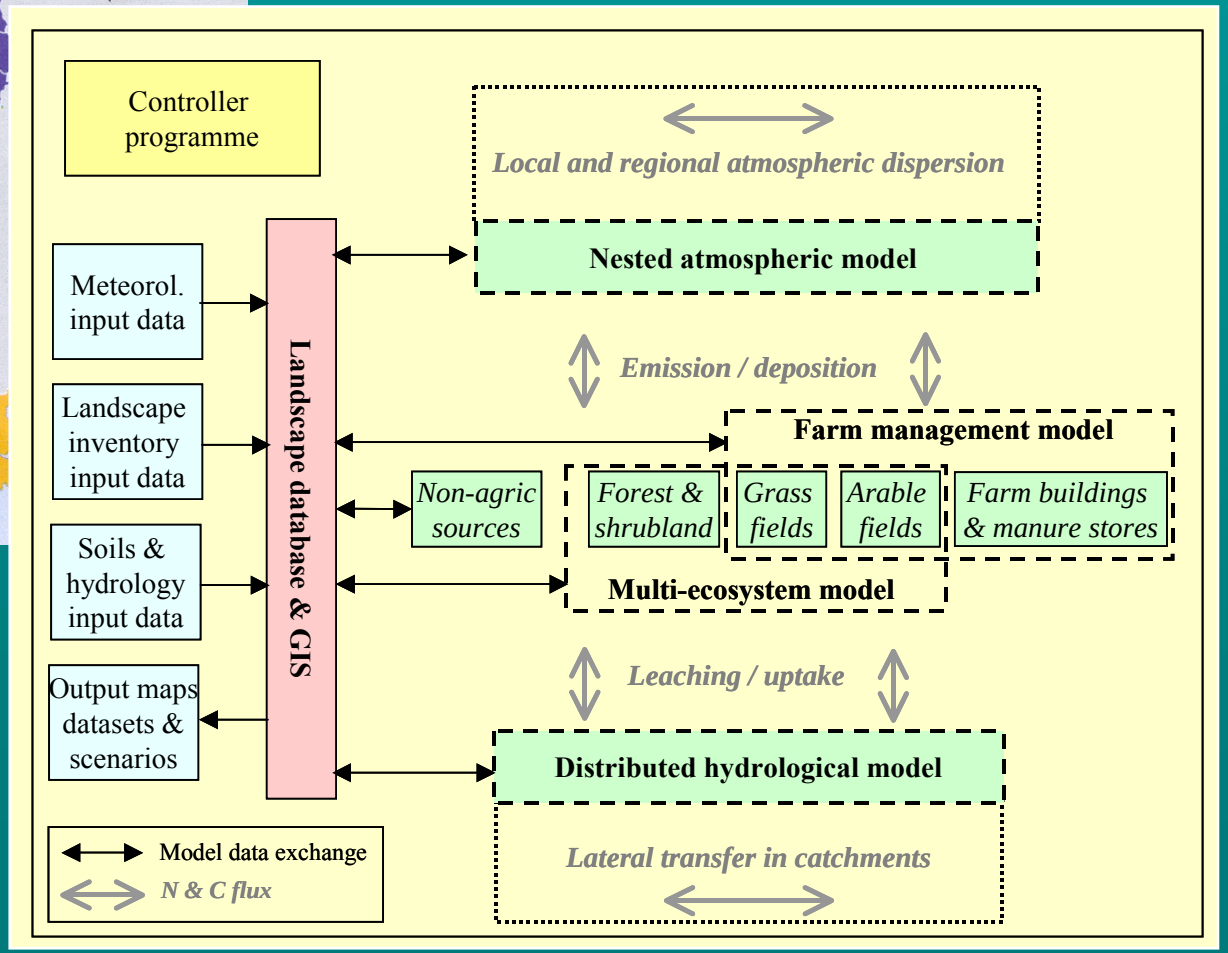
Component 4: NEU Landscapes

- Spatially explit assessment of multiple N and C interactions including lateral flows
- Basis to explore management decisions, policy interactions and stakeholder perspectives
- Activities
  - A4.1: Landscape Inventories
  - A4.2: NitroScape model
  - A4.3: Landscape verification measurements
  - A4.4: Whole farm and landscape decisions

14 Partner Institutes: €1.5 million from EC

Component 4: NEU Landscapes





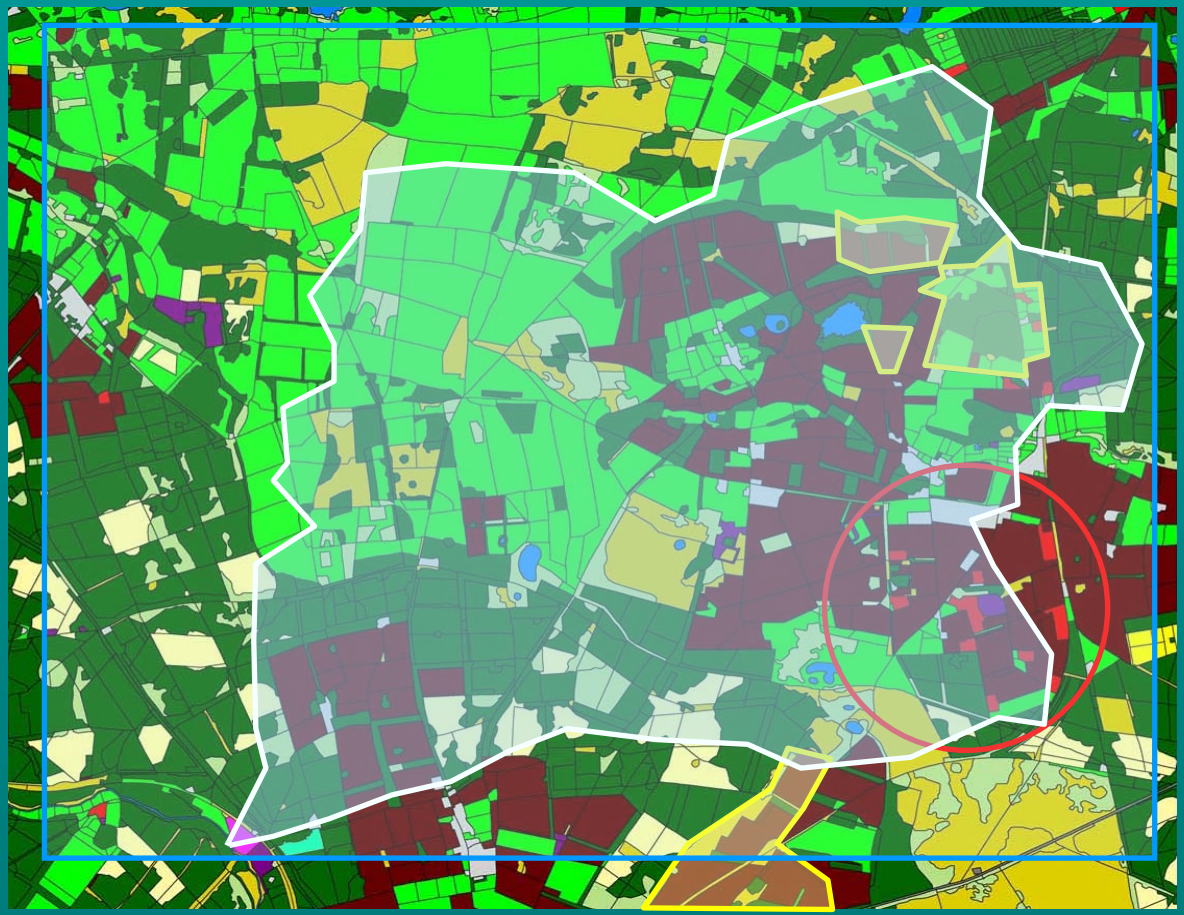
Landscapes integrate multiple spatial scales relevant for multi-pollutant assessment

Farmsteads

Farm units
(fields & buildings)

Water
dispersion

Atmospheric
dispersion



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Department for Environment Food and Rural Affairs

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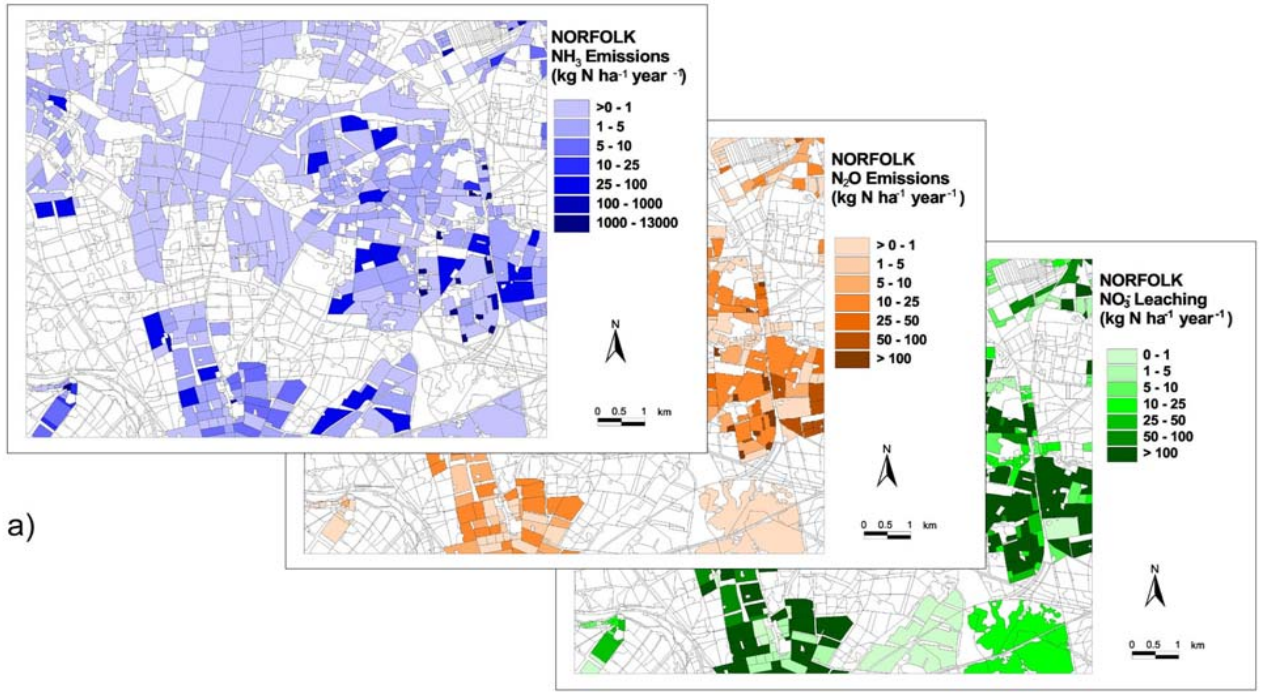
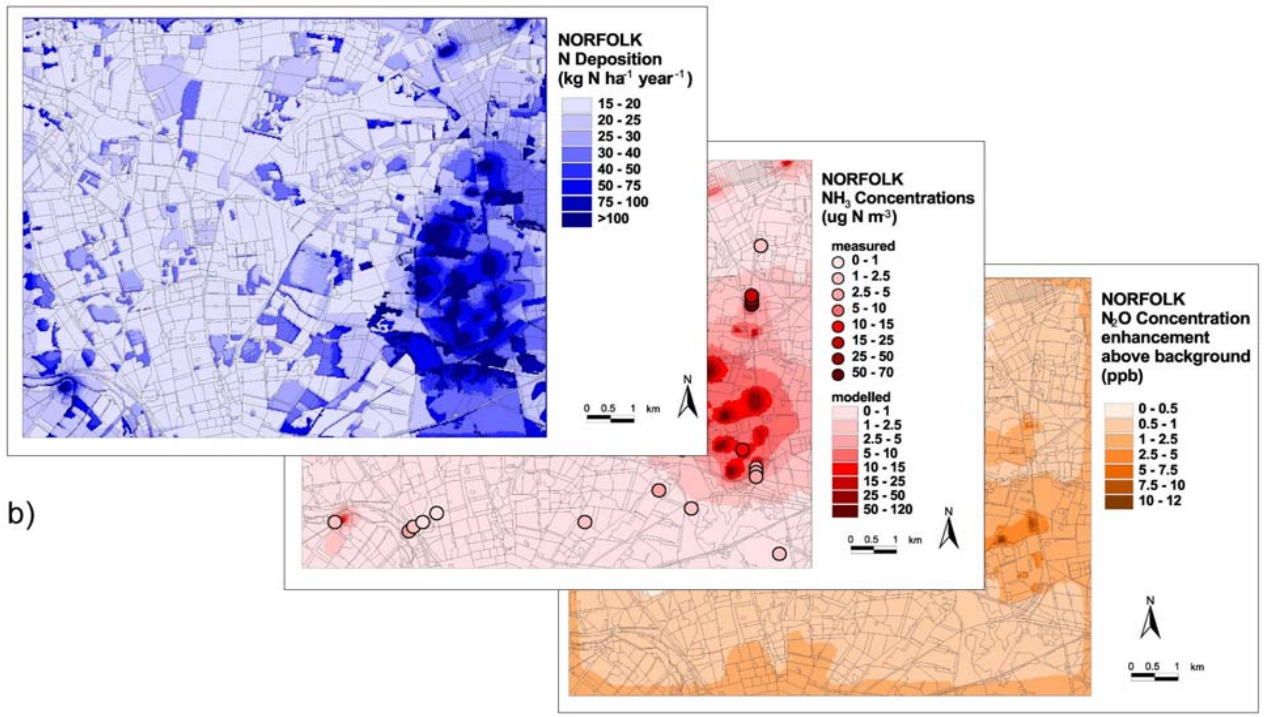
Example outputs of the LANAS model





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Component 5: NEU Integration

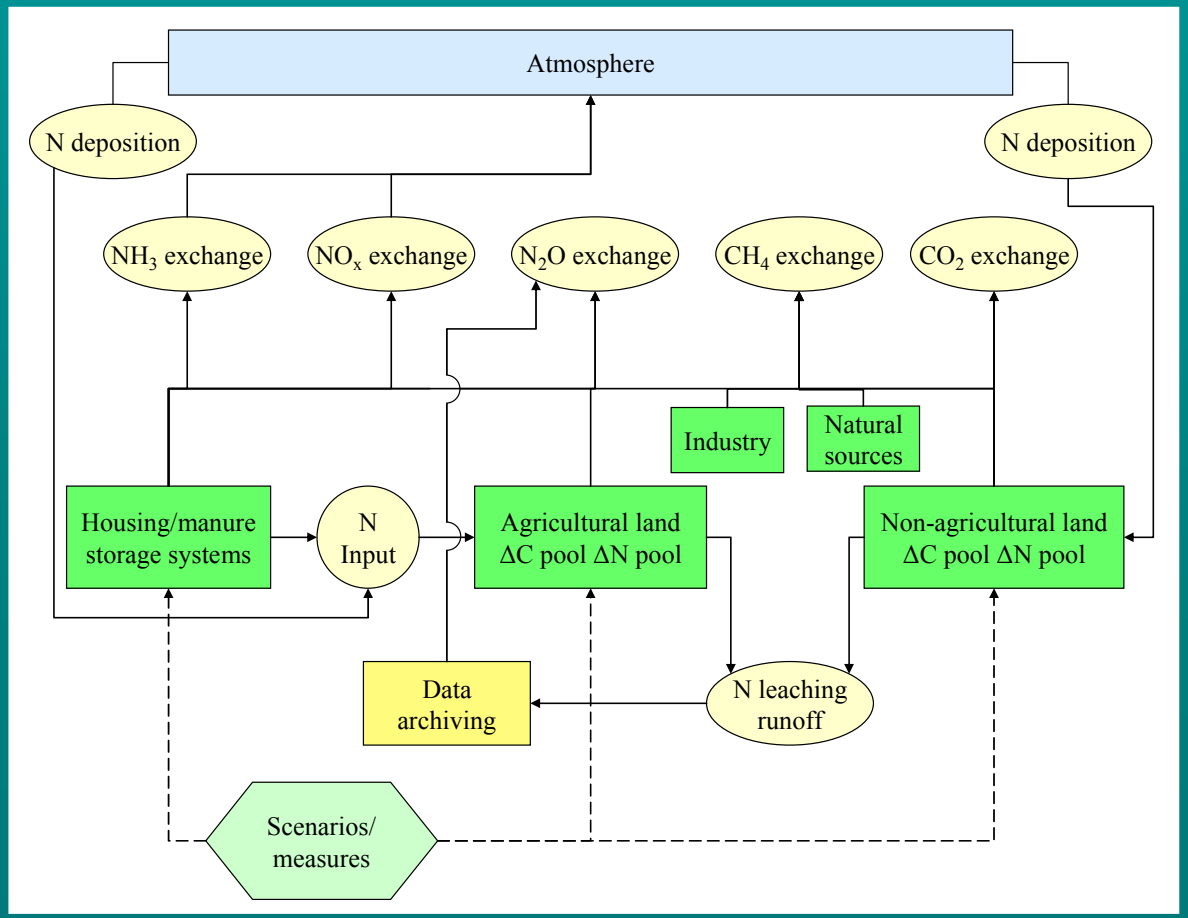
A5.1. GIS Input Data

A5.2. Scenario devlpt.

A5.3. Multi-sector model

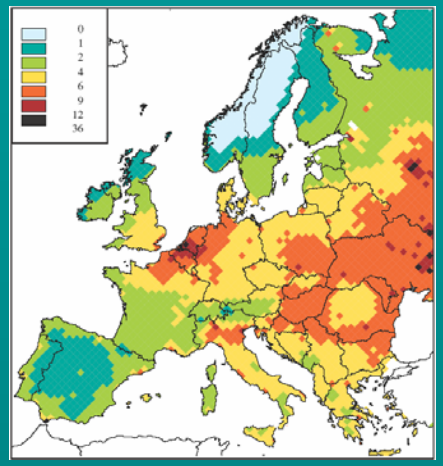
A5.4 Ecoystem models

13 Partner Institutes:
€1.5 million from EC

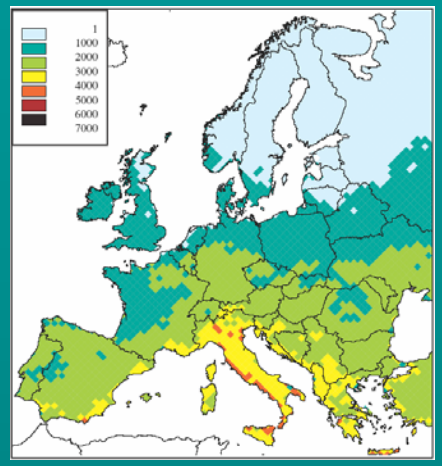


Remaining problem areas in 2020

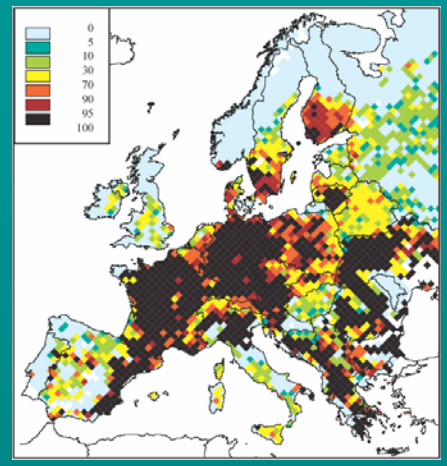
Light blue = no risk



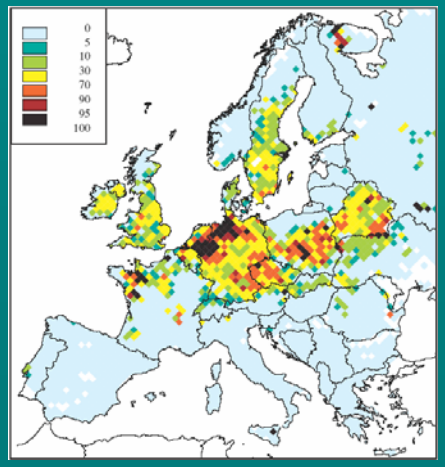
Health - PM



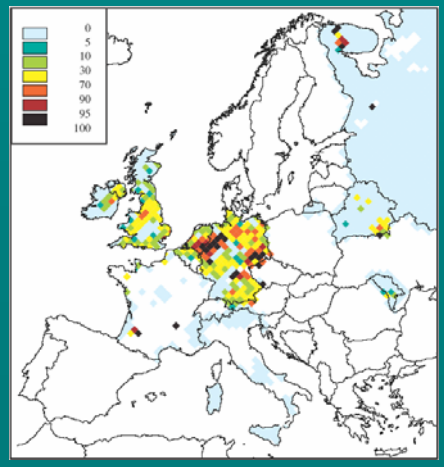
Health+vegetation - ozone



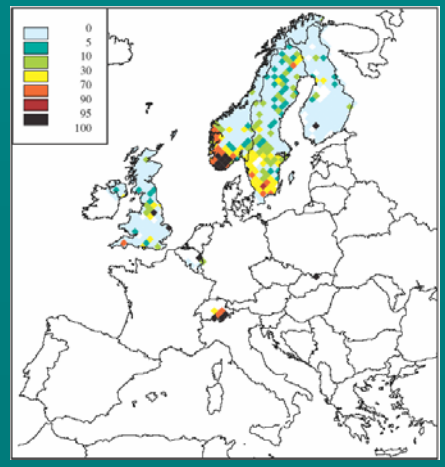
Vegetation – N dep.



Forests – acid dep.



Semi-natural – acid dep.



Freshwater – acid dep.

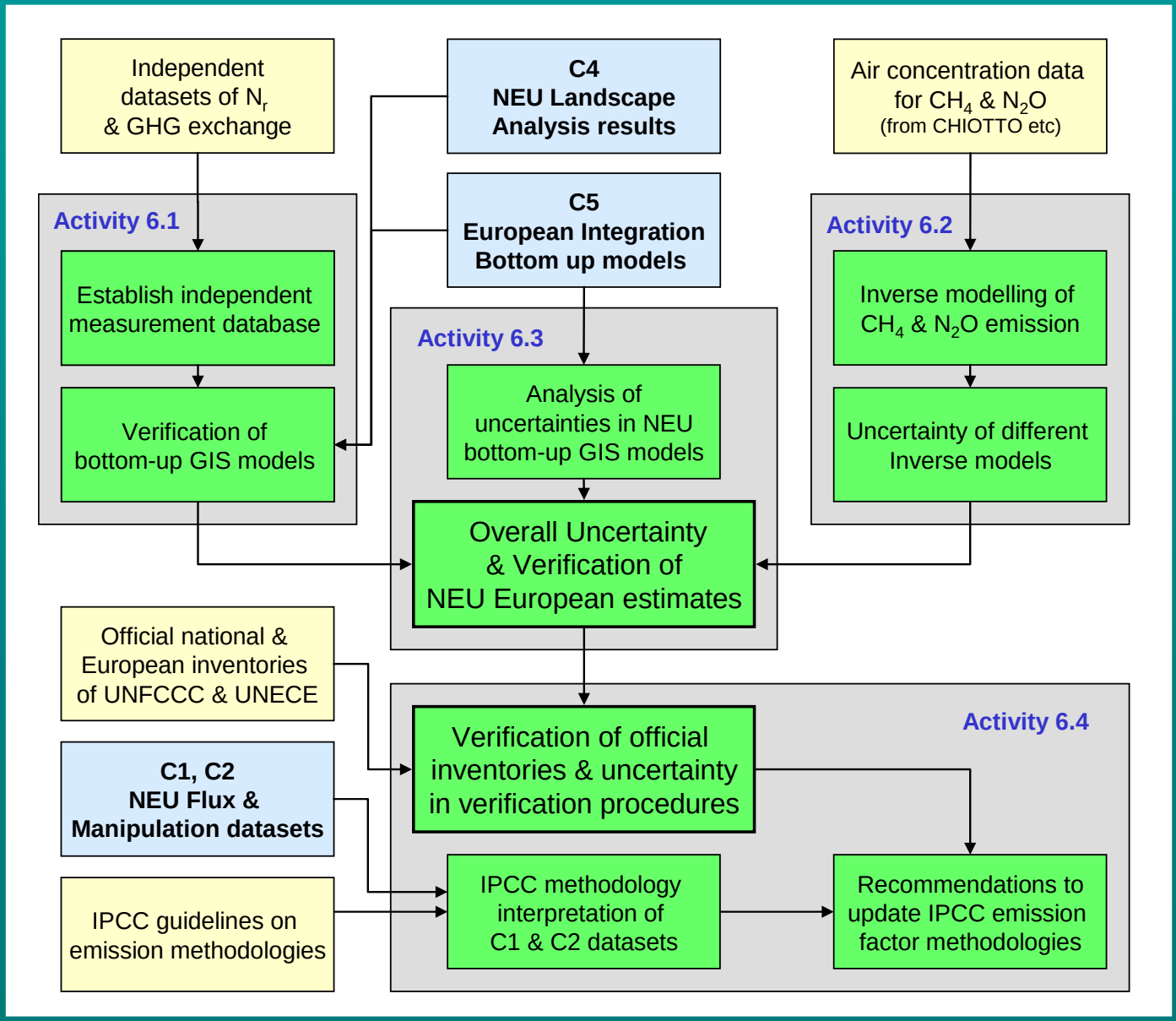
IIASA, Amann

Component 6: Verification

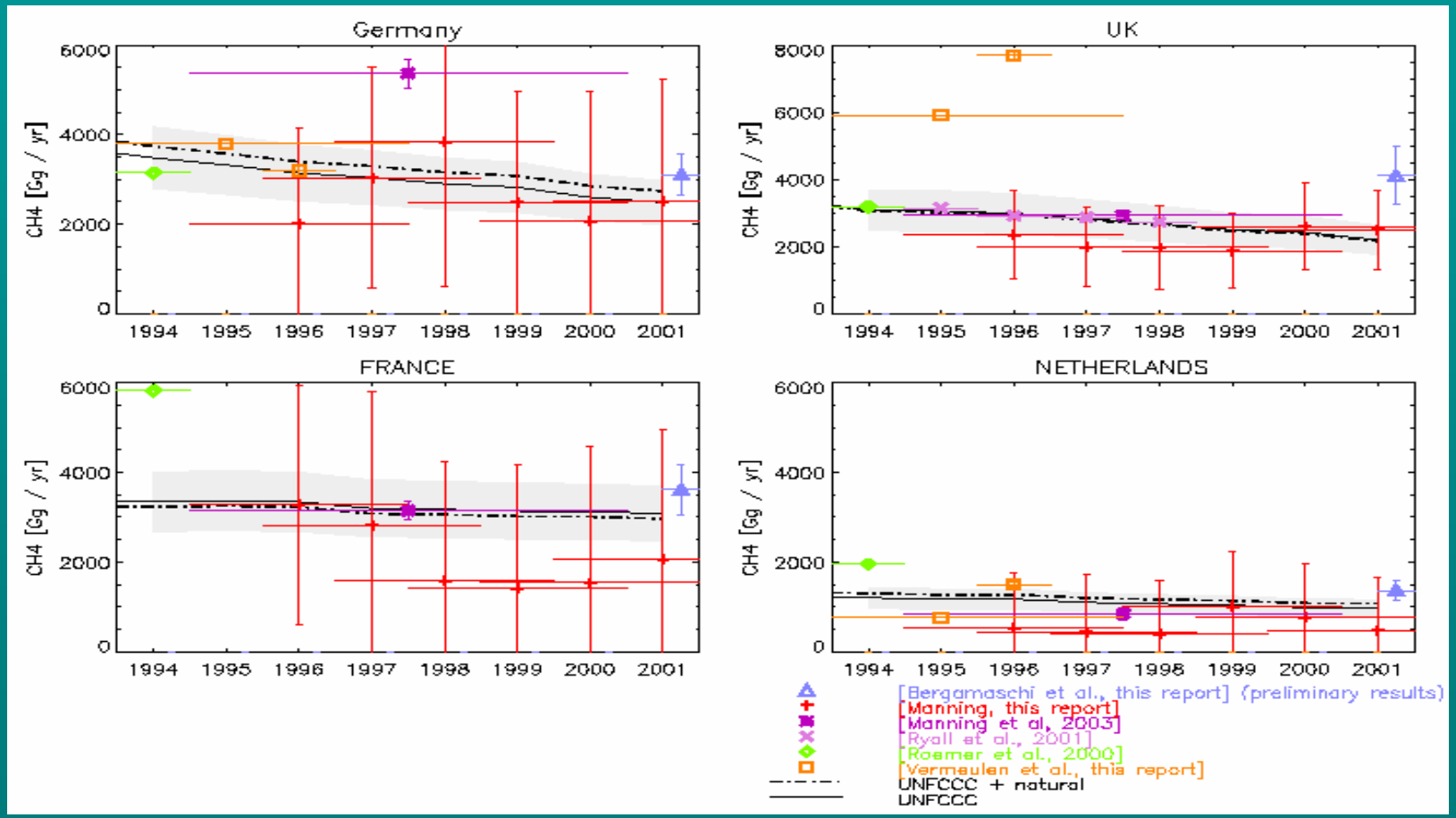
- What is the uncertainty of the estimates?
- How can we verify our model estimates?
- Can we provide independent verification of international convention inventories and trends

- *13 Partner Institutes: €1.5 million from EC*

Component 6: NEU Verification



Inverse Modelling for Emission Verification



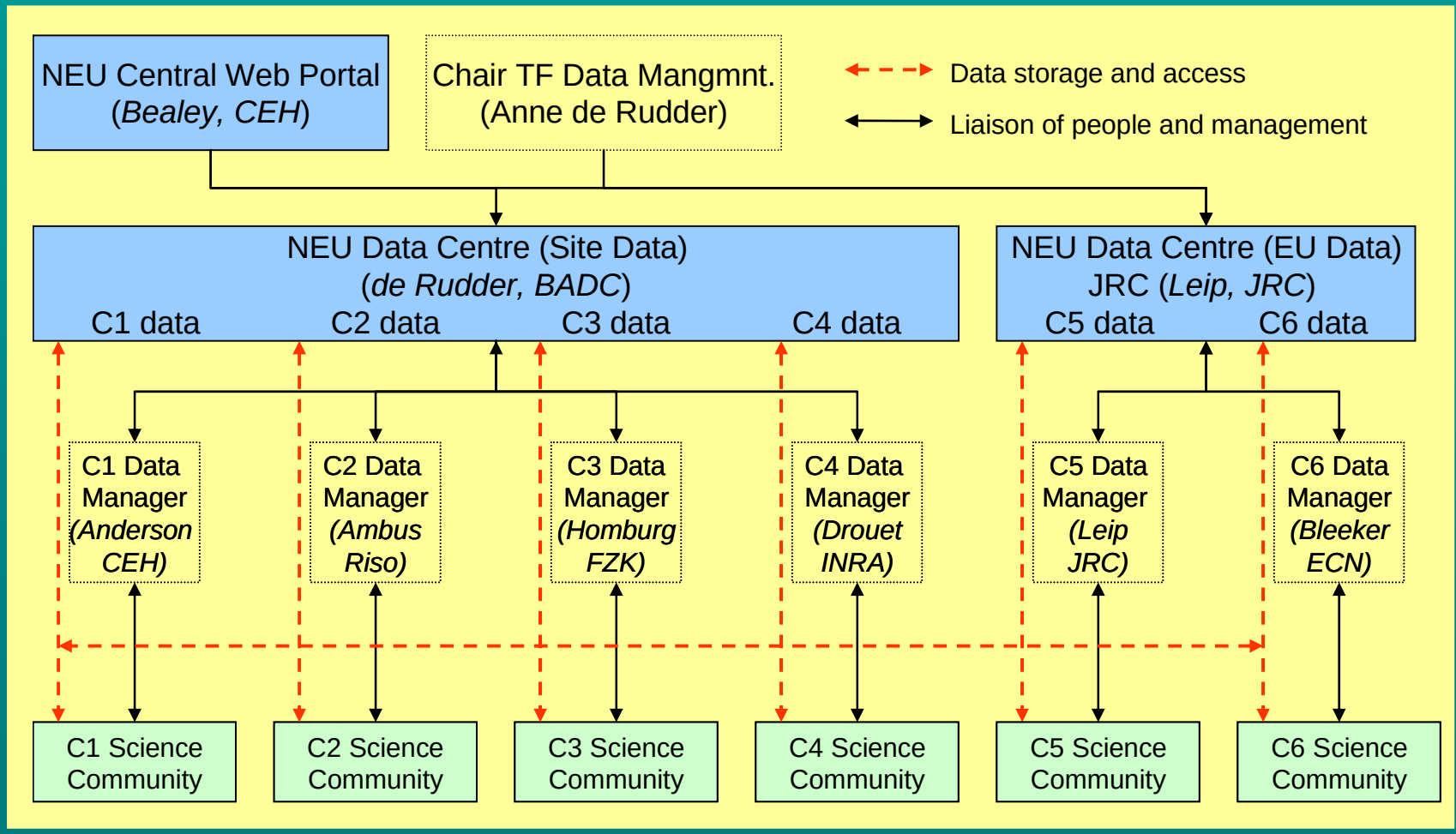
Bergamaschi et al.

Component 7:
NEU Standards and Data Management

- A7.1: Task Force on Common Measurement Protocols
  - Standardization of measurements,
  - Ensuring inputs for models
- A7.2: Task Force on Common Modelling Protocols
  - Ensuring good modelling practice
  - QA/QC in modelling approaches (linking scales)
- A7.3: NEU Data Centres and Data Management
  - Data management plans
  - Data archives and web portal
  - Electronic Workspaces
  - Data validation tools for key datasets

8 funded partner institutes: €0.5 million from EC

NEU Data Management System



Clear synergy with COST 729 - to discuss

Lots to do!

- Immediate task: complete negotiation!
- Start 1 February 2006
- First General Assembly: Garmisch Start March 2006

- Synergy of European Activity with COST 729 –
  - e.g. joint workshops on cross-cutting activities.
  - Database development and sharing information
  - A mechanism for disseminating policy interactions and communicating with stakeholders
  - …