BIOMASS FOR ENERGY USES: ASSESSMENT METHODOLOGY FOR FRANCE

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In collaboration with IFP, FCBA, INRA in the Valerbio Project

Plan of the presentation

- Context
- Objectives
- Tools and assumptions
  - Scenarios
  - Resources analysis
  - Technologies description
- First preliminary results
- Conclusion and perspectives

Context

- Fossil fuel scarcity and environmental concerns are good drivers for renewable alternatives studies
  - How to assume the continuity of liquid fuel ?
  - Are biofuels an acceptable and sustainable solution ?
  - Which biomass can be use ?
  - Which landfield is available without competition with food ?
  - Which rate of incorporation as a substitution ?
- To answer these questions prospective studies are helpful to policy makers

Objectives

- This study deals with the methodology elaborated to assess the potential of biomass for energy use in France:
  - Using a detailed representation of biomass sources (Agriculture and wood products)
  - Taking into account the spatiality of the resources (the country is separated in several regions)
  - Regarding their economical evolutions (costs of production and transport are forecasted on the time horizon)
  - Having a rich technological database for energy generation with biomass input (1st and 2nd generation)

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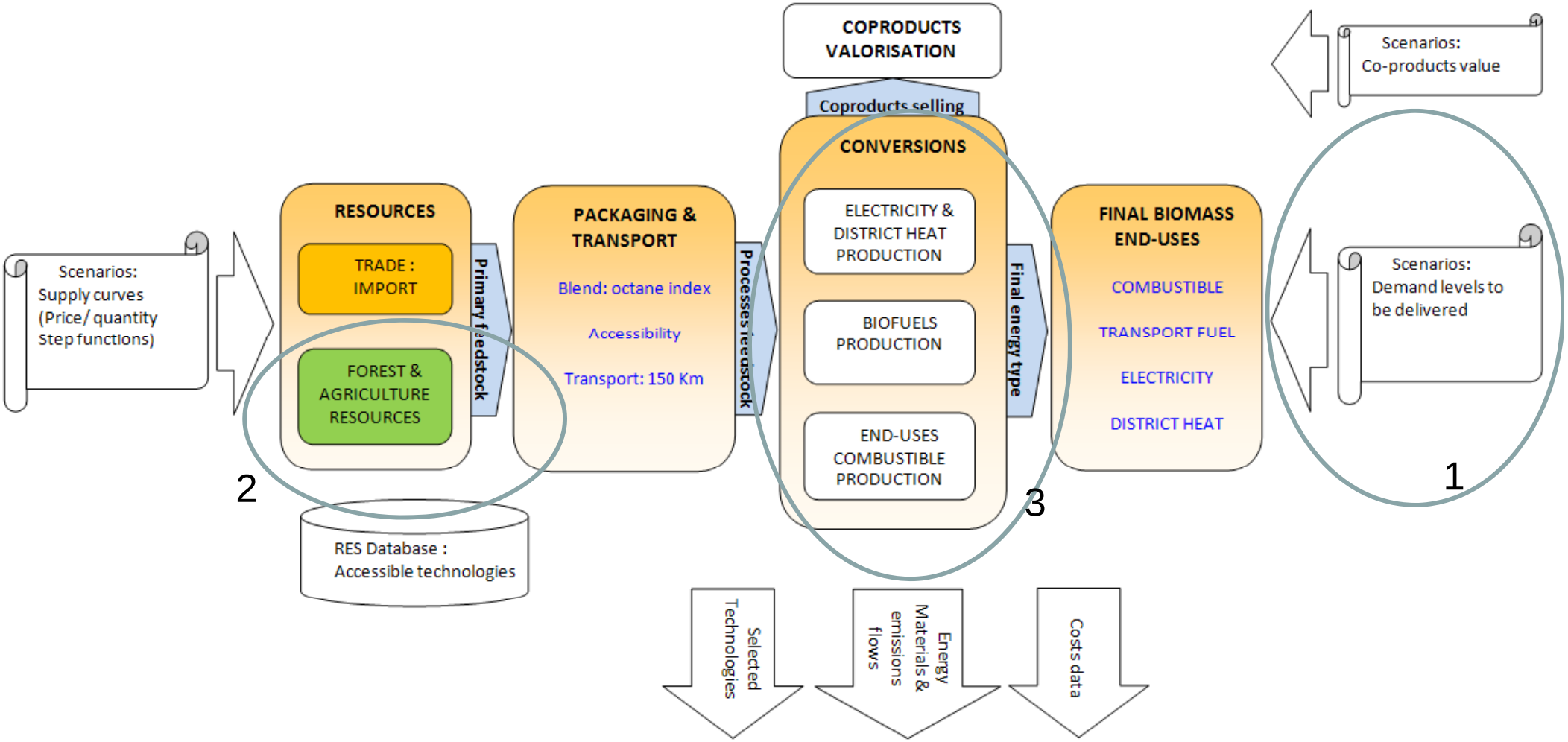
Modelling

- French MARKAL/TIMES Bottom up model is used
  - Time horizon is 2000-2050
  - Demand driven (fuels) and given energy prices
  - All sectors represented
- We only deals with available landfield for energy without food competition
  - Base on marginal and useless landfields
- Detailed technology database including the most promising 2nd generation biofuel production (including co products)

Reference Energy System



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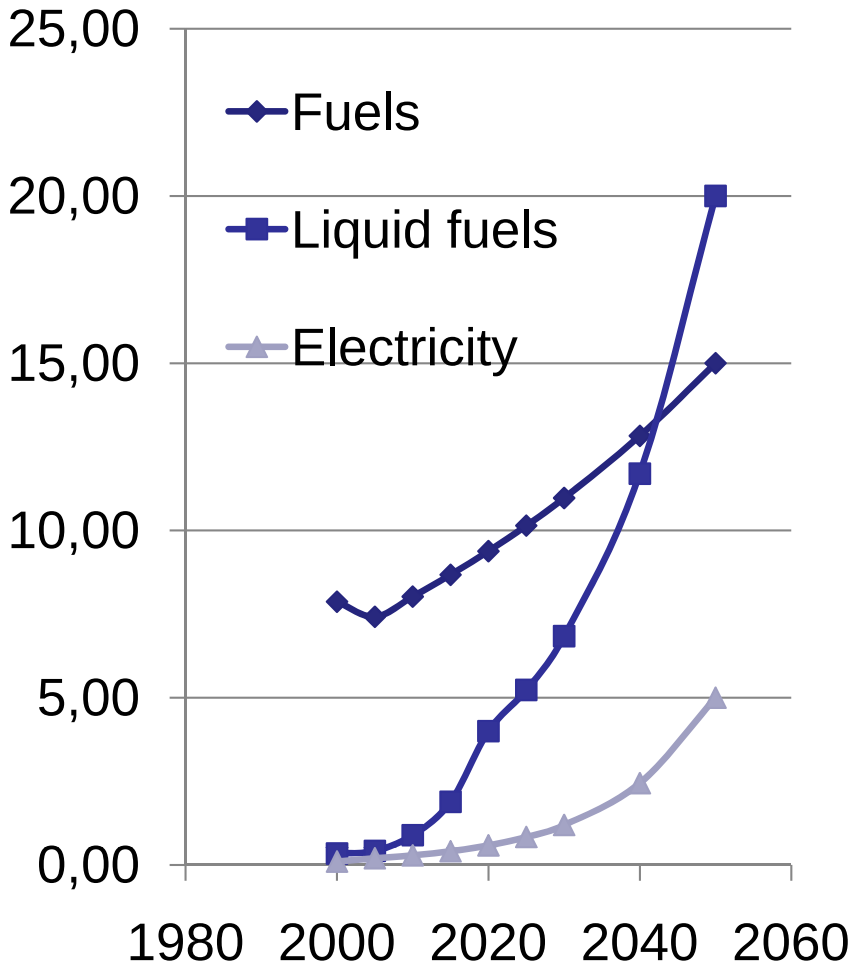
Demand scenario

- 3 commodities
  - Fuels : direct use of biomass
  - Liquid fuels : direct use of biofuels
  - Electricity : Use of electricity produced with biomass
- 3 scenarios
  - S1 : BAU (Business As Usual)
  - S2 : All for energy (biomass mostly use for energy)
  - S3 : Dynamic wood (wood is mostly use for non energy applications)
- For each, 2 kinds of prices for biomass (high and low)

Demand for S2

40 Mtoe for end use services,
With 20 Mtoe for Transportation



40 Mtoe for end use services,
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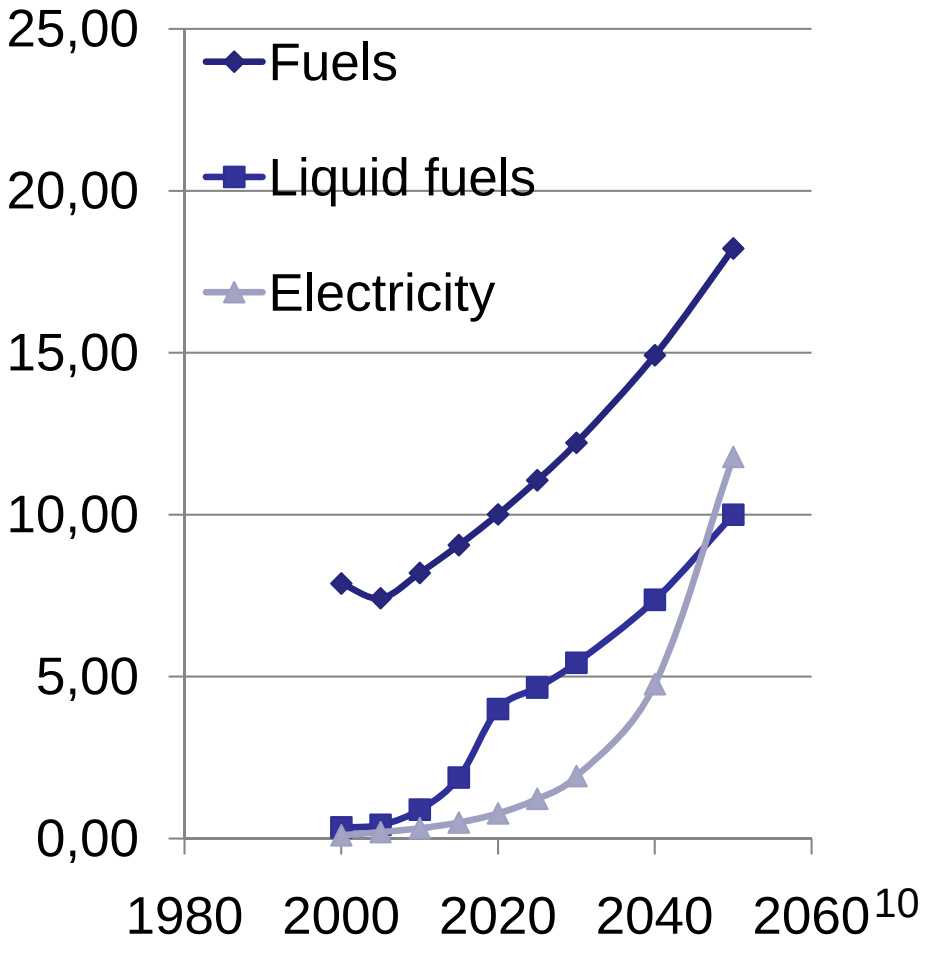

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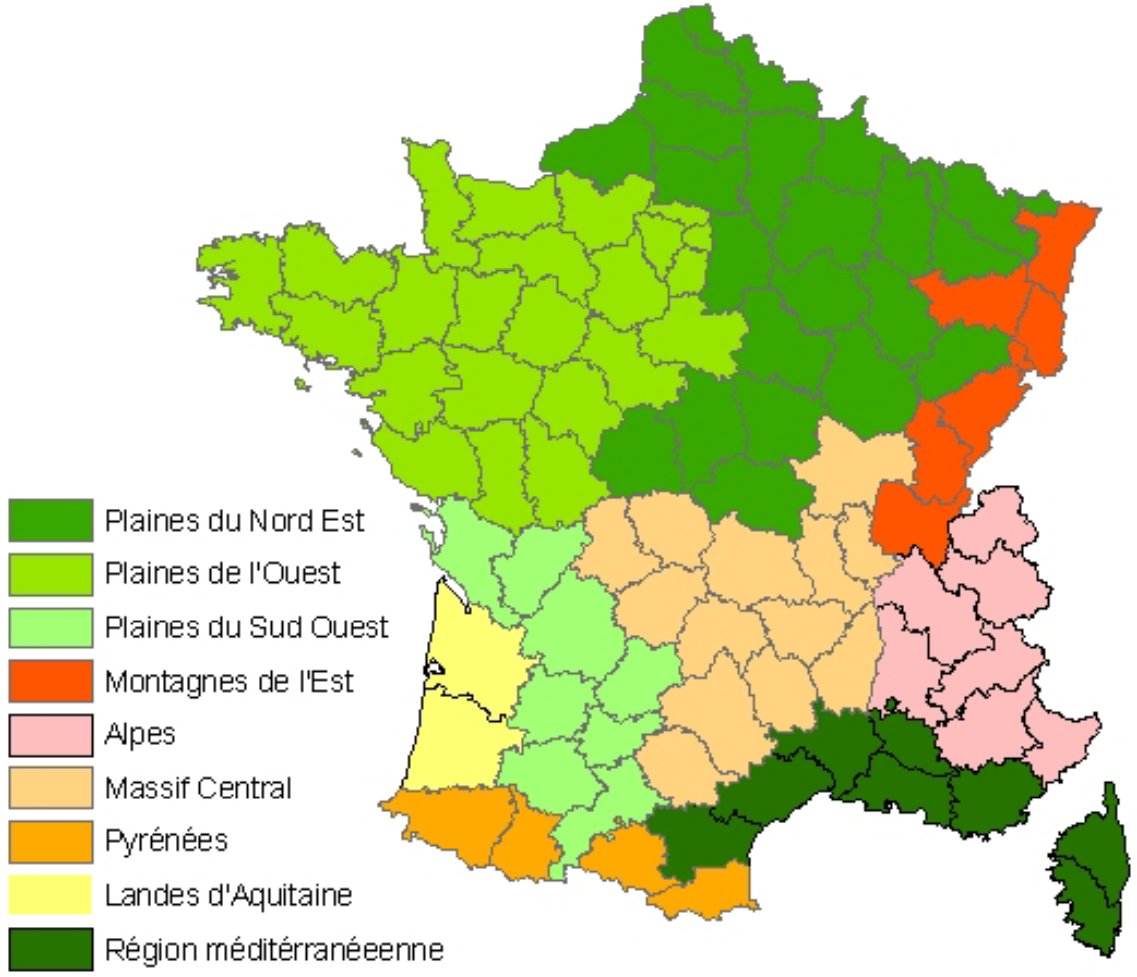
Studied resources

- Agriculture
  - Grains, whole plant, straw for :
    - Corn
    - Wheat
    - Rape
    - Triticale
  - Sugar beet
  - Sunflower
  - Miscanthus
  - Eucalyptus
  - Jatropha, Palm, Poplar…
  - Residu
- Wood
  - 3 Types
    - Big
    - Medium
    - Small
  - 4 Accessibilities
    - Easy (FA)
    - Moderately Difficult (MD)
    - Difficult (DI)
    - Very difficult (TD)

SRC : Short Rotation Coppice

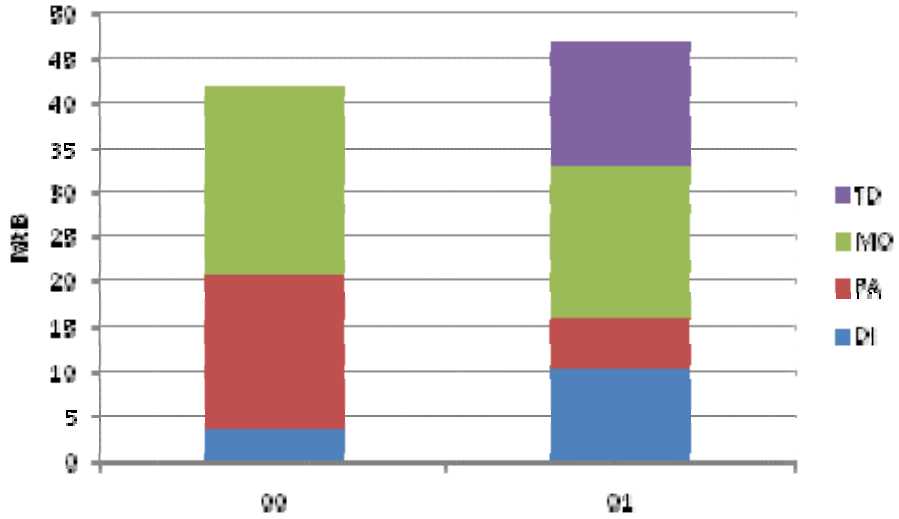
Detailed spatiality for landfield

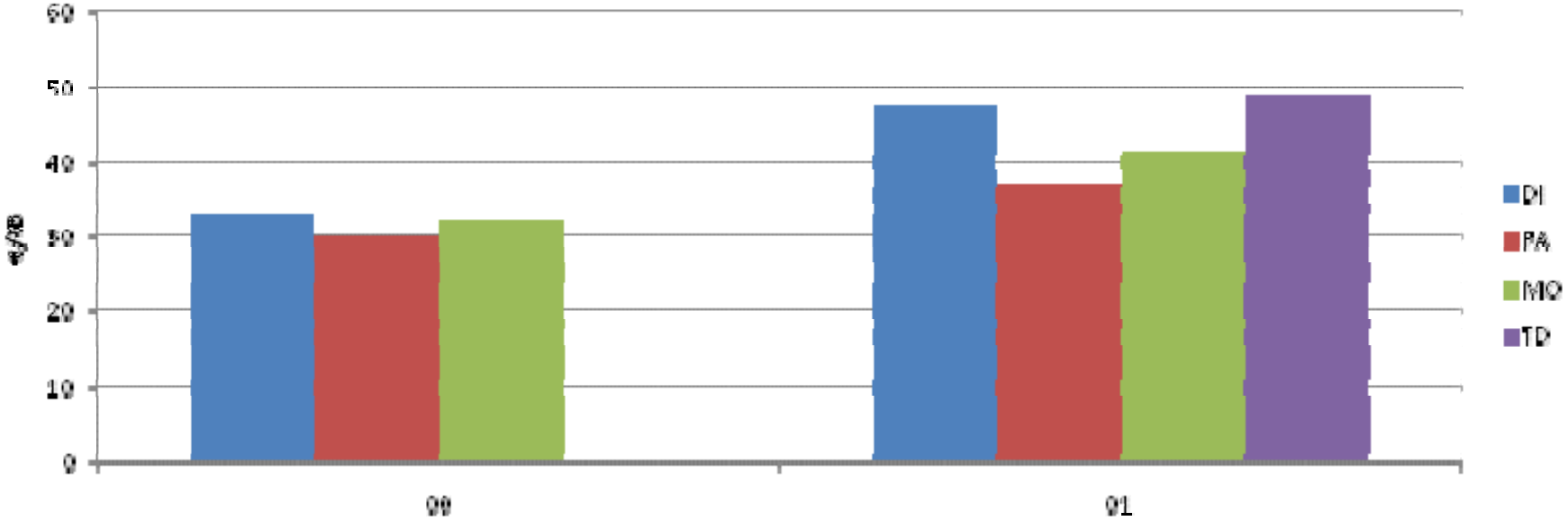
- Pertinent regions for agricultural and wood resources
- Each region has a detailed economic description (cost of production and transport by commodity)
- Realistic evolutions and bounds on region's potentials



Example for wood resources

- Actual resource (00)
- Reachable resource (01)
- Imply different costs depending on accessibility
- Will influence the final choice for the technologies





Wood potentials

S2 :
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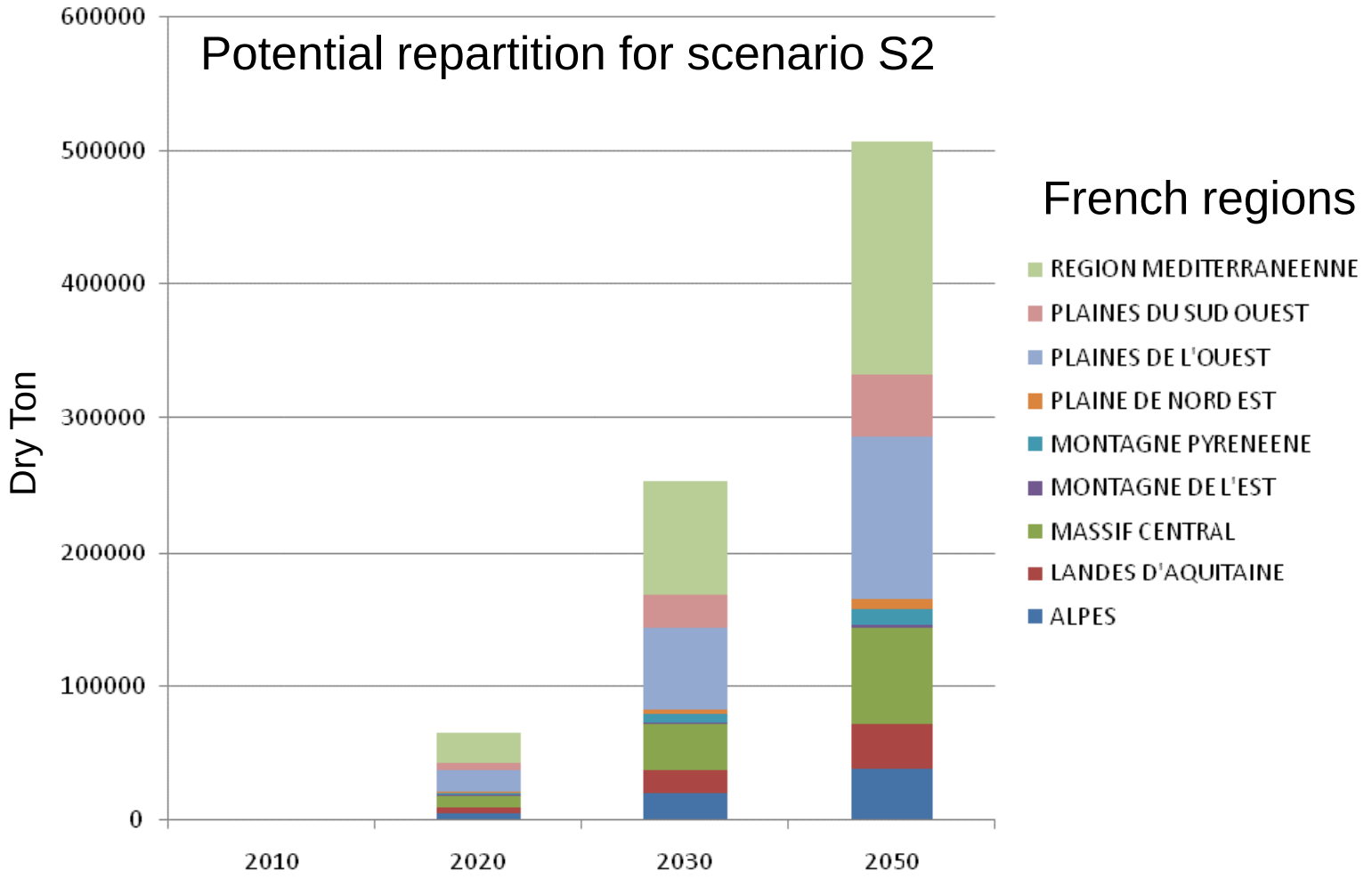

Agriculture potentials

S2 :
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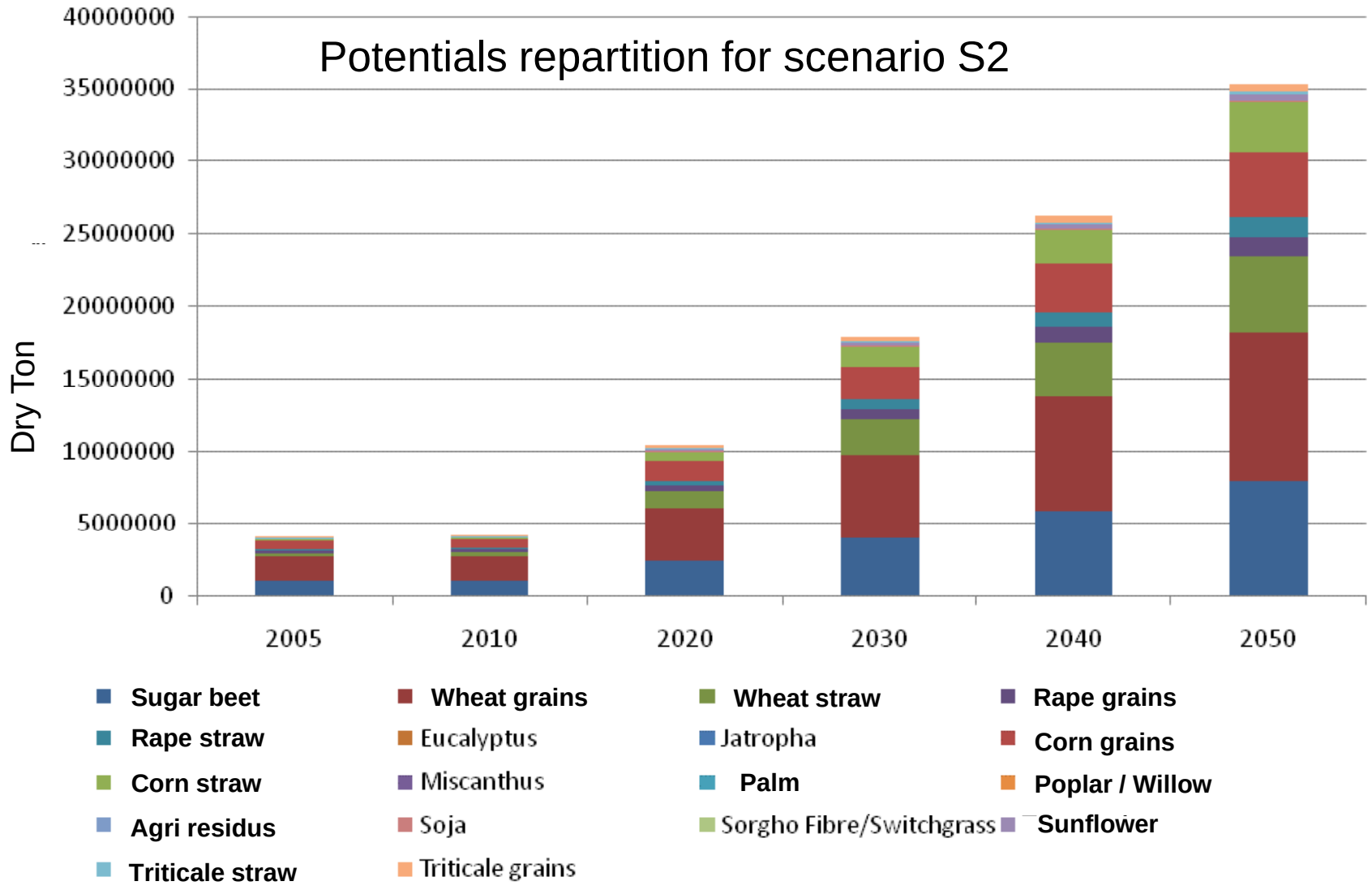

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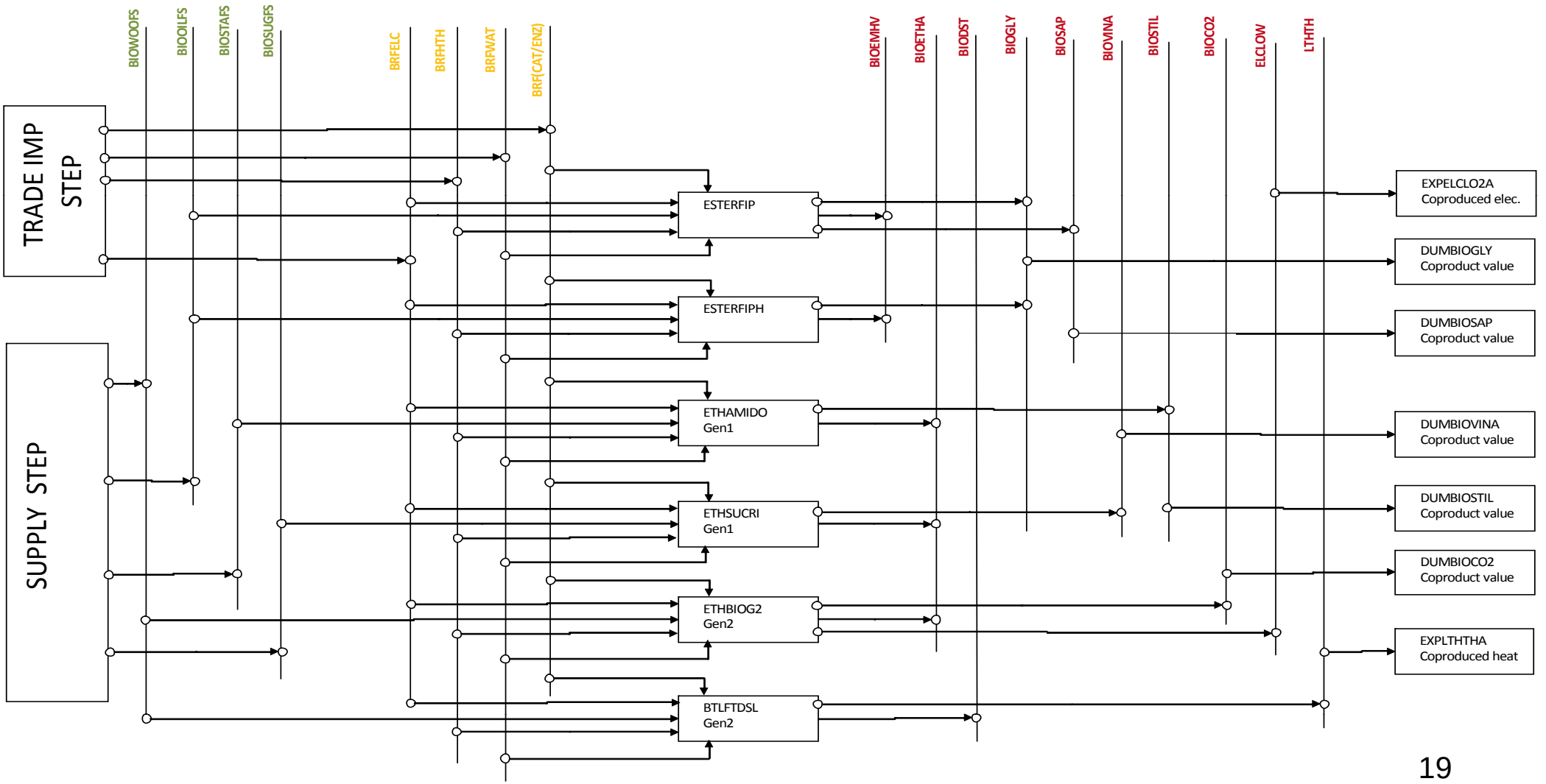
Processes for biofuels production

- Economical values for all of the processes
- Valorization of the production of heat and power
- Valorization of the Co-products

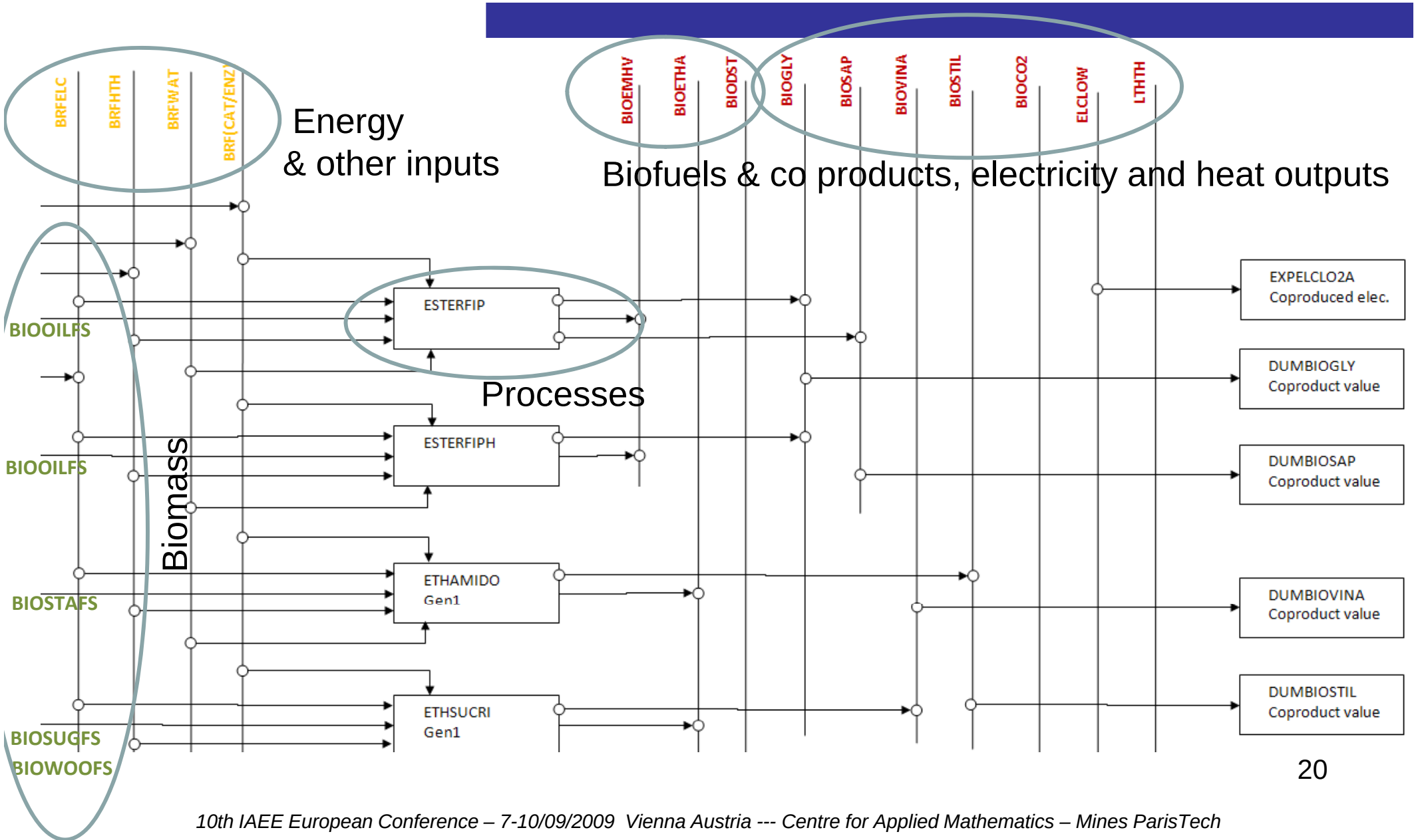
Process	Description
BTLFTDSL	FT (Fischer-Tropsch)-diesel wood
BTLFTDSLB	FT-diesel straw
ESTERFIP	Trans-esterification
ESTERFIPH	Advanced Trans-esterification
ETHAMIDO	Ethanol starch (Amidon)
ETHBOIG2	Ethanol wood
ETHBOIG2B	Ethanol straw
ETHSUCRI	Ethanol sugar

Commodities	Description
BIODST	FT synthetic diesel
BIOEMHV	Biodiesel
BIOETHA	Bioethanol

Biofuels production scheme



A detail of the RES



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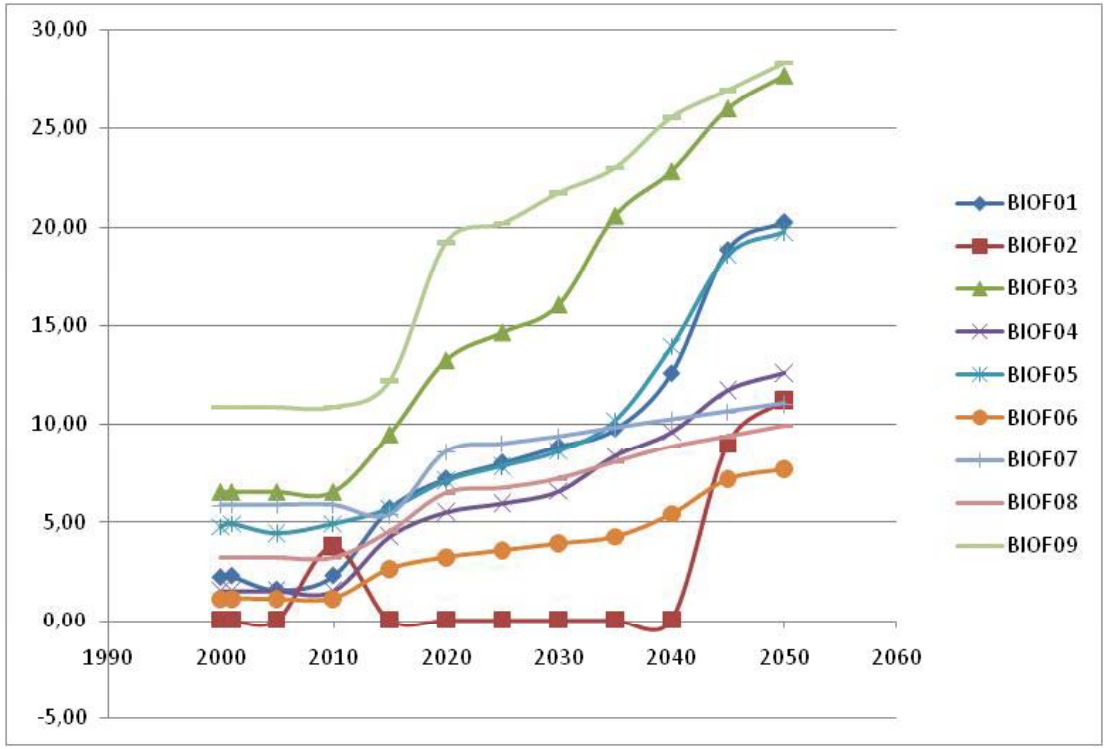
Resources repartition

Wood resources



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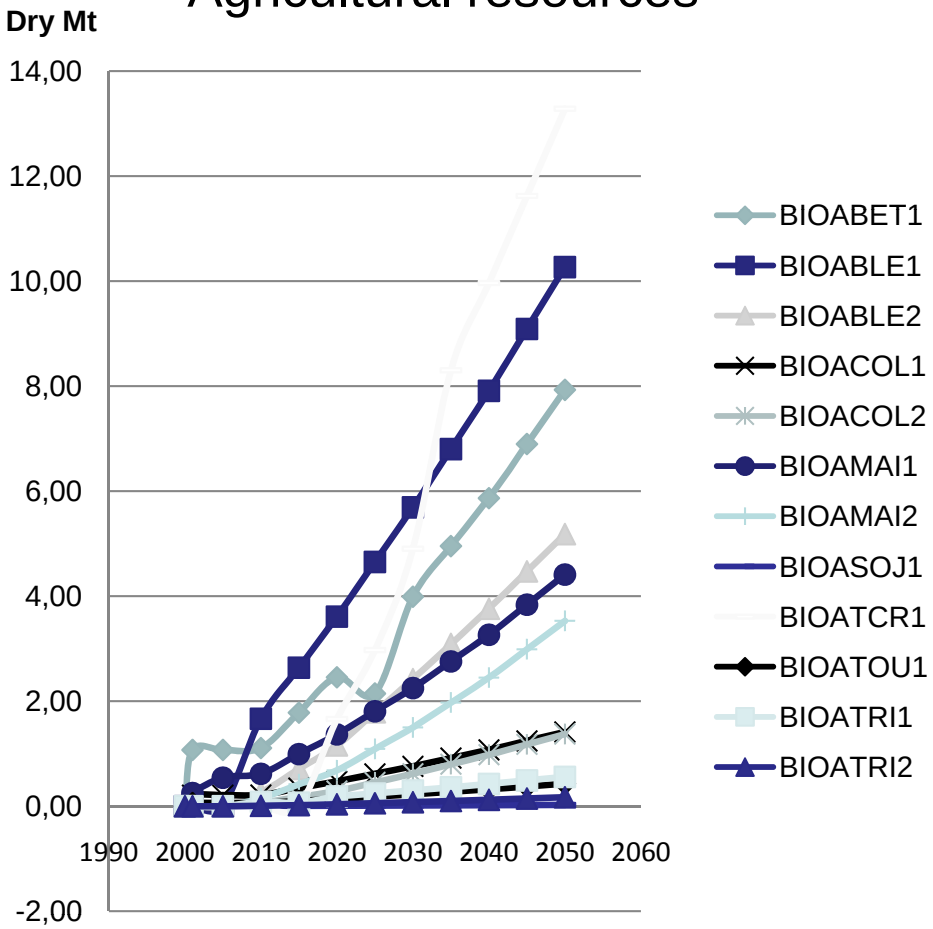
Agricultural resources



Technology path

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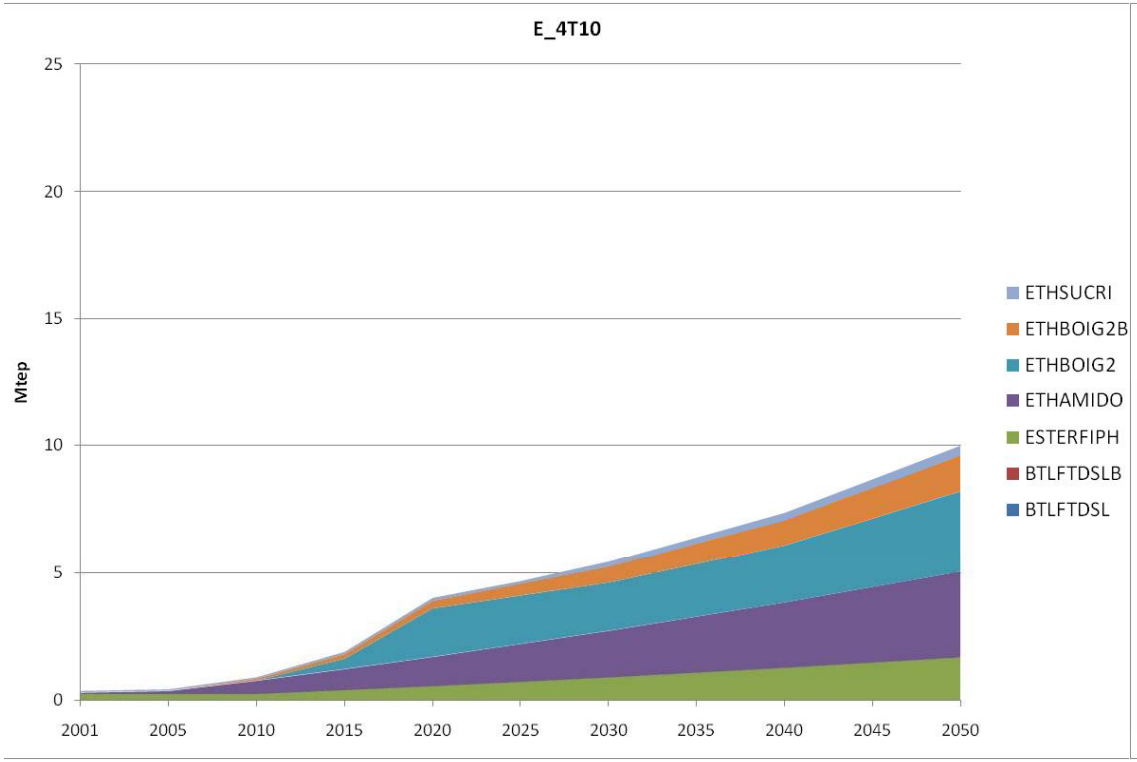

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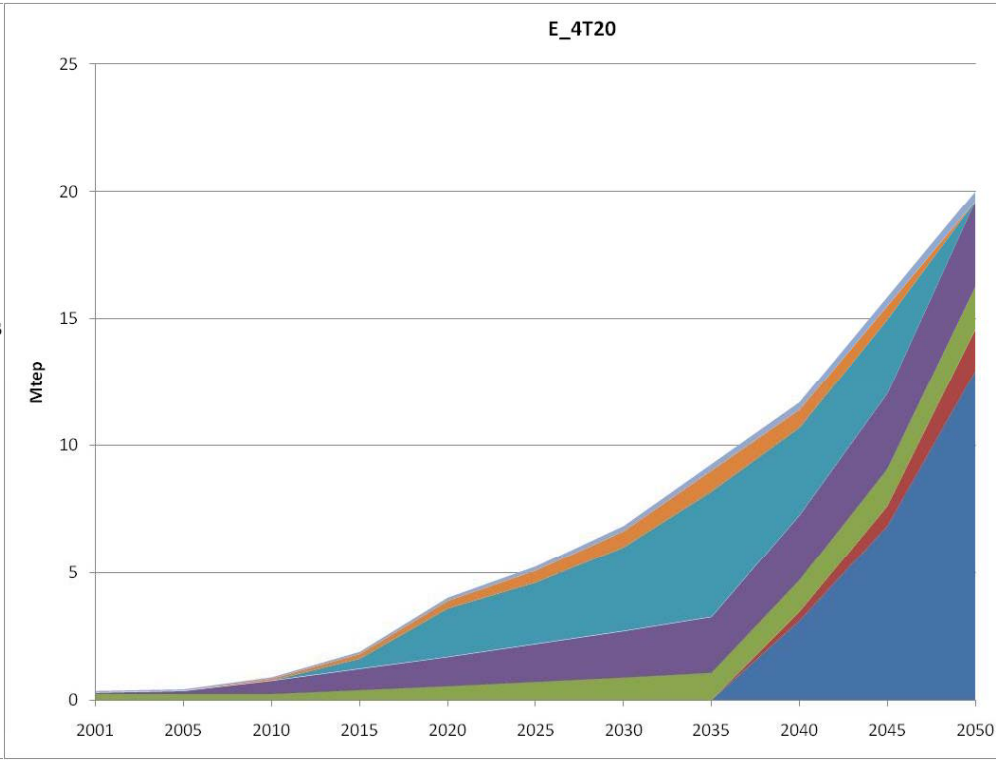

Electricity production

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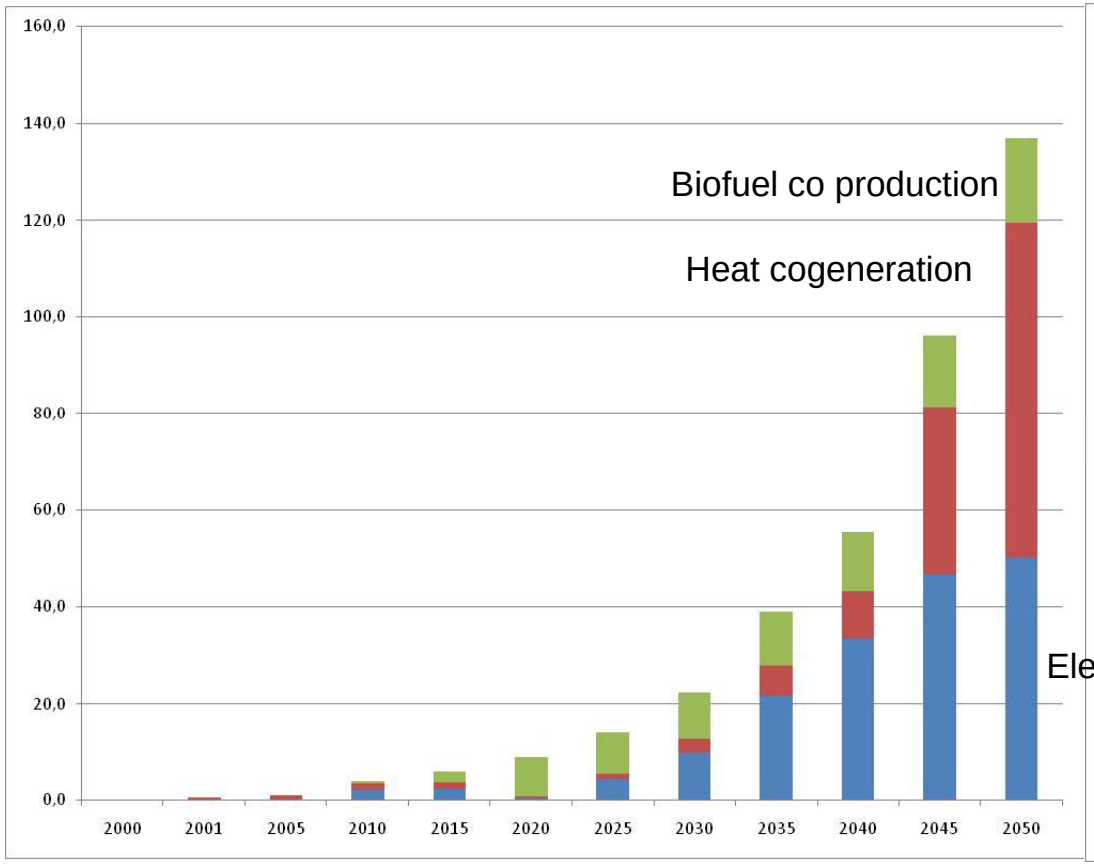

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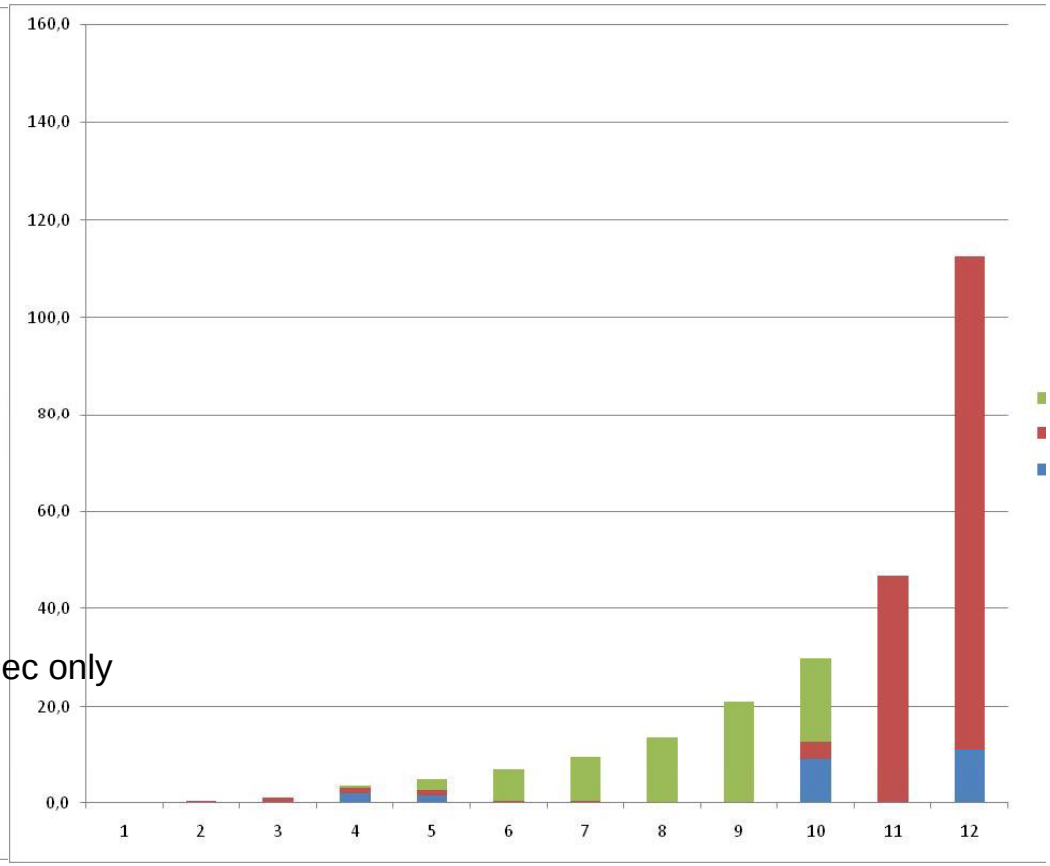

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Conclusions & perspectives

- Detailed potentials for biomass with their evolution for each region
  - Permit to assess the future implantation of conversion unit
- Validation of the Implementation of this cutting up in the French model
- A Tool to assess the limits of the French potential of biomass for biofuels is operational
- Preliminary results are promising and are to be discuss with agricultural and forestry experts
- Final results will be available at the end of the year
- Sensitivity analysis will be carried out
- Detailed scenarios can be presented to policy makers

Thank you
for your attention