



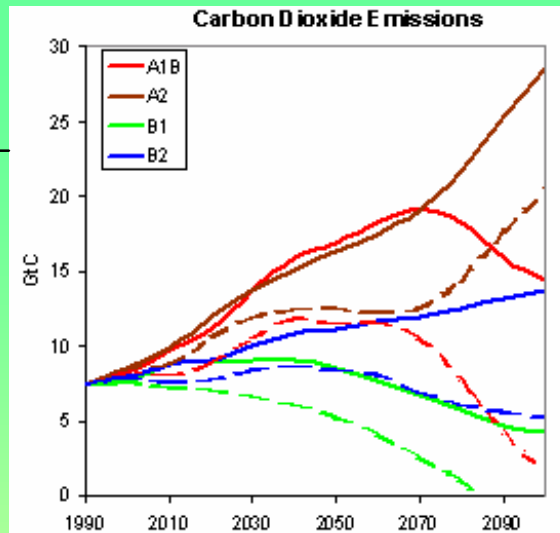
Decision Support Tools for land-use related choices at regional and national levels

Michael Obersteiner

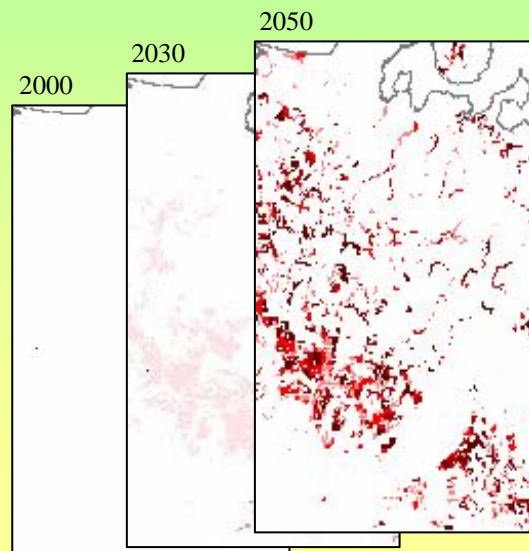
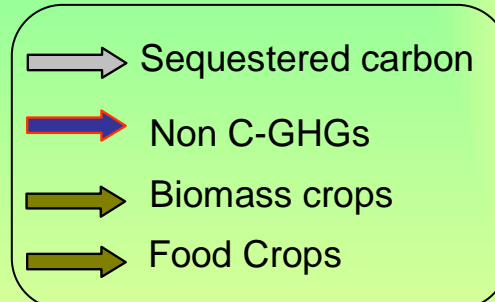
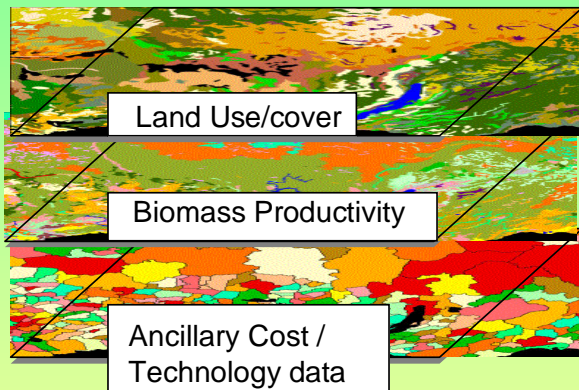
**Land-use Related Choices under the Kyoto Protocol
Obligations, Options and Methodologies for Defining “Forest”
and
Selecting Activities under Kyoto Protocol Article 3.4
Graz / Austria
2-4 May, 2005**

INSEA-toolbox

Global Carbon Cycle



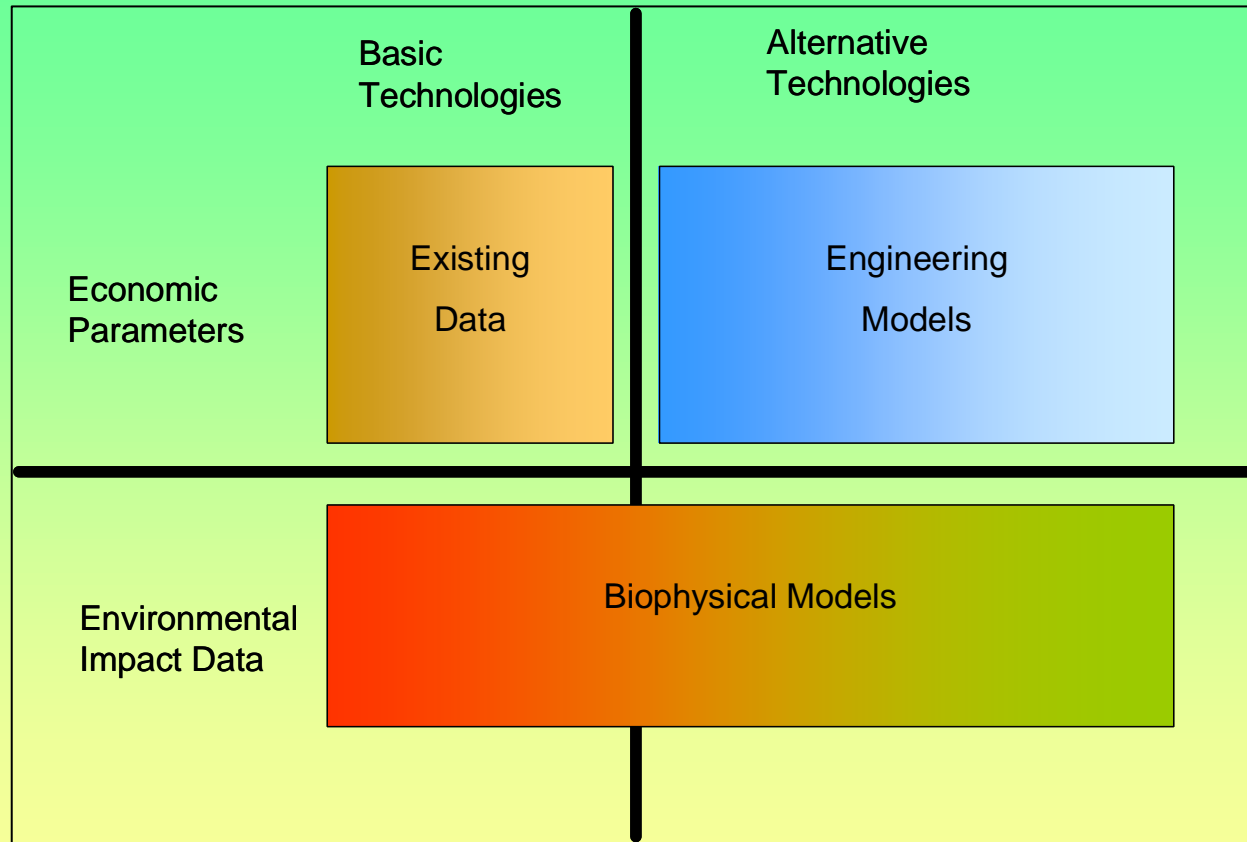
Link to Energy Models



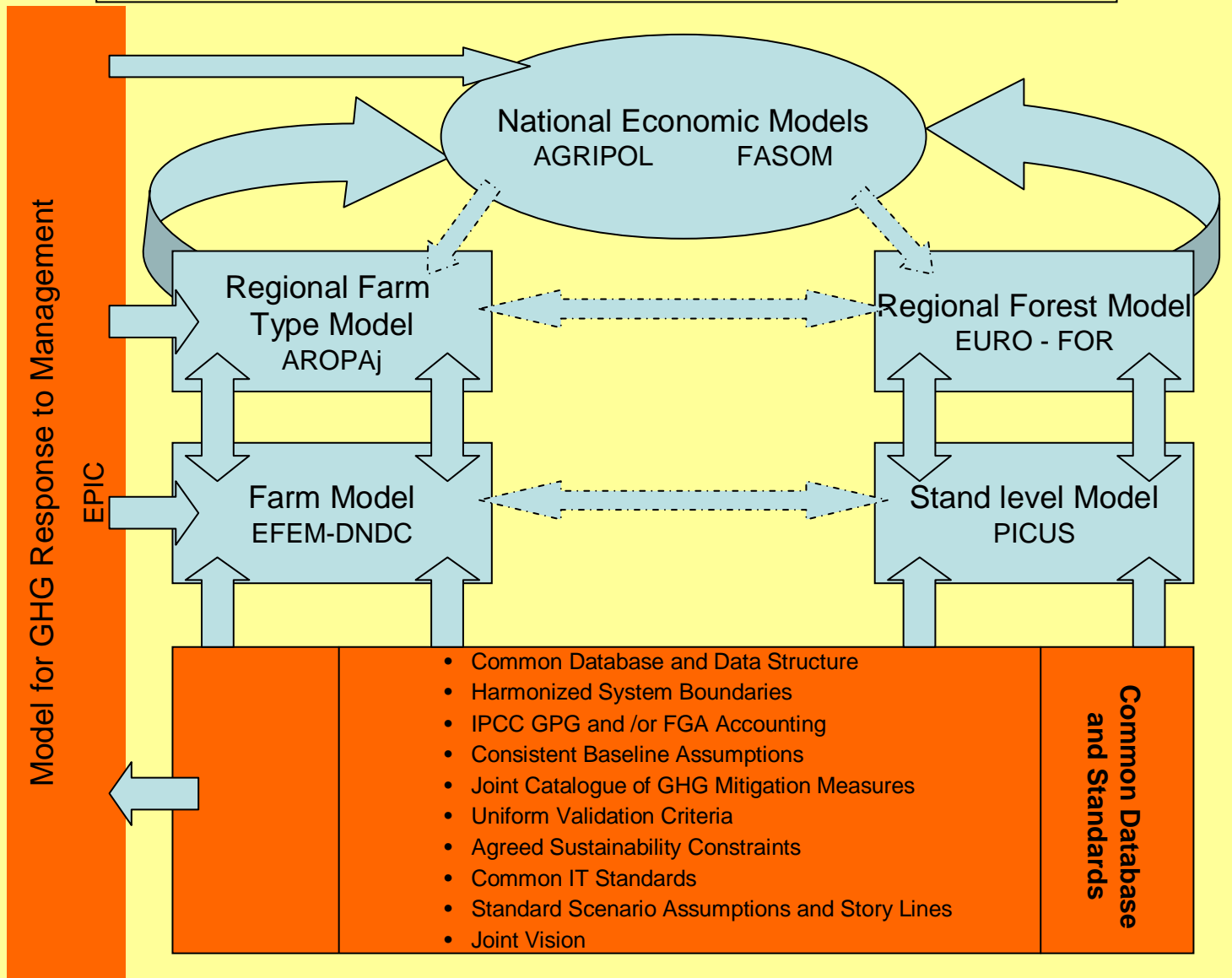
Geography of Supply

Agricultural forest Market Model

Common Platform



INTEGRATED POLICY FRAMEWORK



EPIC simulates many processes:

Weather: simulated or actual

Hydrology: evapotranspiration, runoff, percolation, 5 PET equations,...

Erosion: wind and water, 6 erosion equations,.

Carbon sequestration: plant residue, manure, leaching, sediment, ...

Crop growth: NPK uptake, stresses, yields, N-fixation,...

Fertilization: application, runoff, leaching, mineralization, denitrification, volatilization, nitrification,...

Tillage: mixing, harvest efficiencies,...

Irrigation and furrow diking,...

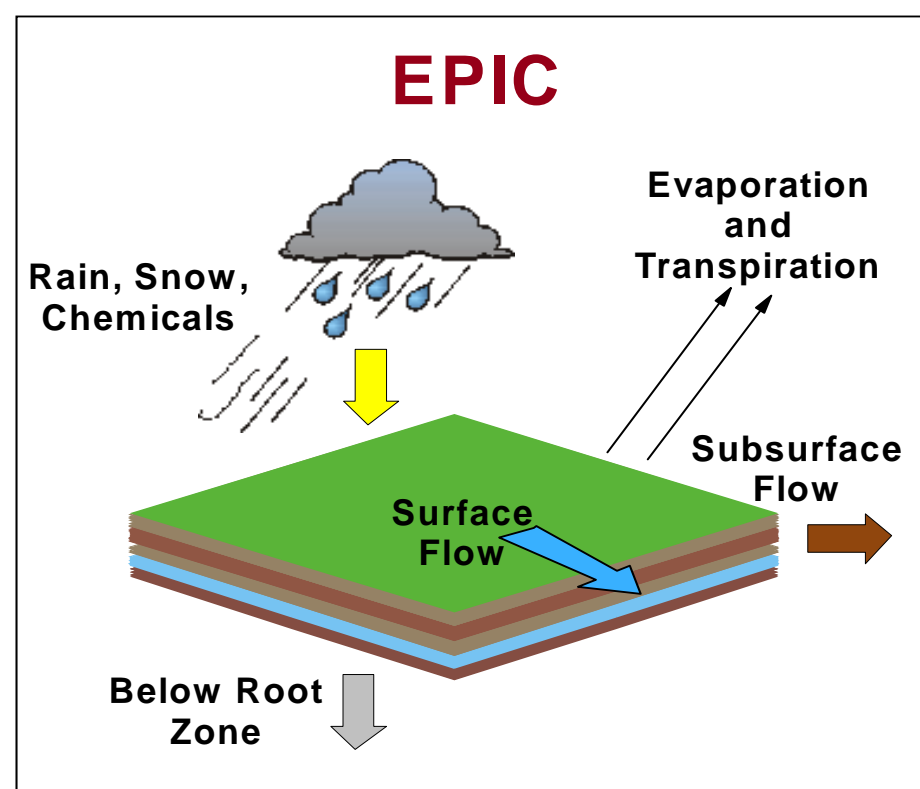
Drainage: depth,...

Pesticide: application, movement, degradation,...

Grazing: trampling, efficiency,...

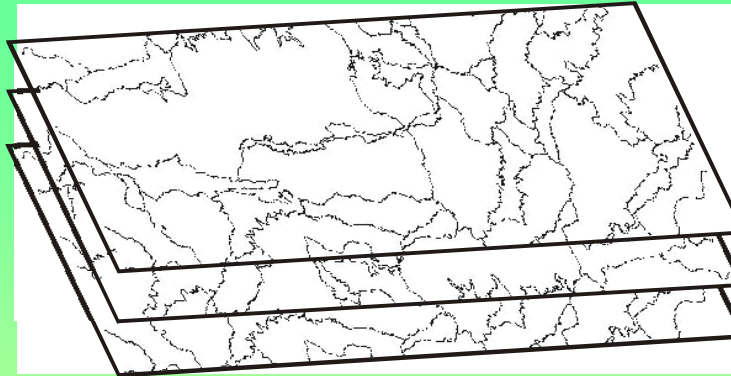
Manure application and transport,...

Crop rotations: inter-cropping, weed, competition, annual and perennial crops,...



on a daily time step

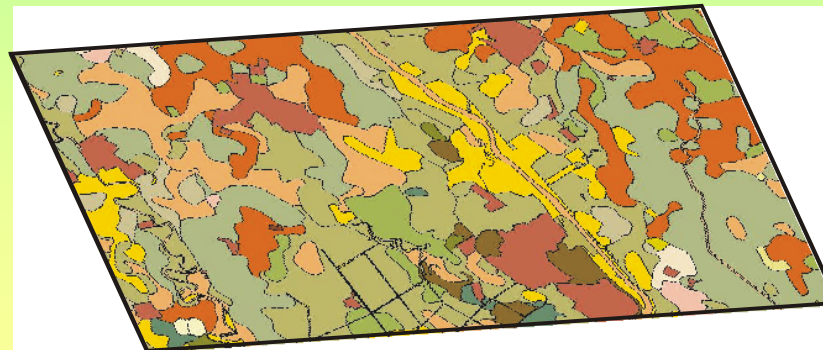
Geography of Analysis



Soil HRU
Topography HRU
Climate HRU
etc.



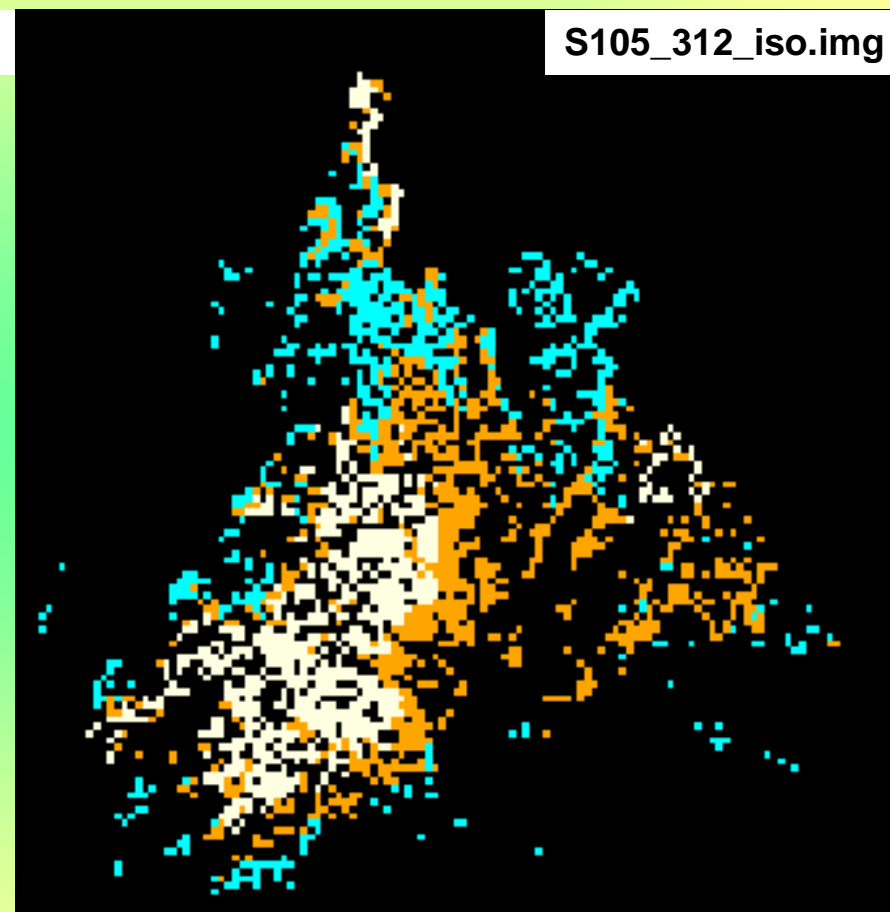
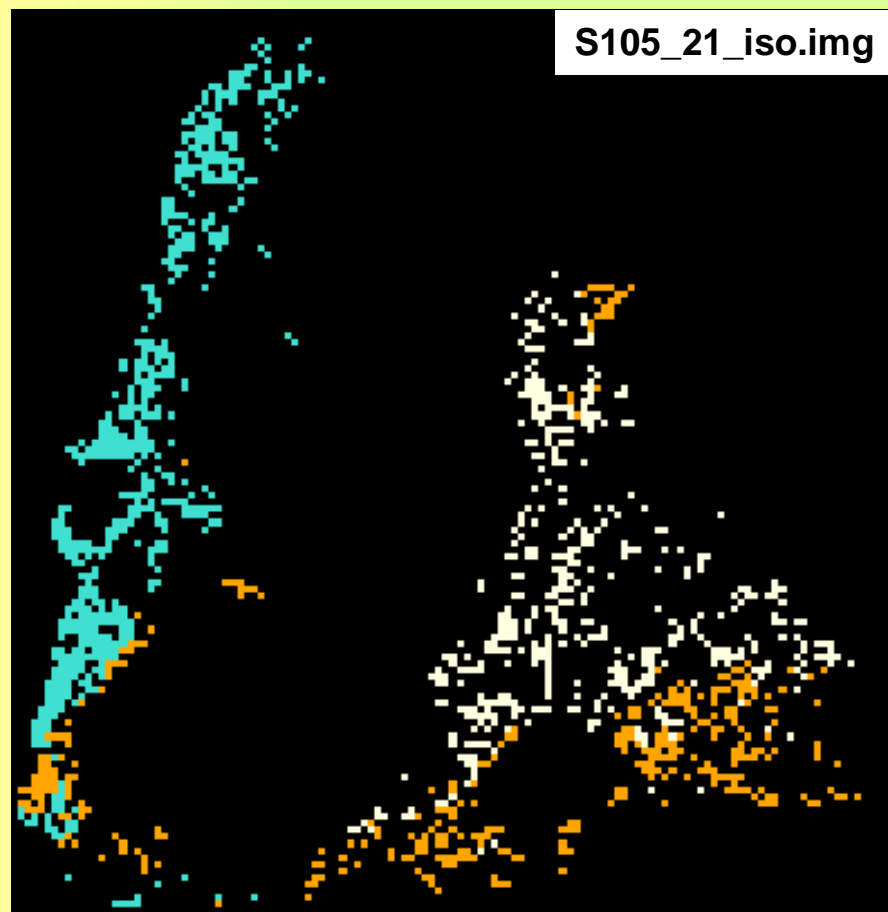
Intersection



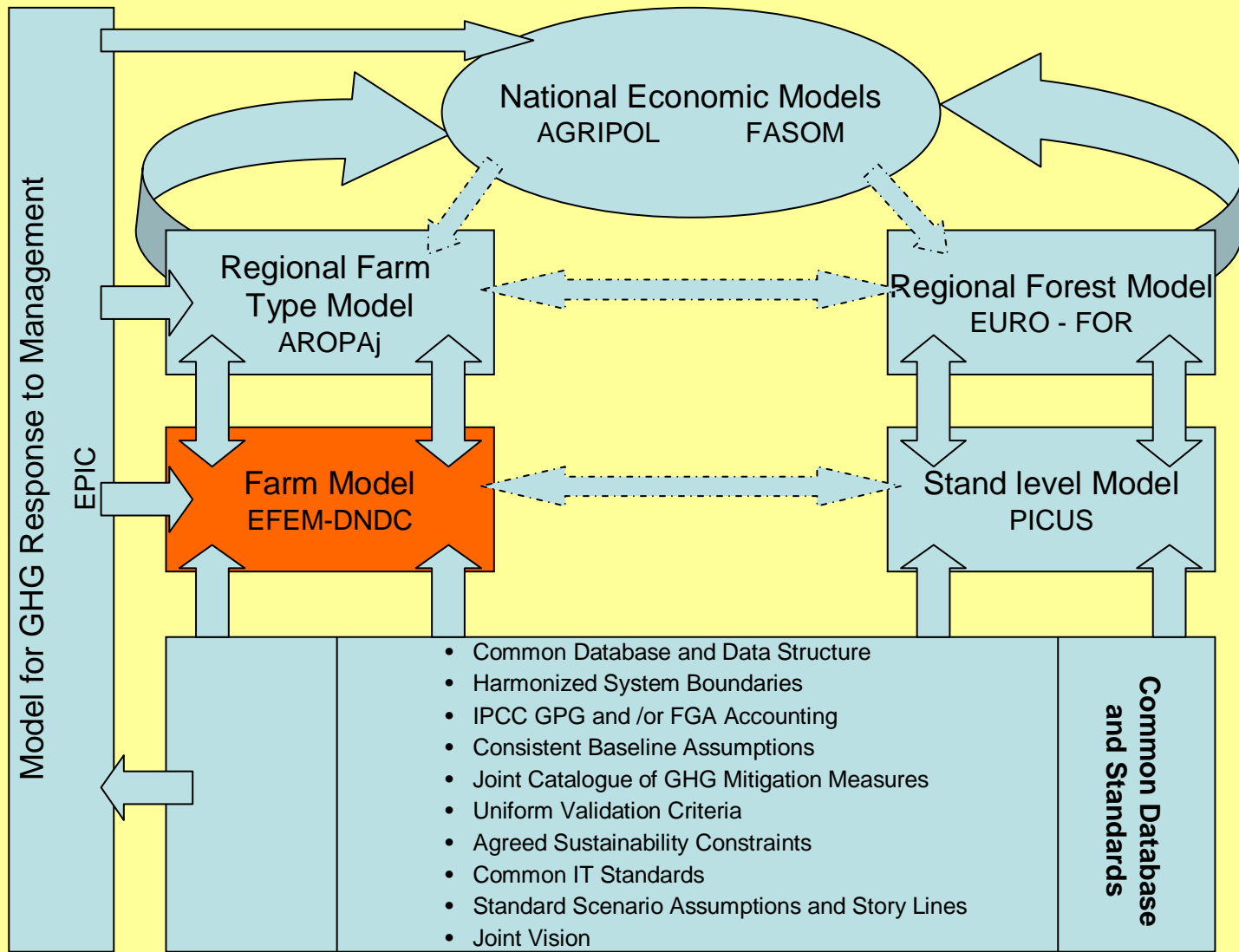
EPIC HRU



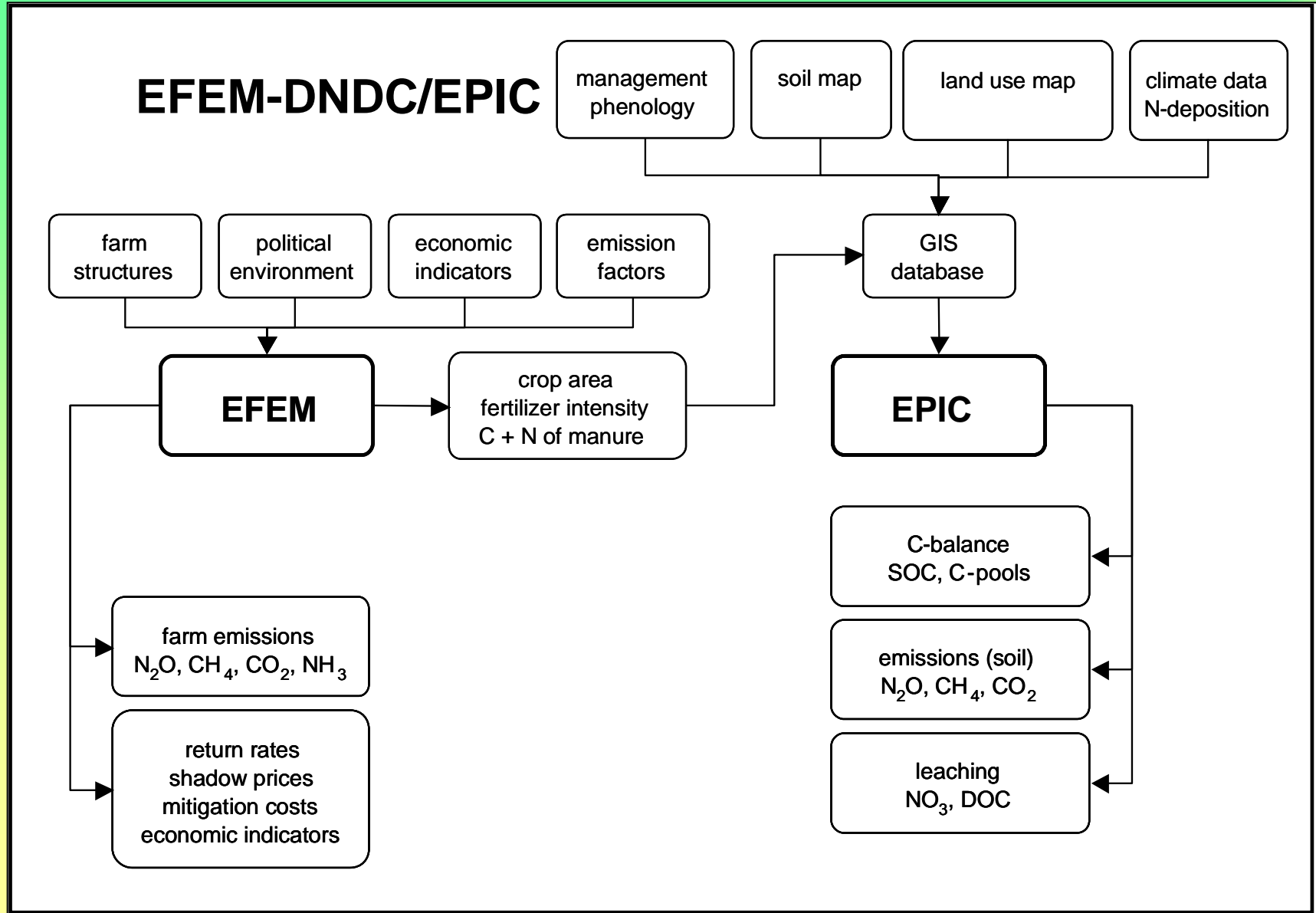
3 min



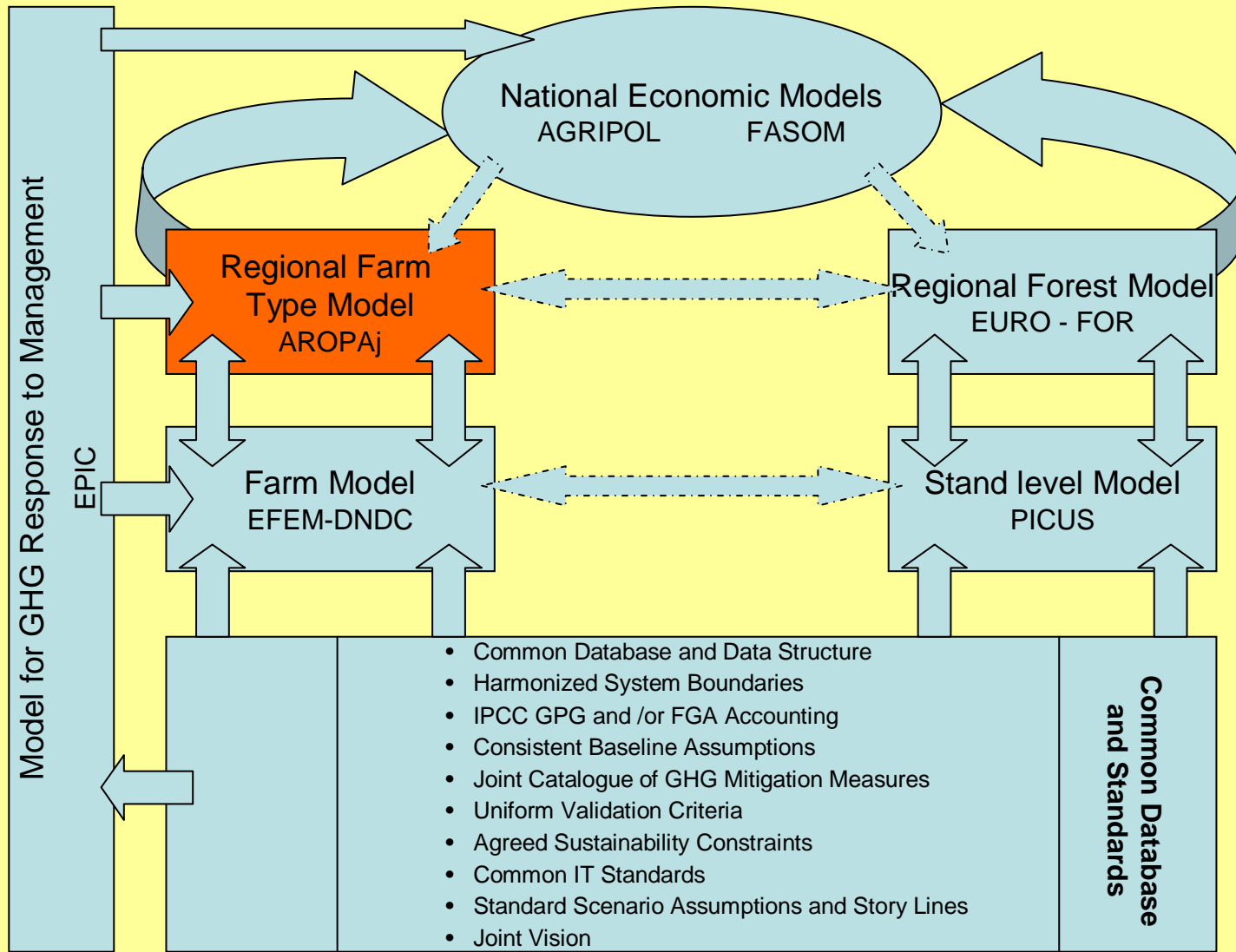
INTEGRATED POLICY FRAMEWORK



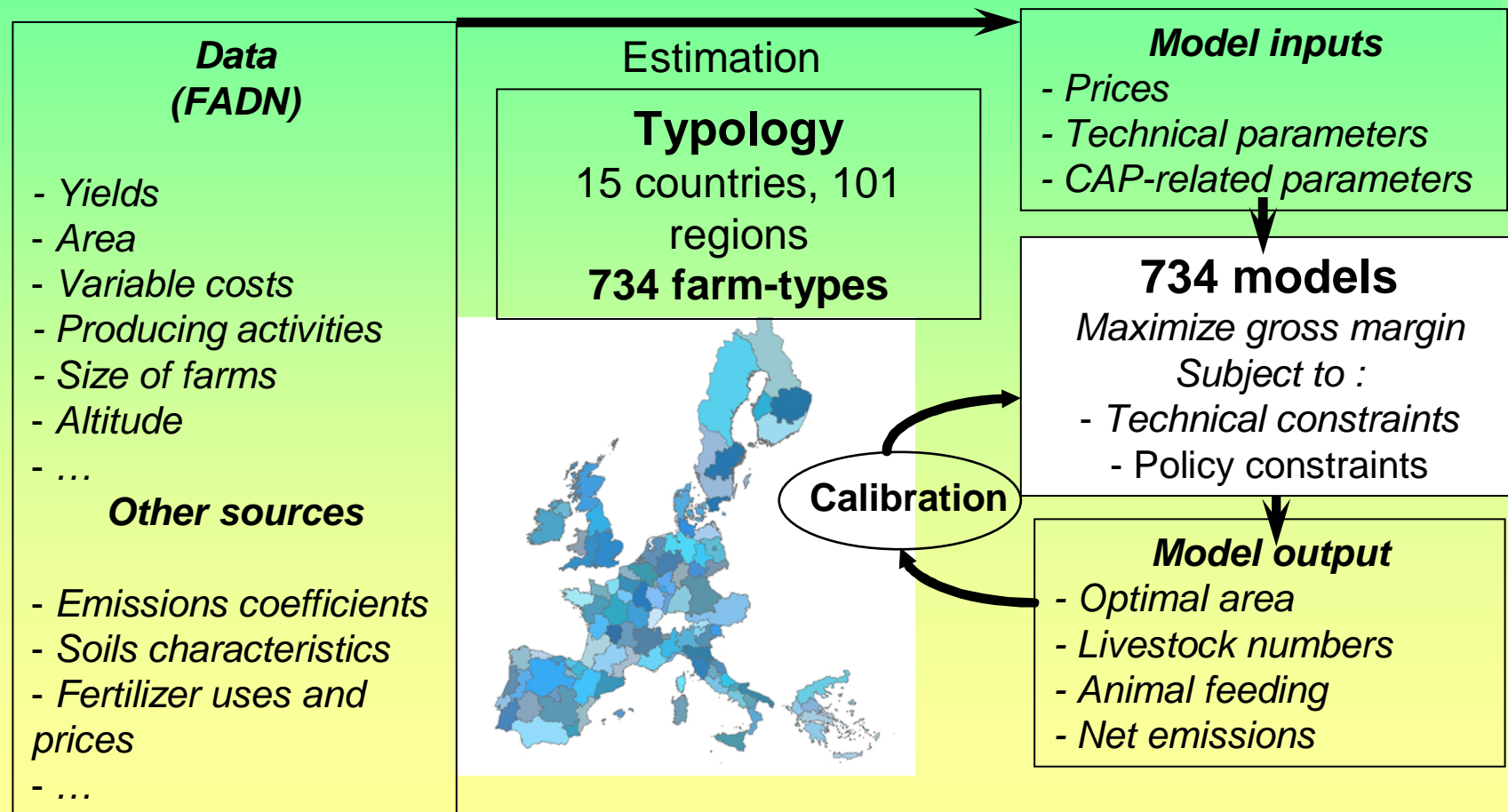
Farm-level model



INTEGRATED POLICY FRAMEWORK

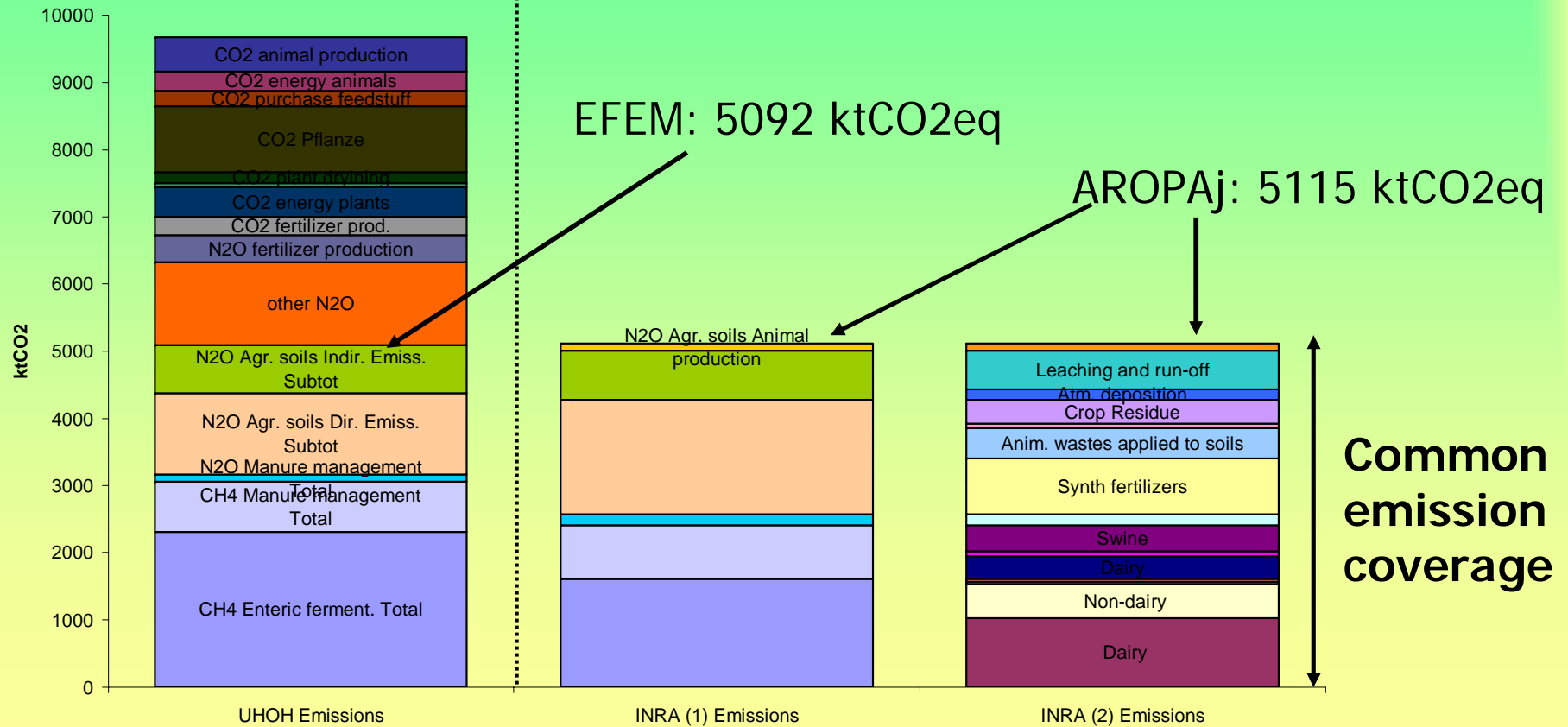


Overview of the Regional Agri-Model

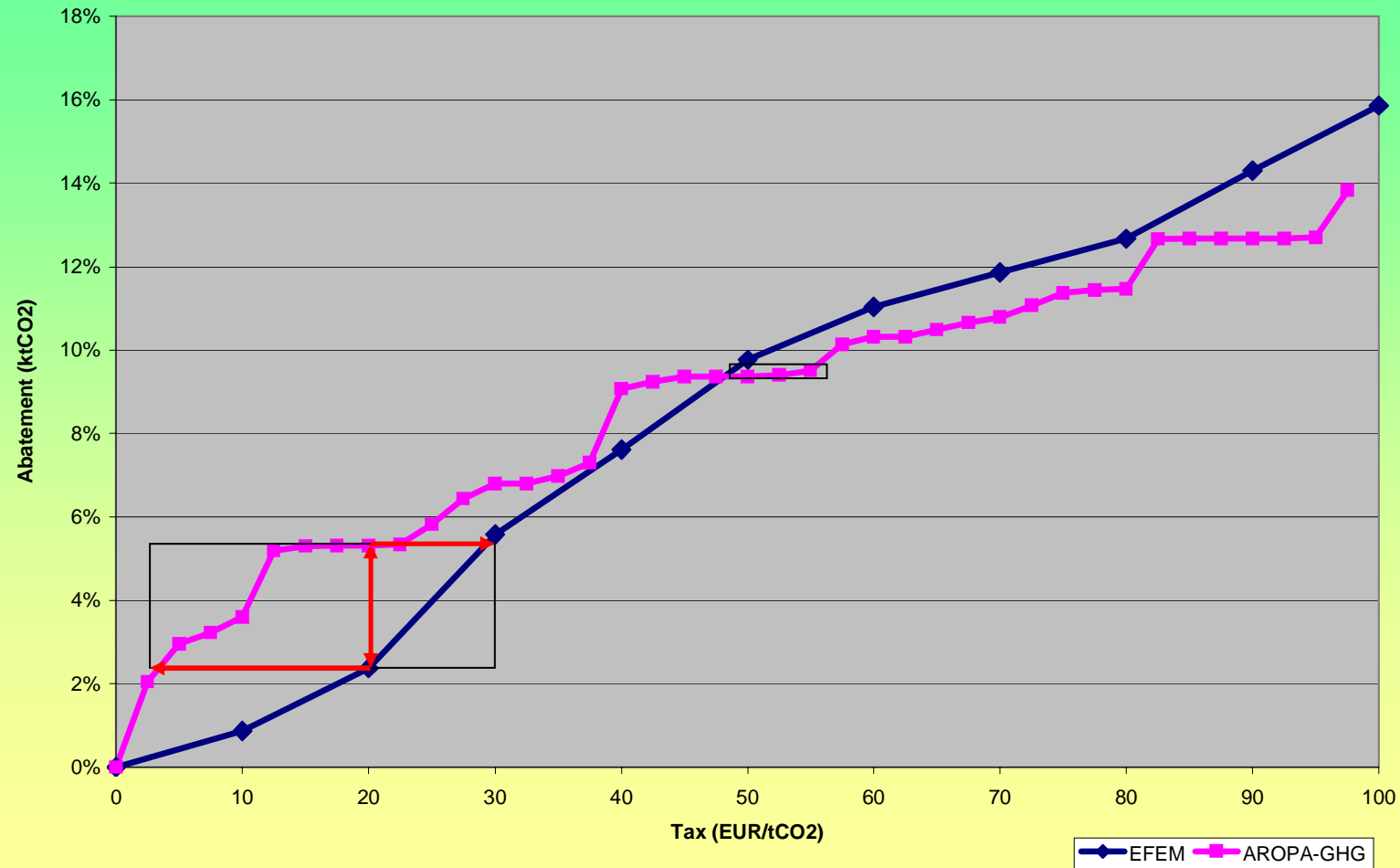


Baseline emissions by sources

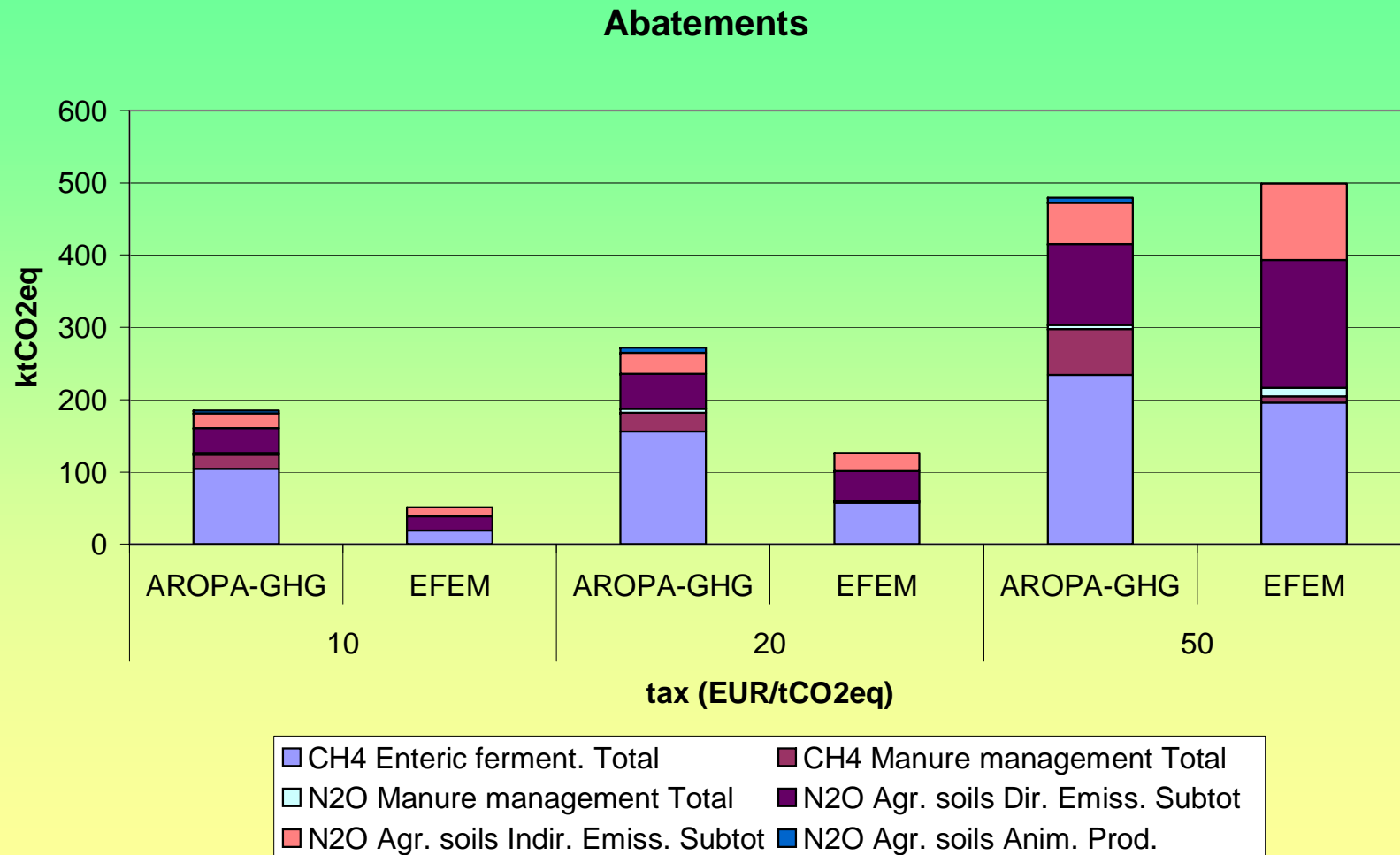
Baseline emissions by source (GWP: CH₄=23, N₂O=296)



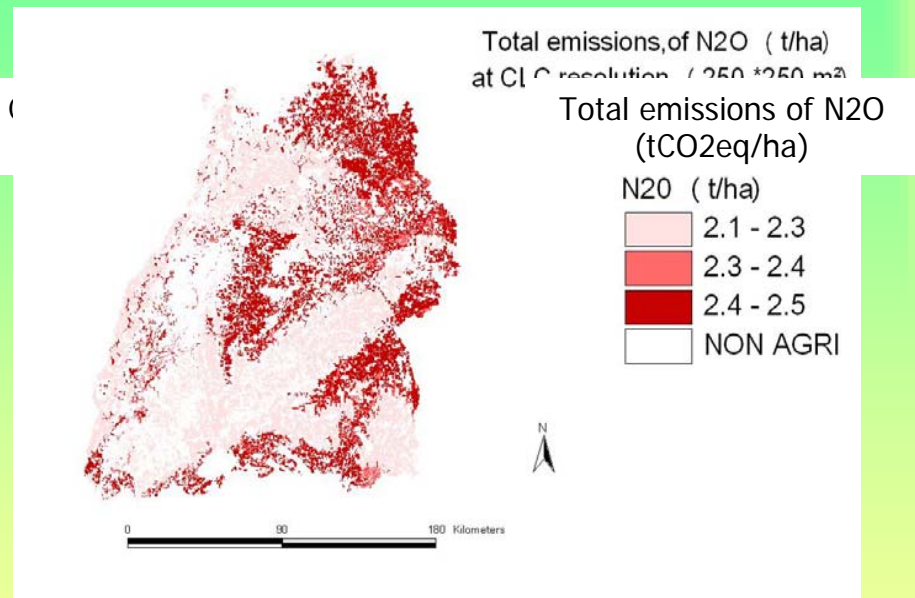
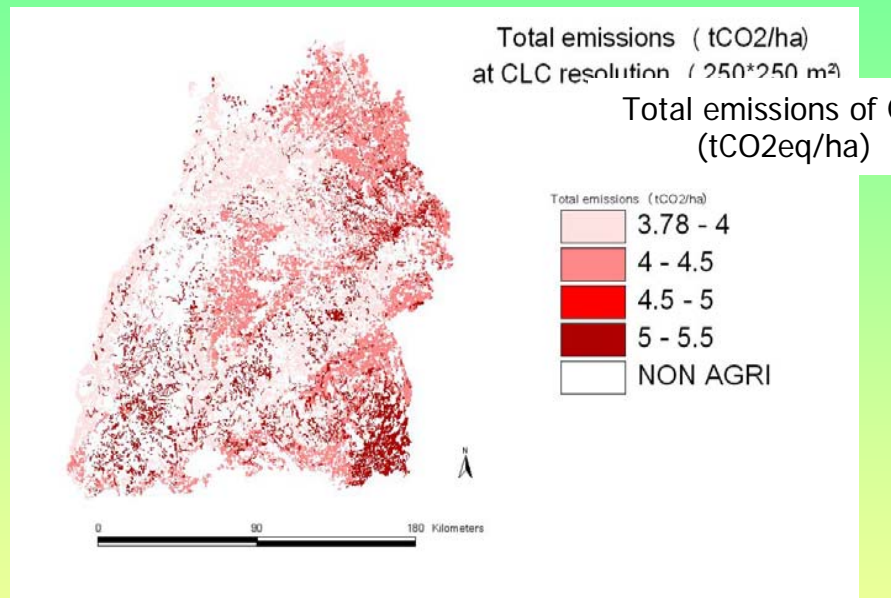
Abatement supply



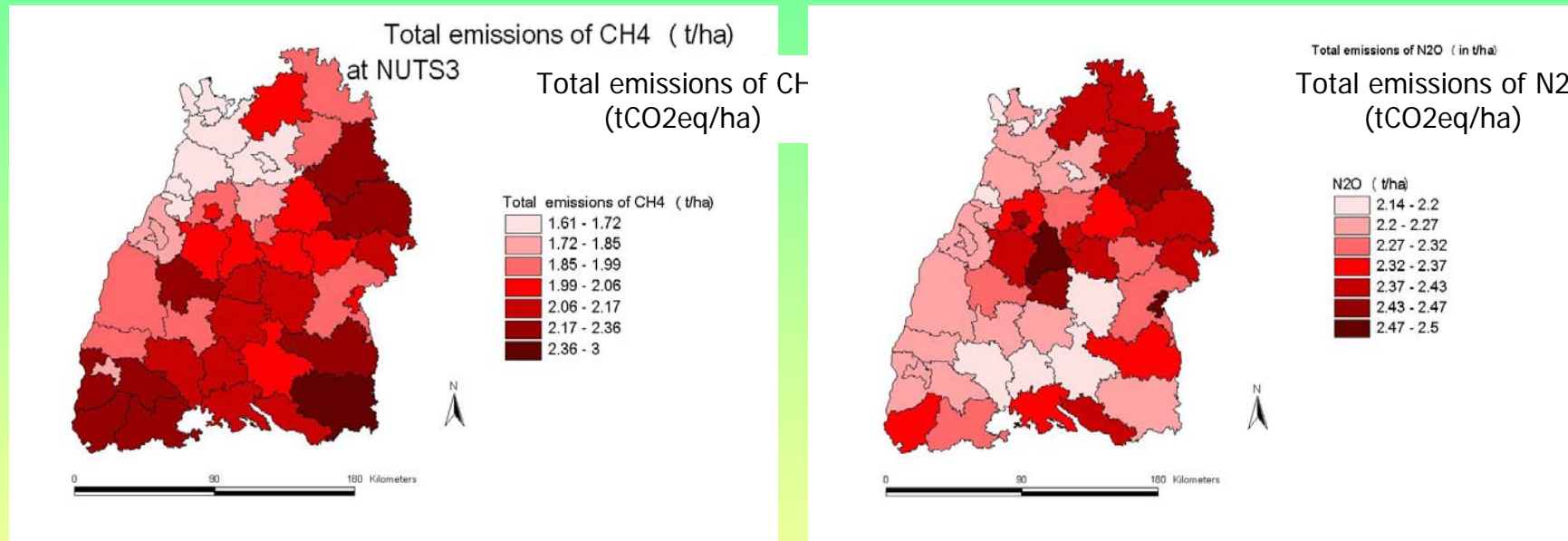
Cost-effective abatements



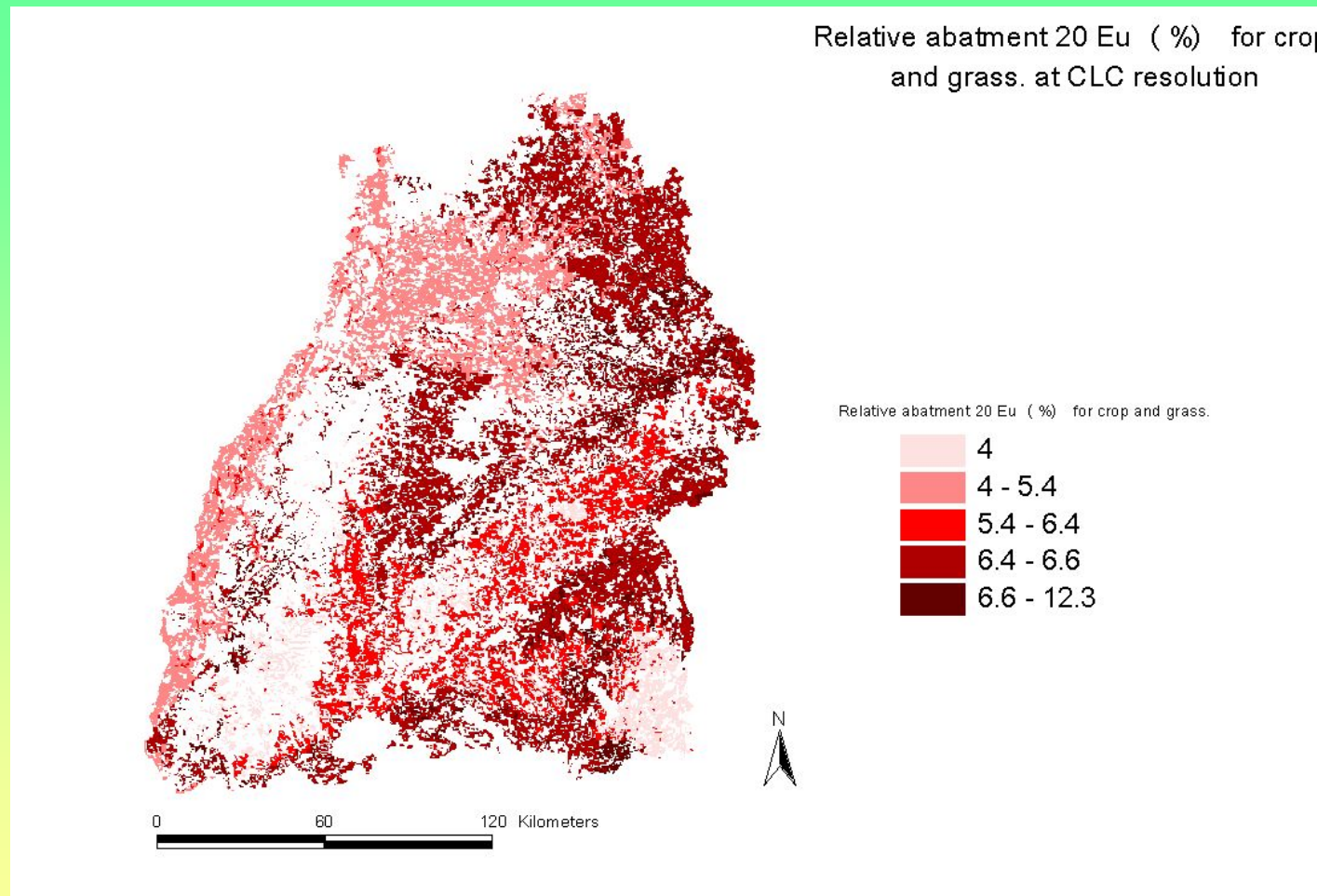
GHG emissions from AROPA-GHG at CLC resolution (250m x 250m)



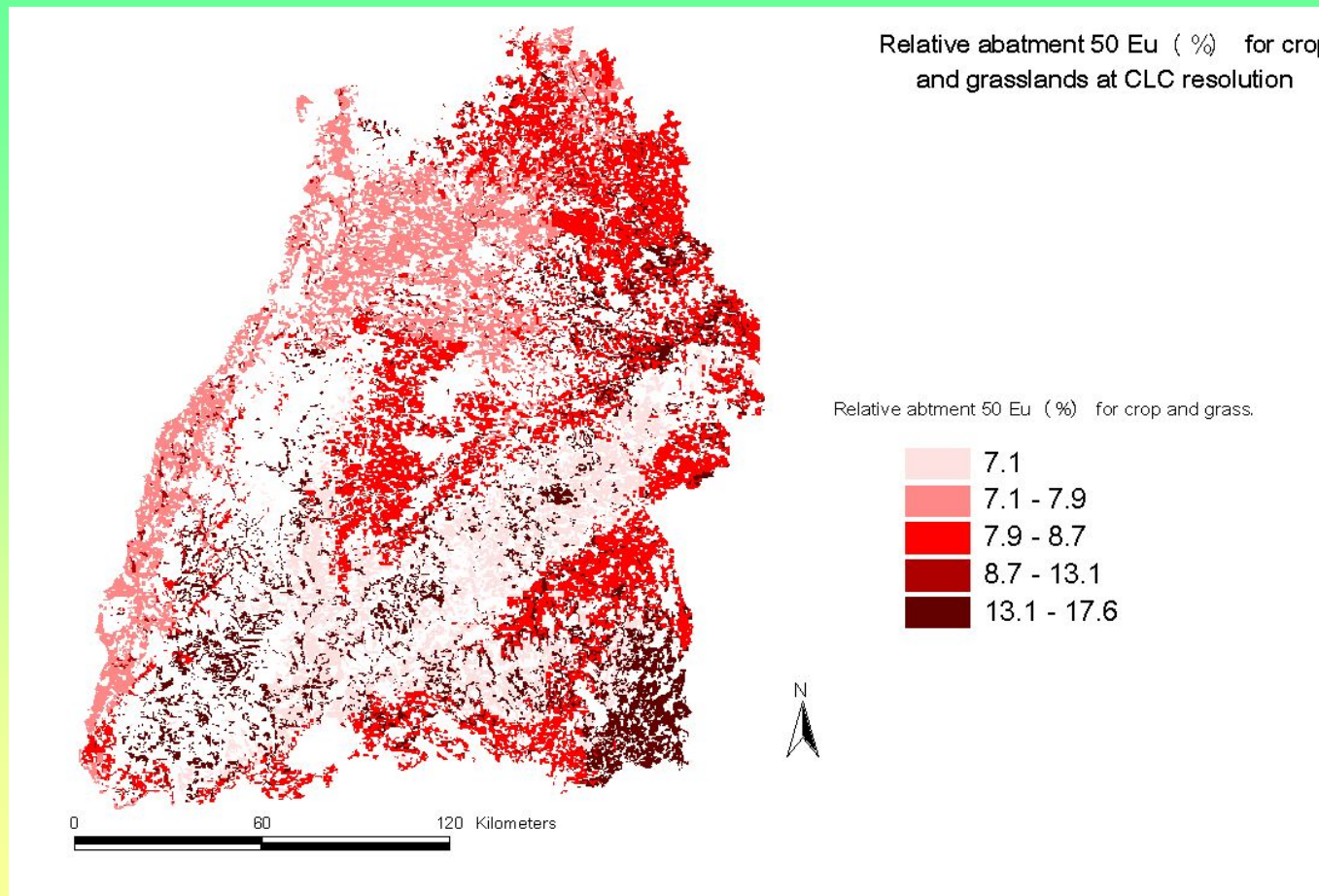
GHG emissions from AROPA-GHG at NUTS3 resolution



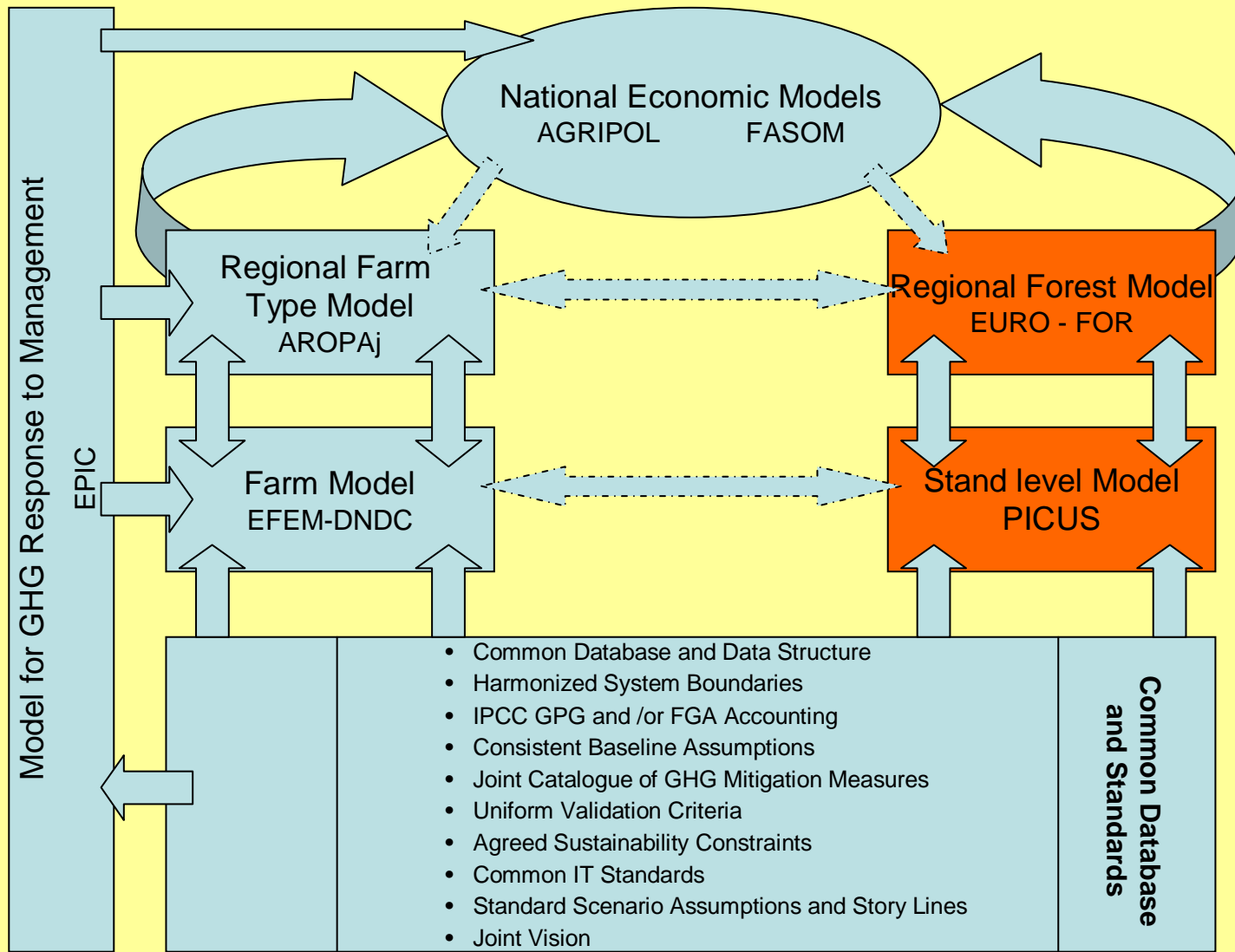
Abatement of GHG emissions AROPA-GHG (20 €/tCO₂e)



Abatement of GHG emissions AROPA-GHG (50 €/tCO₂e)



INTEGRATED POLICY FRAMEWORK



PICUS 2.0

Picus 2.0 Alpha - Paused

Szenario Simulation Stammdaten Extras

Starten Pause Laden Speichern Bearbeiten Outputmanager Load Run Ergebnisse/Analyse

Szenario: Dietmar 09.03.2133

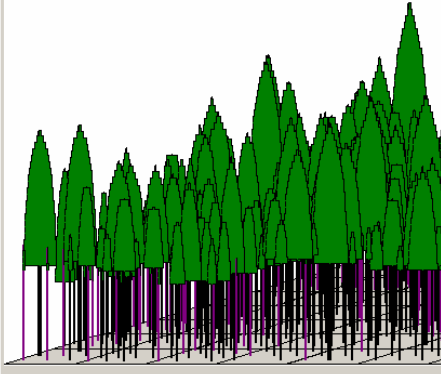
Log Outputs Anzeige Chart Baum Baumdetails Batchmode

Fileausgabe

- Klima
- Transpiration
- Bodenwasser

Selected Outputs (disable/enable)

- Volle Ausgabe pro Baum
- Aufteilungsparameter pro Baum
- Bestandssummen



Patch

- Nichts
- Wasser
- Wasser (num)

Start Dokument1 - Microsoft W... Picus2

Picus 2.0 Alpha - Paused

Szenario Simulation Stammdaten Extras

Starten Pause Laden Speichern Bearbeiten Outputmanager Load Run Ergebnisse/Analyse

Szenario: Dietmar 01.06.2033

Log Outputs Anzeige Chart Baum Baumdetails Batchmode

Fileausgabe

- Klima
- Transpiration
- Bodenwasser

Selected Outputs (disable/enable)

- Volle Ausgabe pro Baum
- Aufteilungsparameter pro Baum
- Bestandssummen

Chart

Fichte 2820
Höhe: 1846,58

dCrown: 23,96
hBole: 650 KA: 700

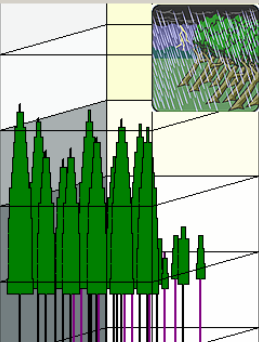
Start Record

Warten

- Nie
- Auto
- Click

Datum: 02.01.2033

| | |
|--------------------------|----------|
| Temp (avg) | 5,13 |
| Zufluss (mm) | 0,000 |
| Abfluss (mm) | ??? |
| Transpiration (mm) | 0,182 |
| Strahlung Direkt (kJ/m2) | 198,109 |
| Strahlung Diffus (0..1) | 1770,691 |
| Assimilation | ??? |
| Psi Schicht 0 | 57,193 |
| Ass Fichte 197 | 0,235 |
| Transp Fichte 197 | 0,005 |



Picus 2.0 Alpha - Paused

Szenario Simulation Stammdaten Extras

Starten Pause Laden Speichern Bearbeiten Outputmanager Load Run Ergebnisse/Analyse

Szenario: Dietmar 01.12.2082

Log Outputs Anzeige Chart Baum Baumdetails Batchmode

Fileausgabe

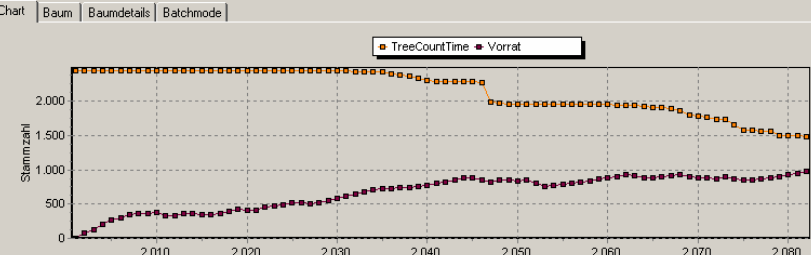
- Klima
- Transpiration
- Bodenwasser

Selected Outputs (disable/enable)

- Volle Ausgabe pro Baum
- Aufteilungsparameter pro Baum
- Bestandssummen

Chart

TreeCountTime Vorrat

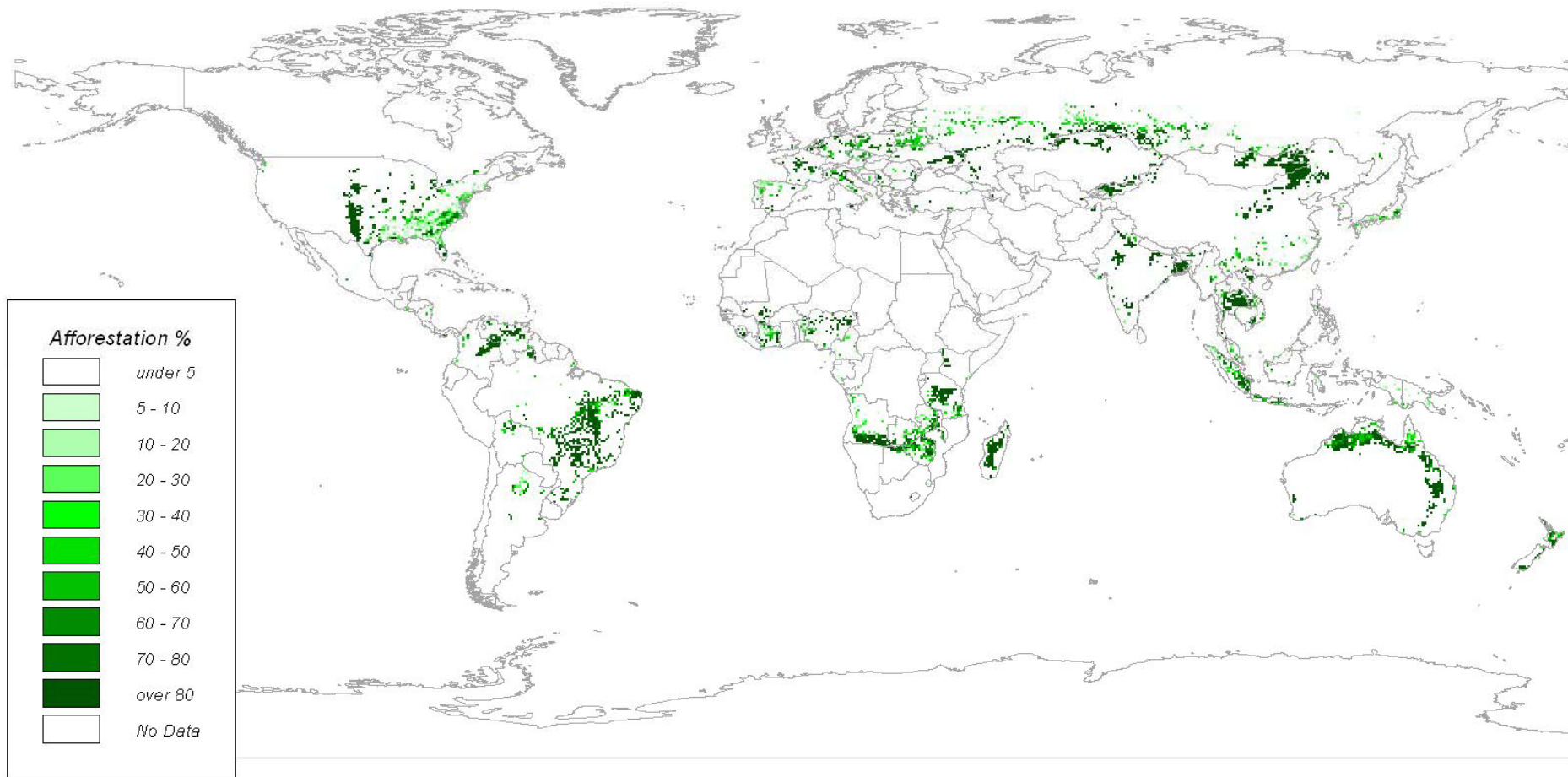


Stammzahl

2010 2020 2030 2040 2050 2060 2070 2080

Start Dokument1 - Microsoft W... Picus2

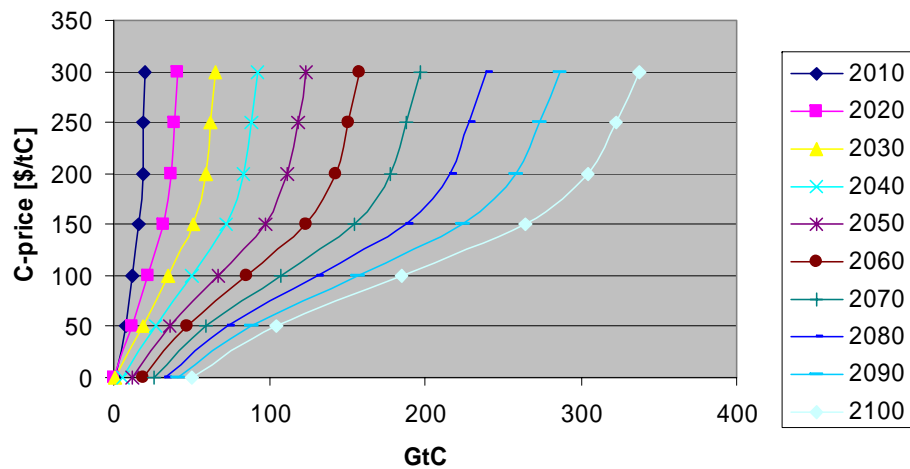
Afforestation in B1



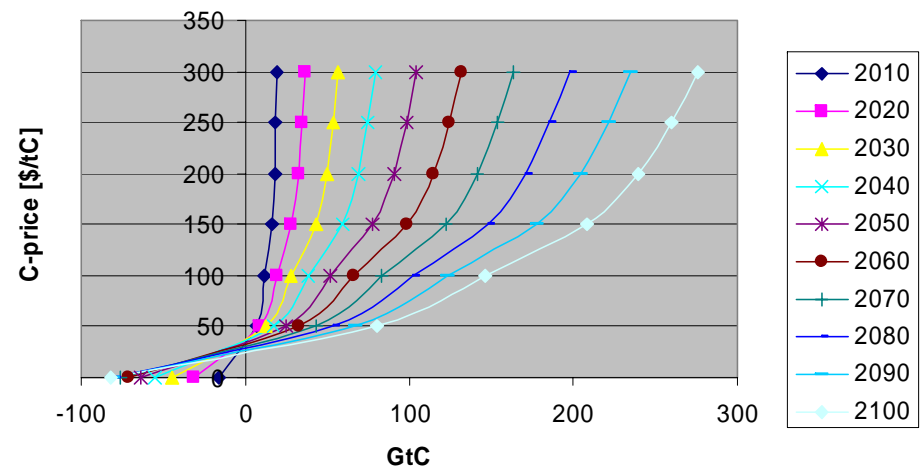
Carbon Sequestration

Total Carbon Supply: B1/A2

Cumulative C-sequestration potential in B1

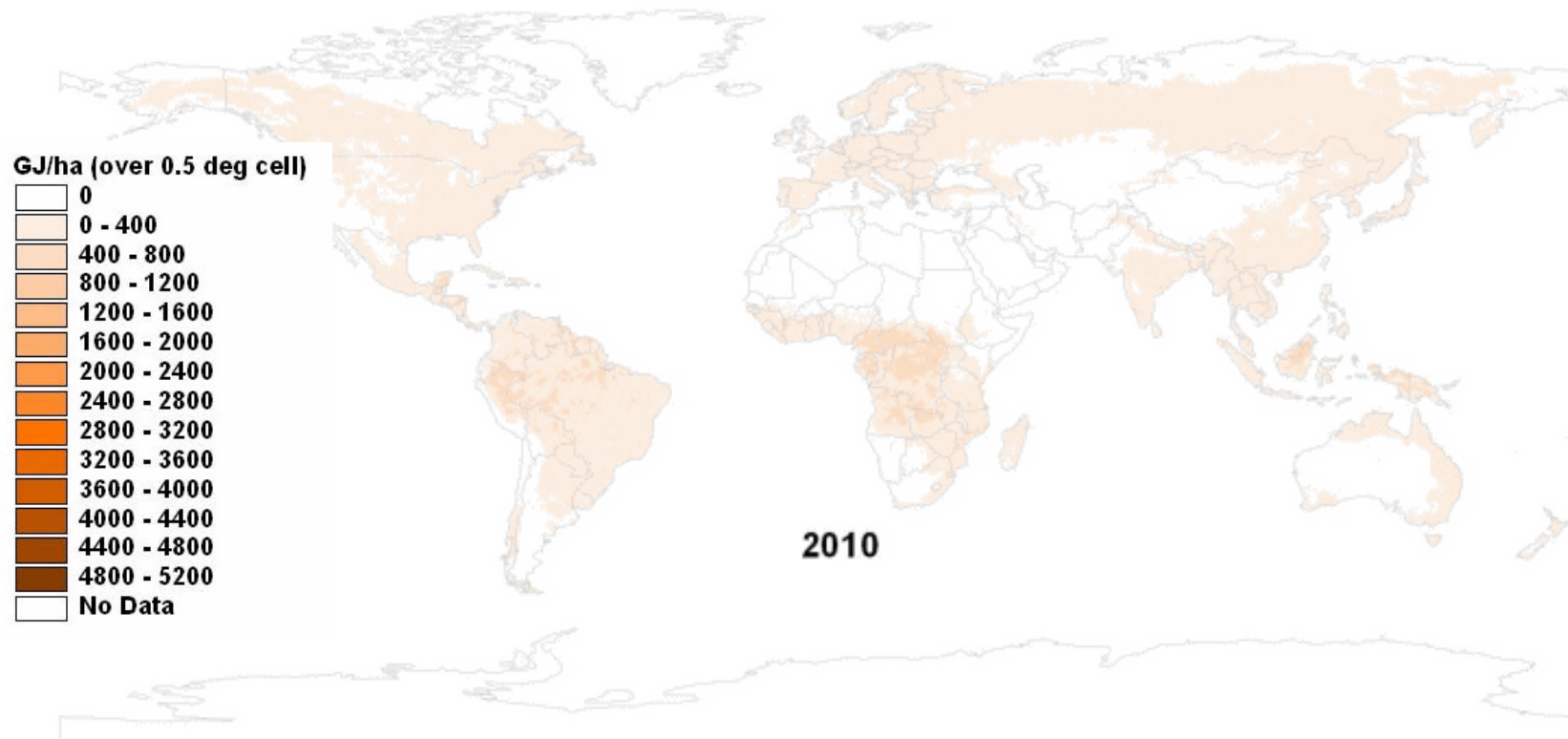


Cumulative C-sequestration potential in A2



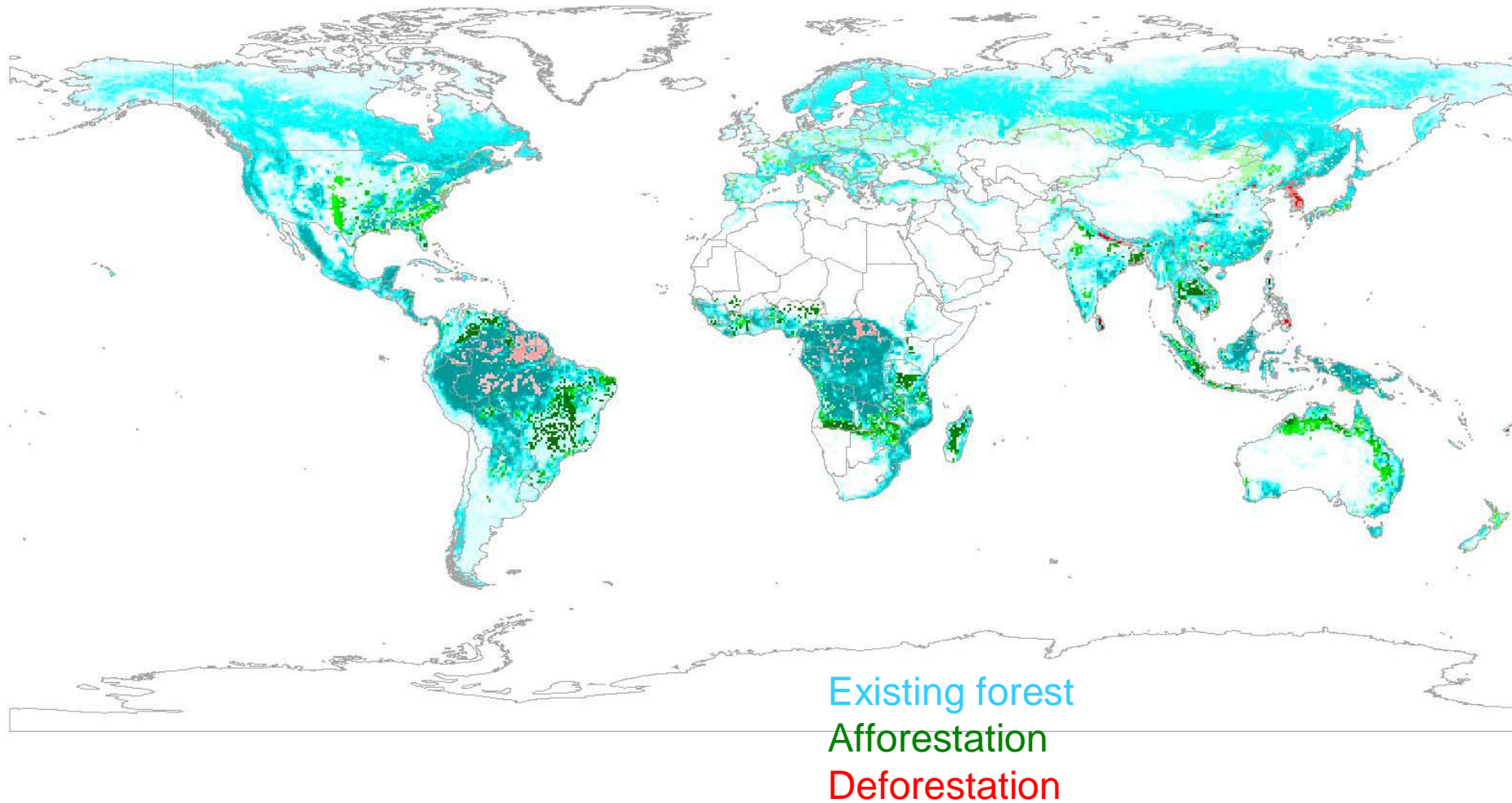
Bioenergy Supply for 2000-2100

B1 (Price < 6\$/GJ)

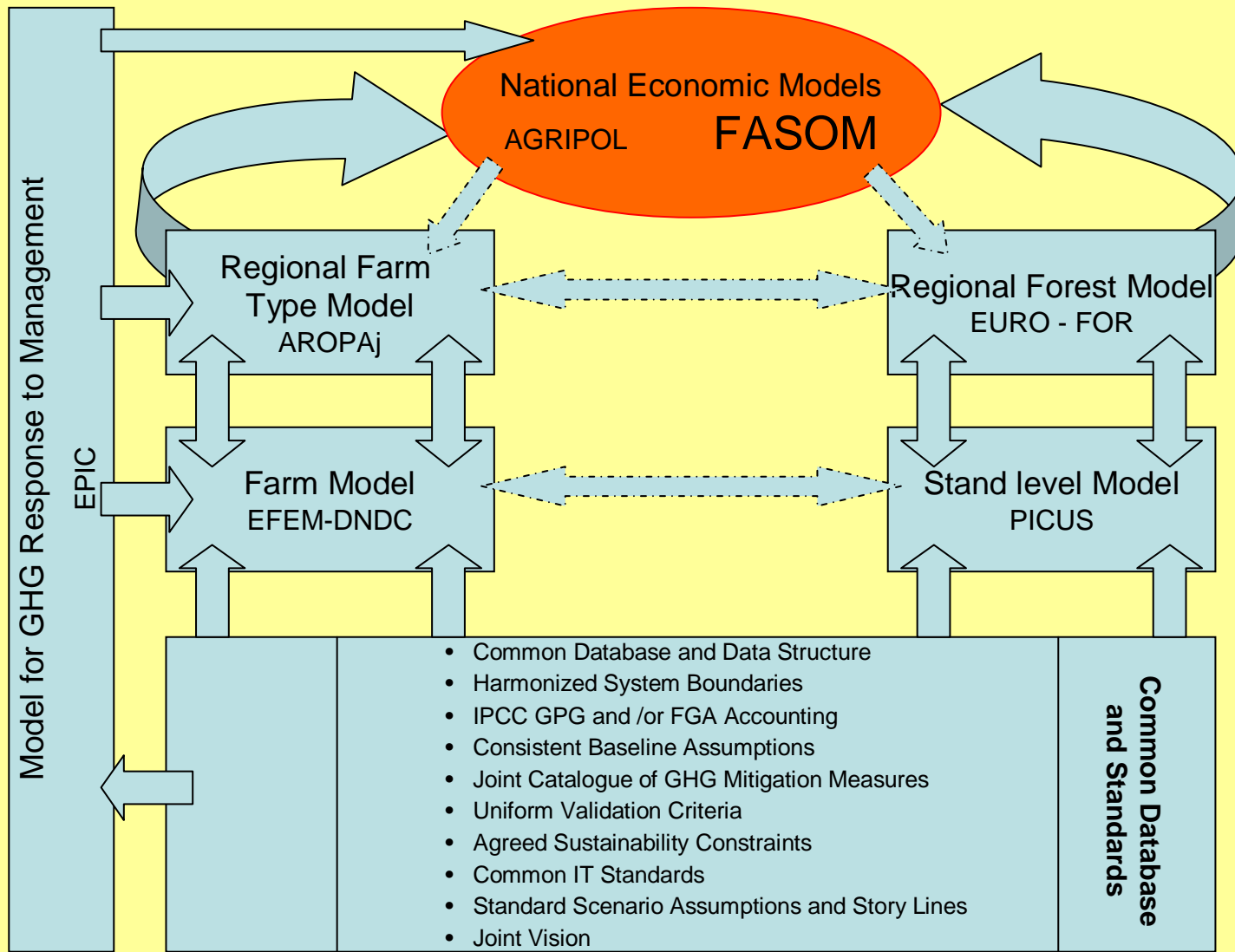


Land Use Change until 2100 for B1

Intensity map: (affected) ha x C-uptake



INTEGRATED POLICY FRAMEWORK



Basic Modeling

