GEOBENE

System Dynamics Model for Analyzing and Measuring the Benefits of Global Earth Observation

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33rd International Symposium on Remote Sensing of Environment 2009, Stresa, Italy

Project

- European Community's Sixth Framework Programme – “Global Earth Observation – Benefit Estimation: Now, Next and Emerging” (GEOBENE)
- The project objectives: develop *methodologies* and *analytical tools* to *assess societal benefits of GEO* in the domains of: Disasters, Health, Energy, Climate, Water, Weather, Ecosystems, Agriculture and Biodiversity.


Health


Climate


Weather


Agriculture


Disasters

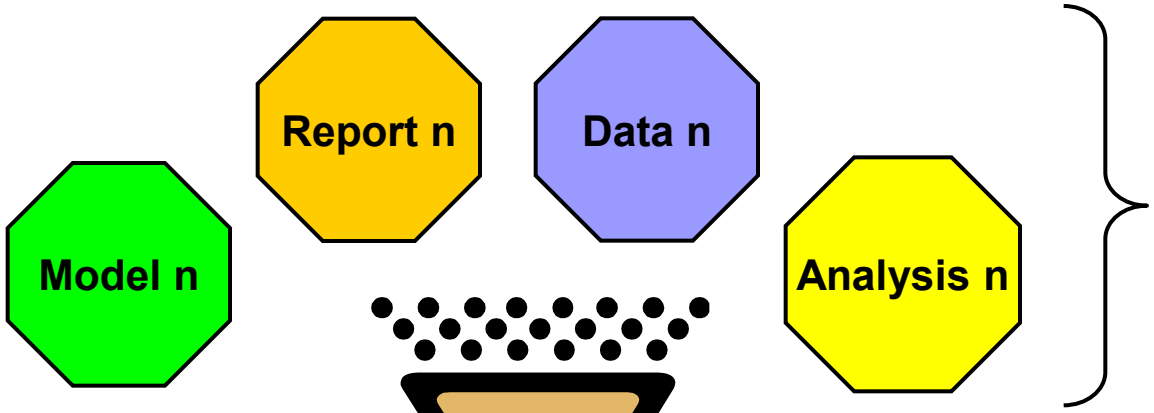

Energy


Water


Ecosystem


Biodiversity

Integration and benefits measurement

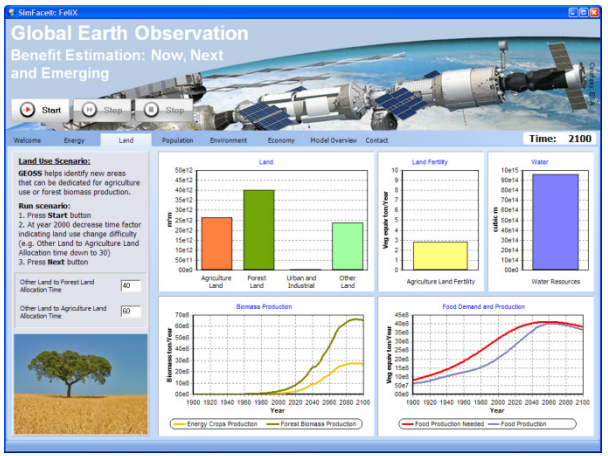


GEO-BENE studies in particular SBAs

Global Model

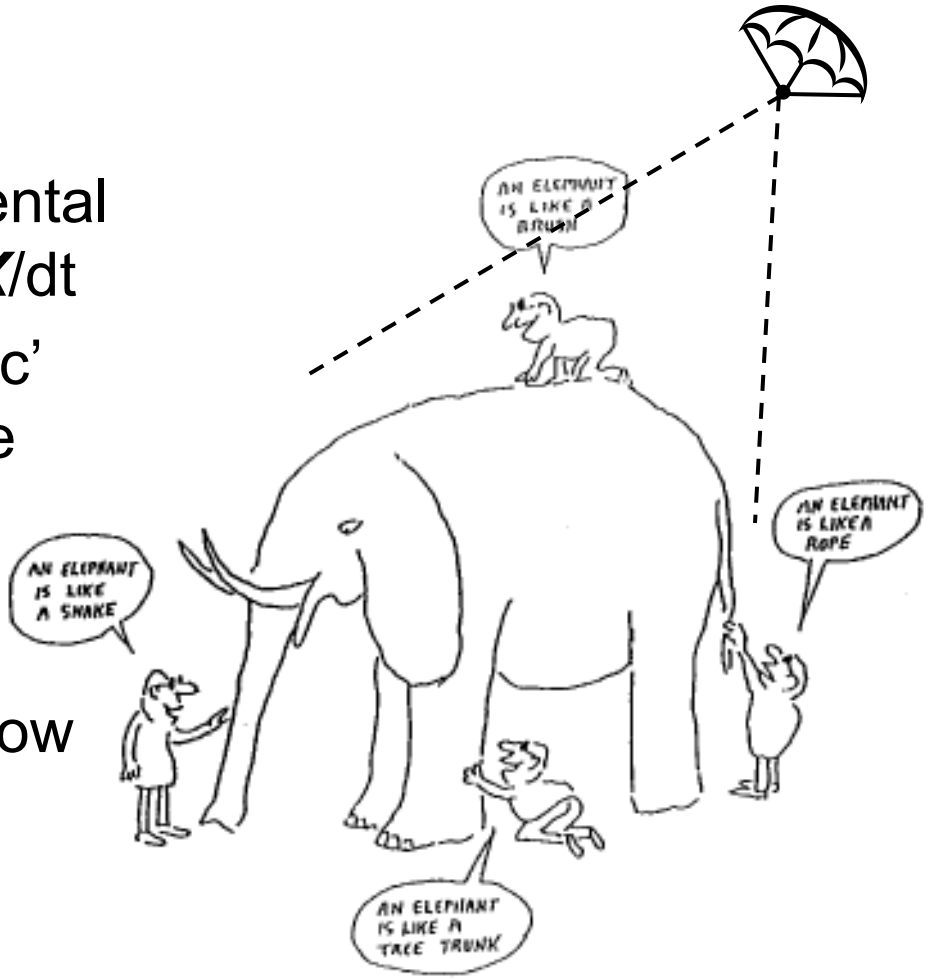
FeliX

Easy Simulation and Results Presentation

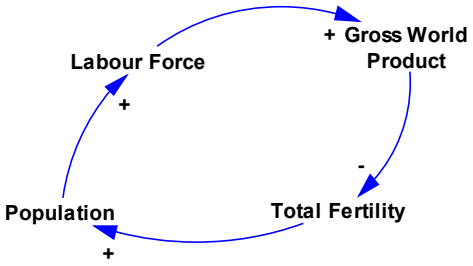


FeliX

- ***F***ull of ***E***conomic-***E***nvironmental ***L***inkages and ***I***ntegration d***X***/dt
- Global model trying to 'mimic' the whole system (the whole 'elephant') and make it an experimental field to asses benefits of GEOSS (does GEOSS help us to get to know <and 'socialize'> with the 'elephant'?)
- System Dynamics model



FeliX – Causal Loop Diagram



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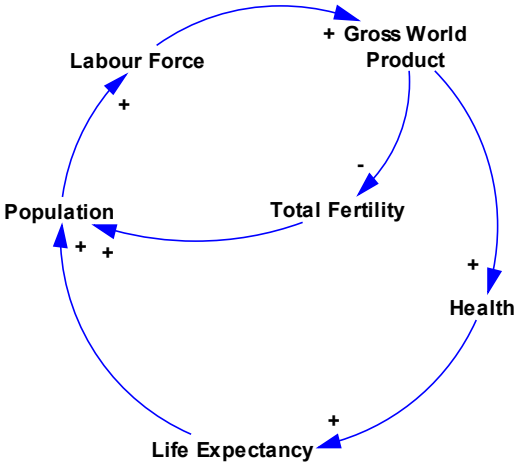

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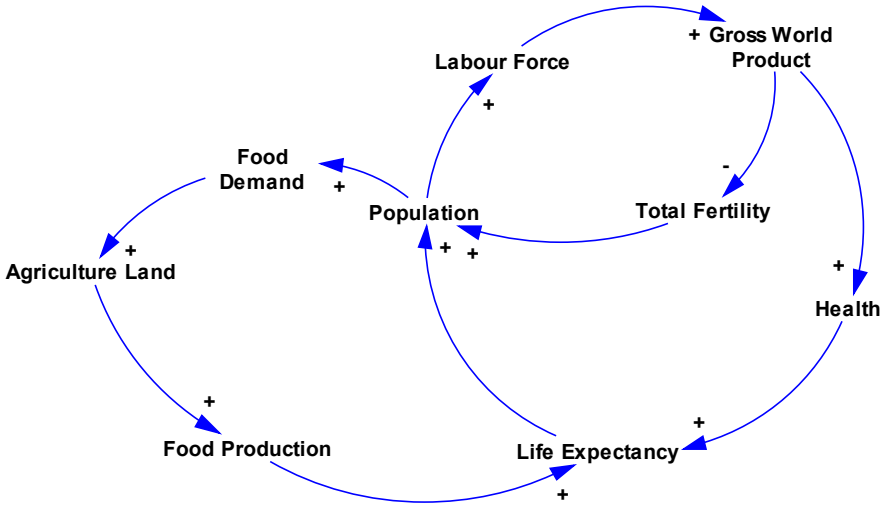

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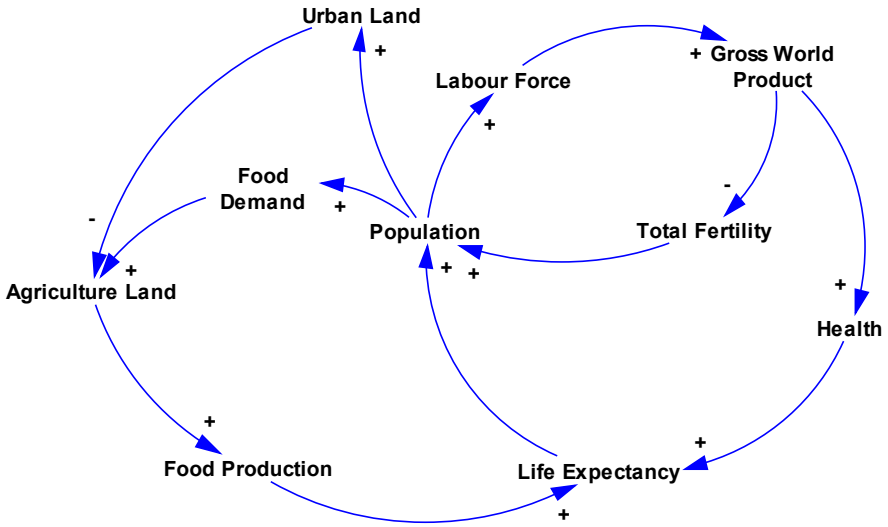

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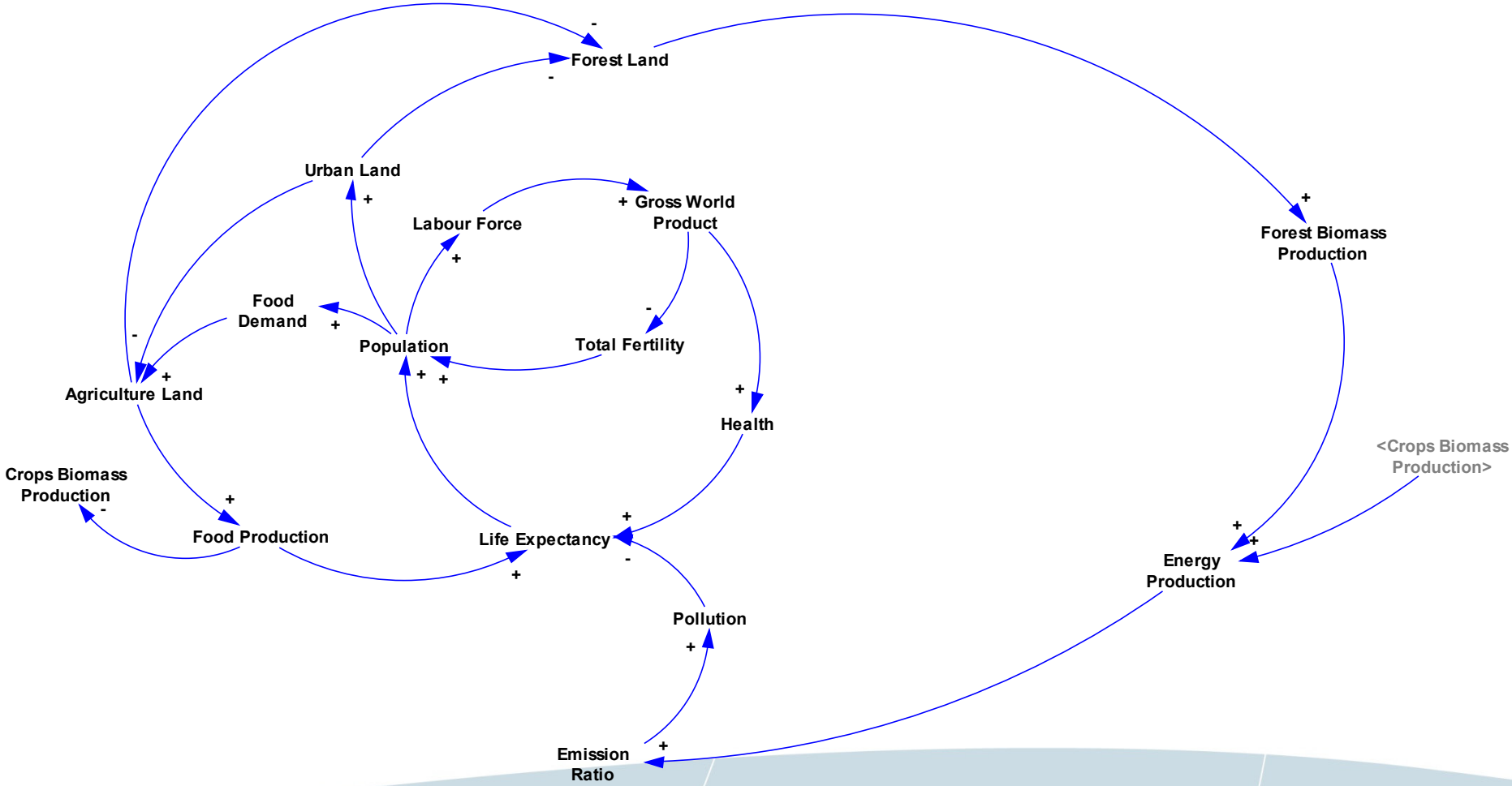

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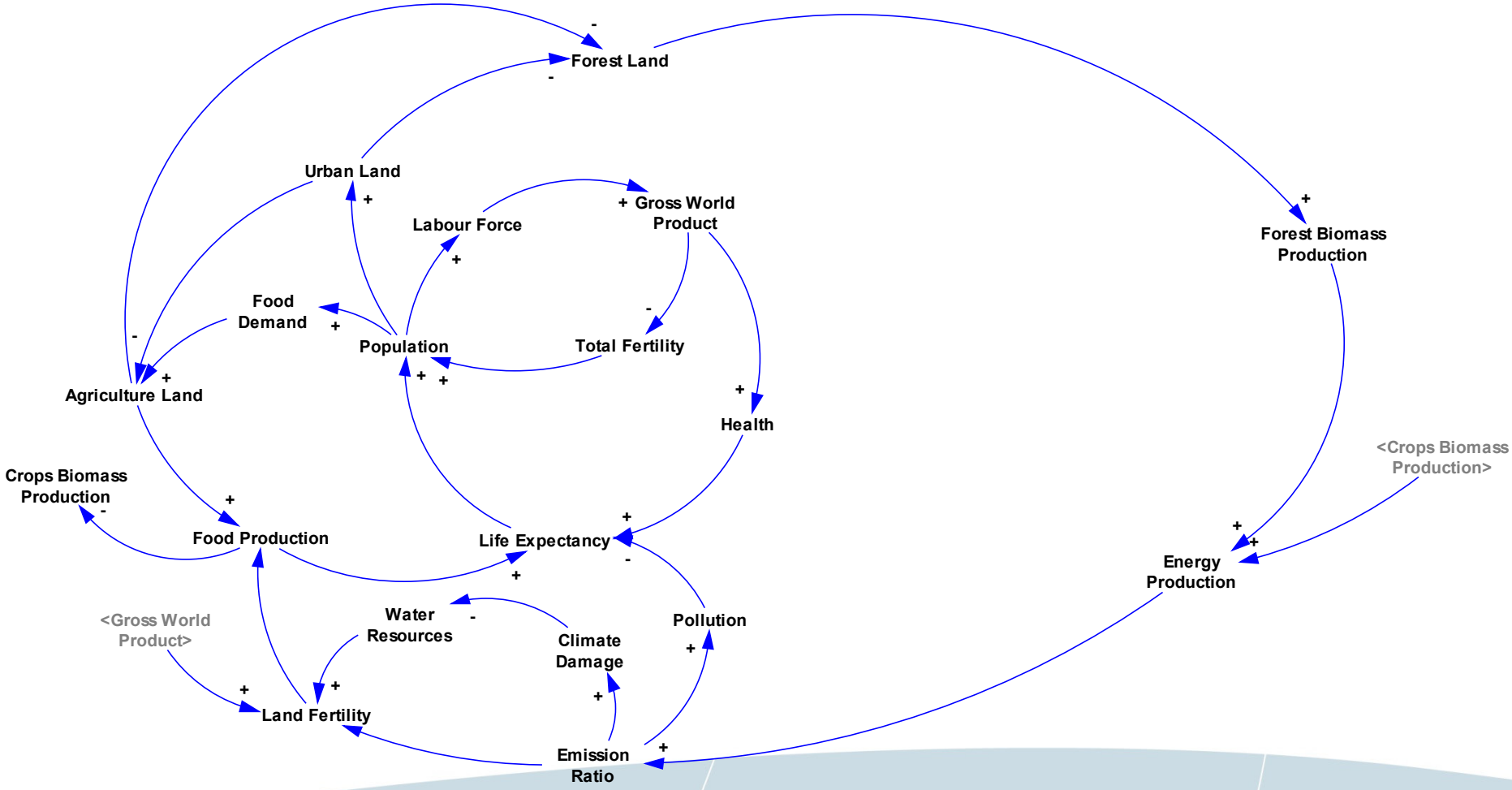

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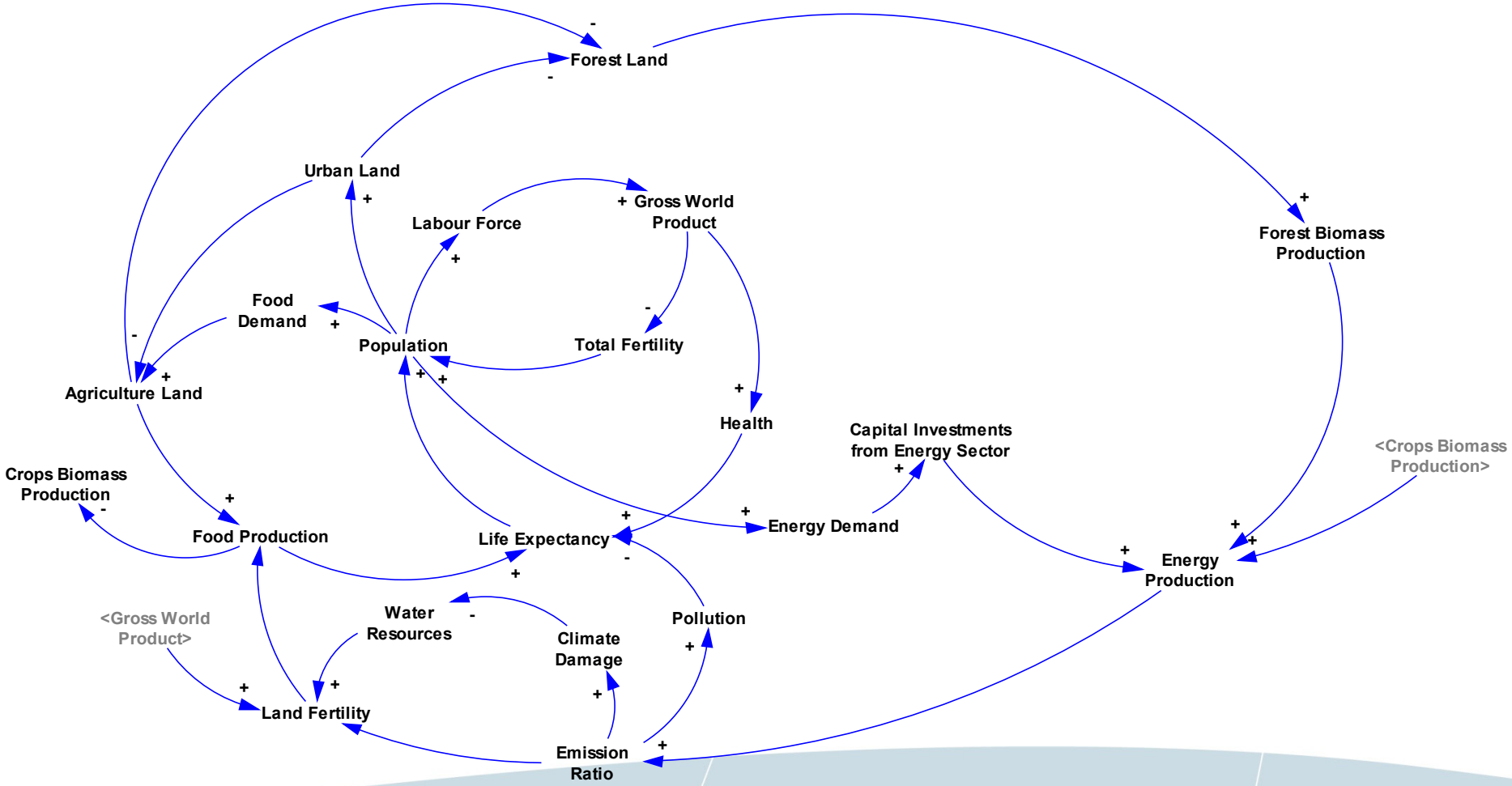

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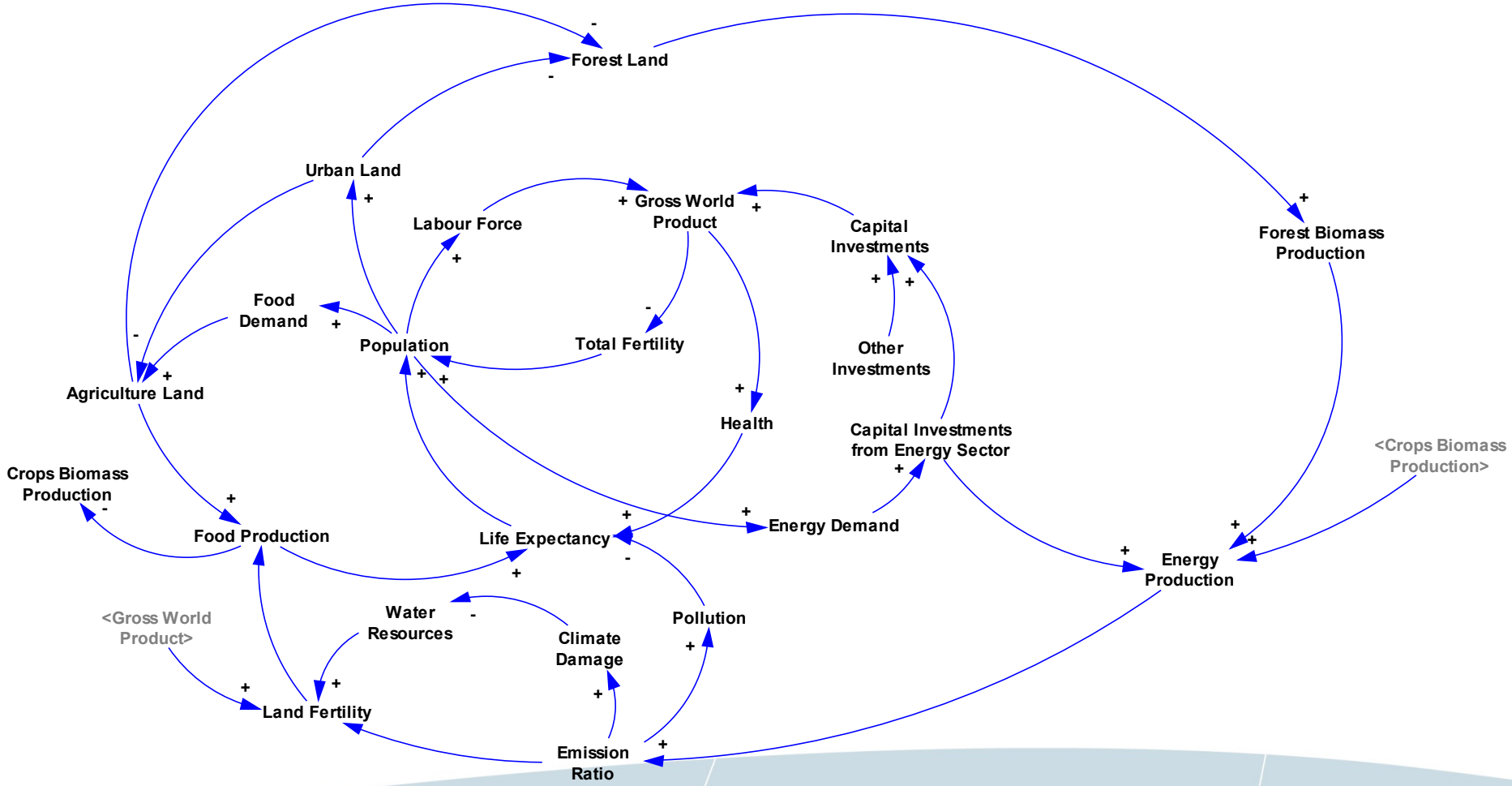

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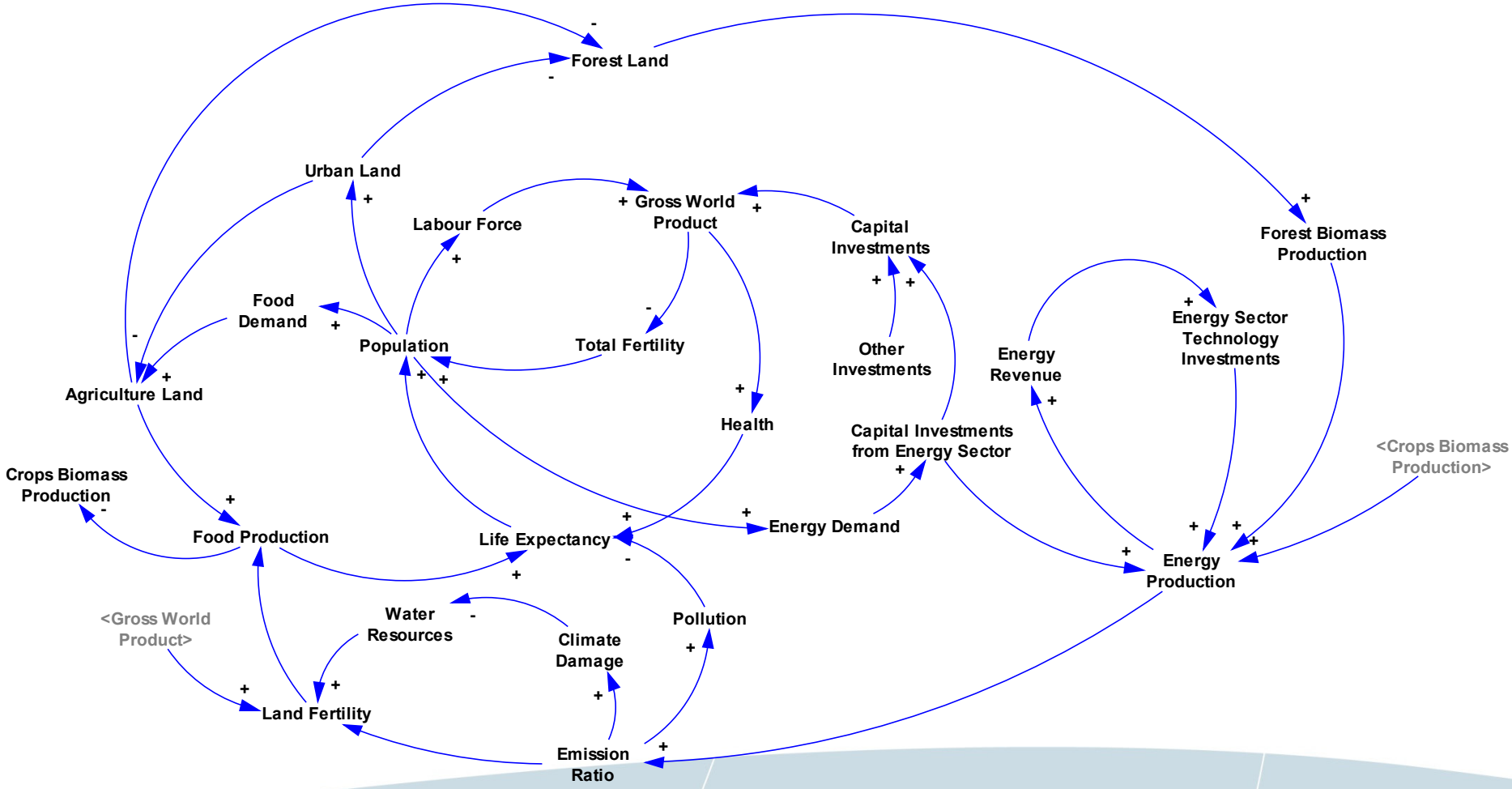

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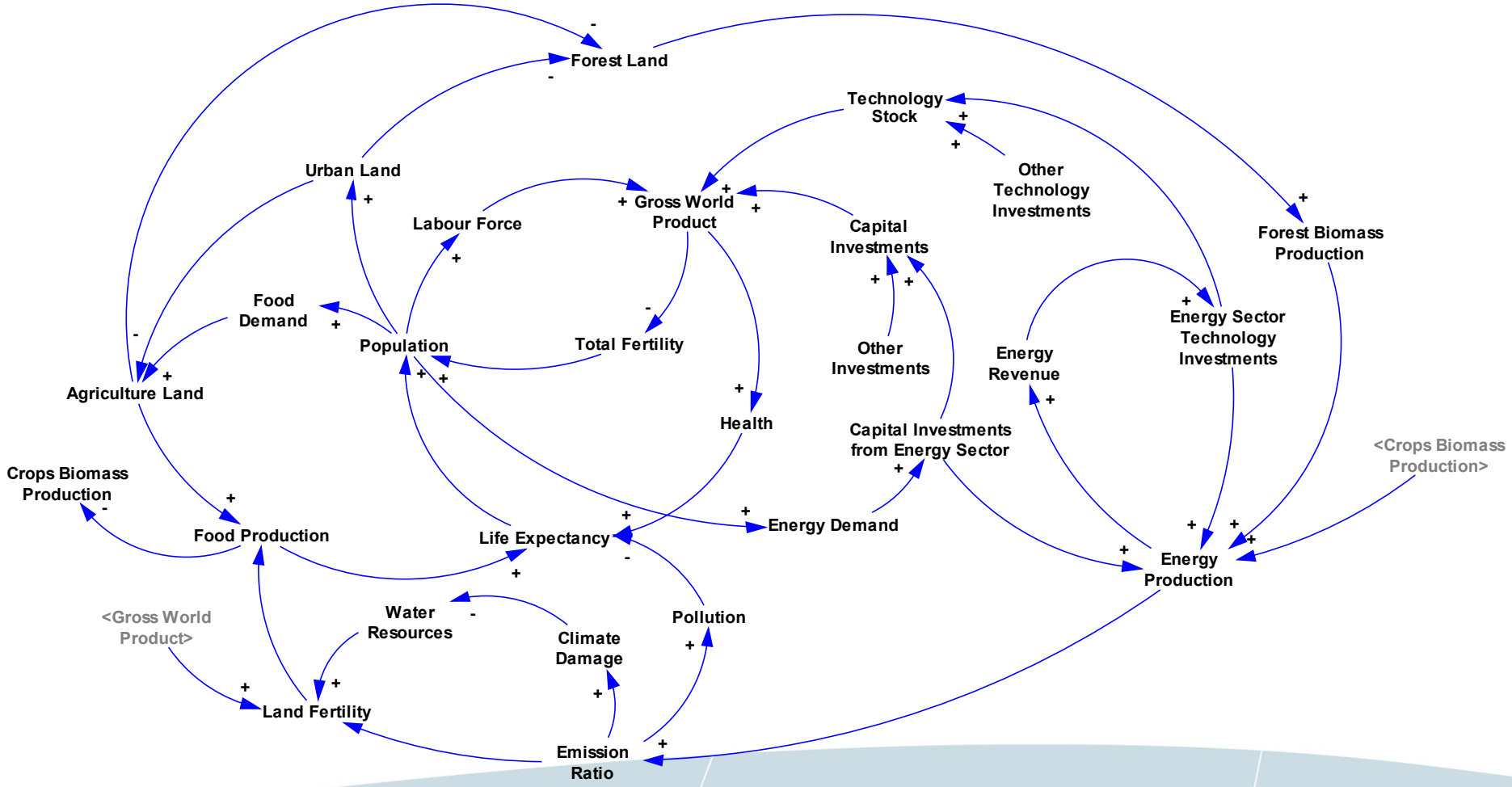

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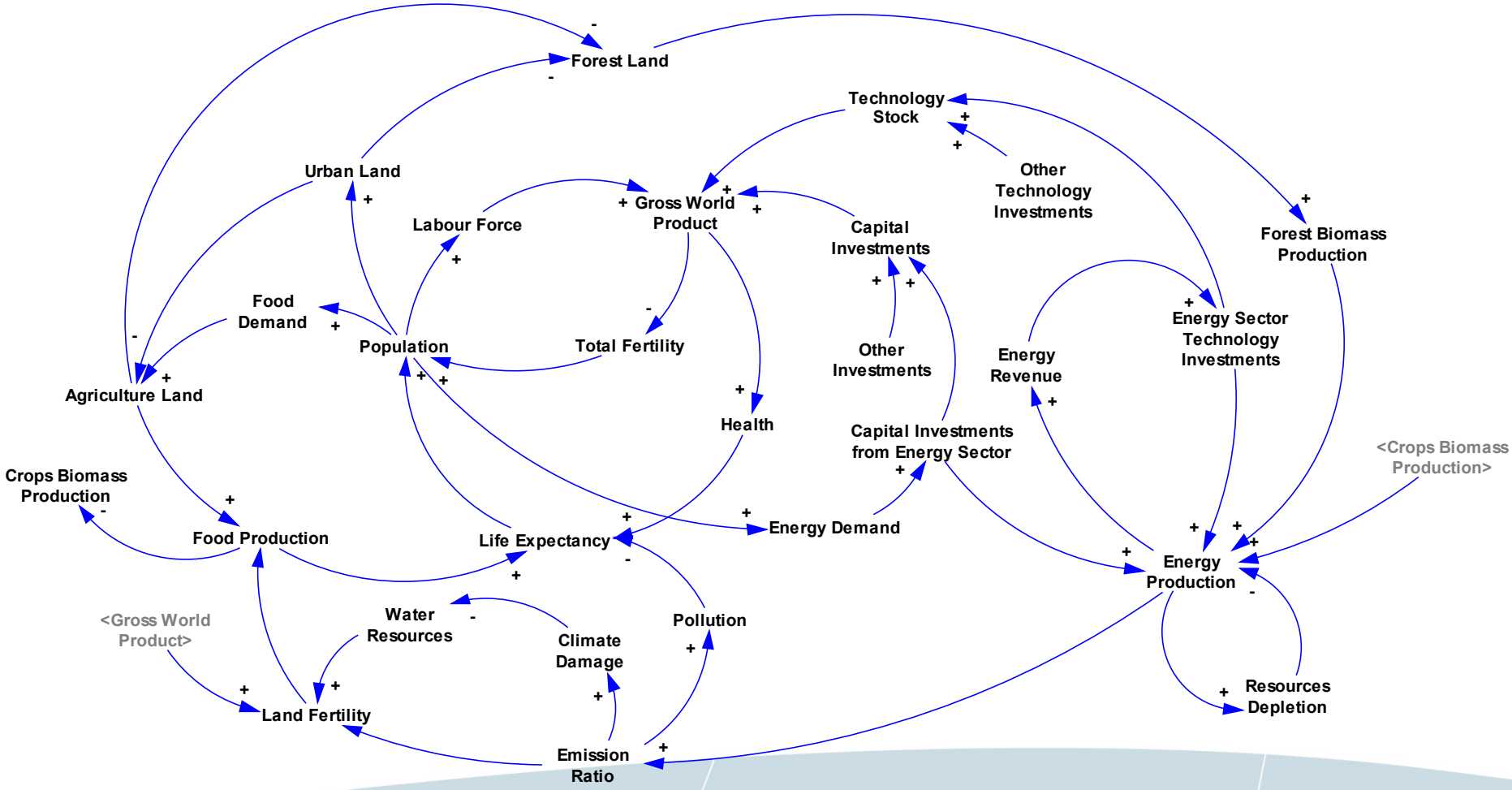
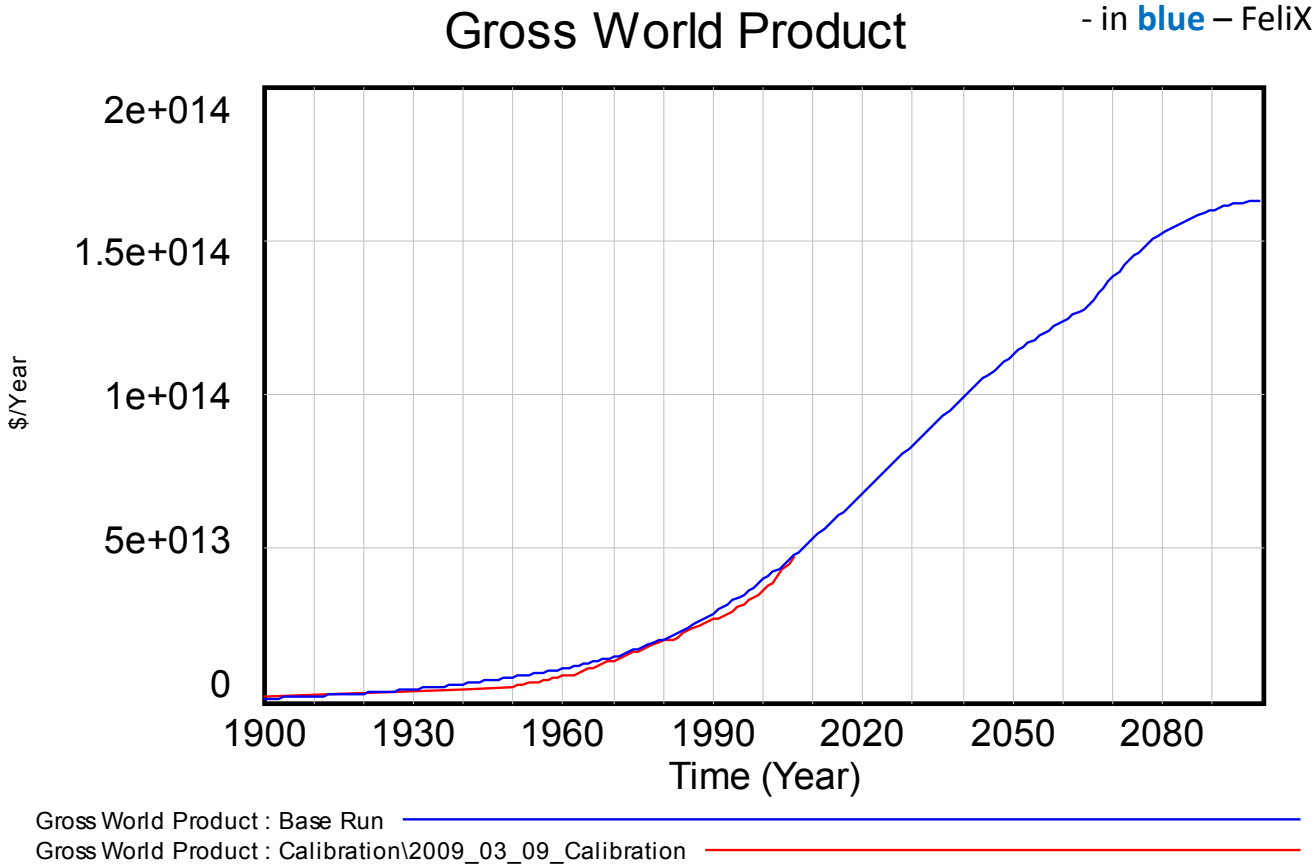


Modeling process

- Information from other models, case studies, reports
- Group Model Building sessions with SME
- Nine model sectors: Economy, Energy, CO2 Emissions, Carbon Cycle, Climate & Environment, Population, Technology, Land, Energy and the Global Earth Observation System of Systems (GEOSS)
- Social Benefits Areas (SBAs) are inherently embedded into the model structure.
- Calibration to historical data (over a period of a century – subject to data availability).

Economy Sector

- in **red** – historical data
- in **blue** – FeliX model Base Run



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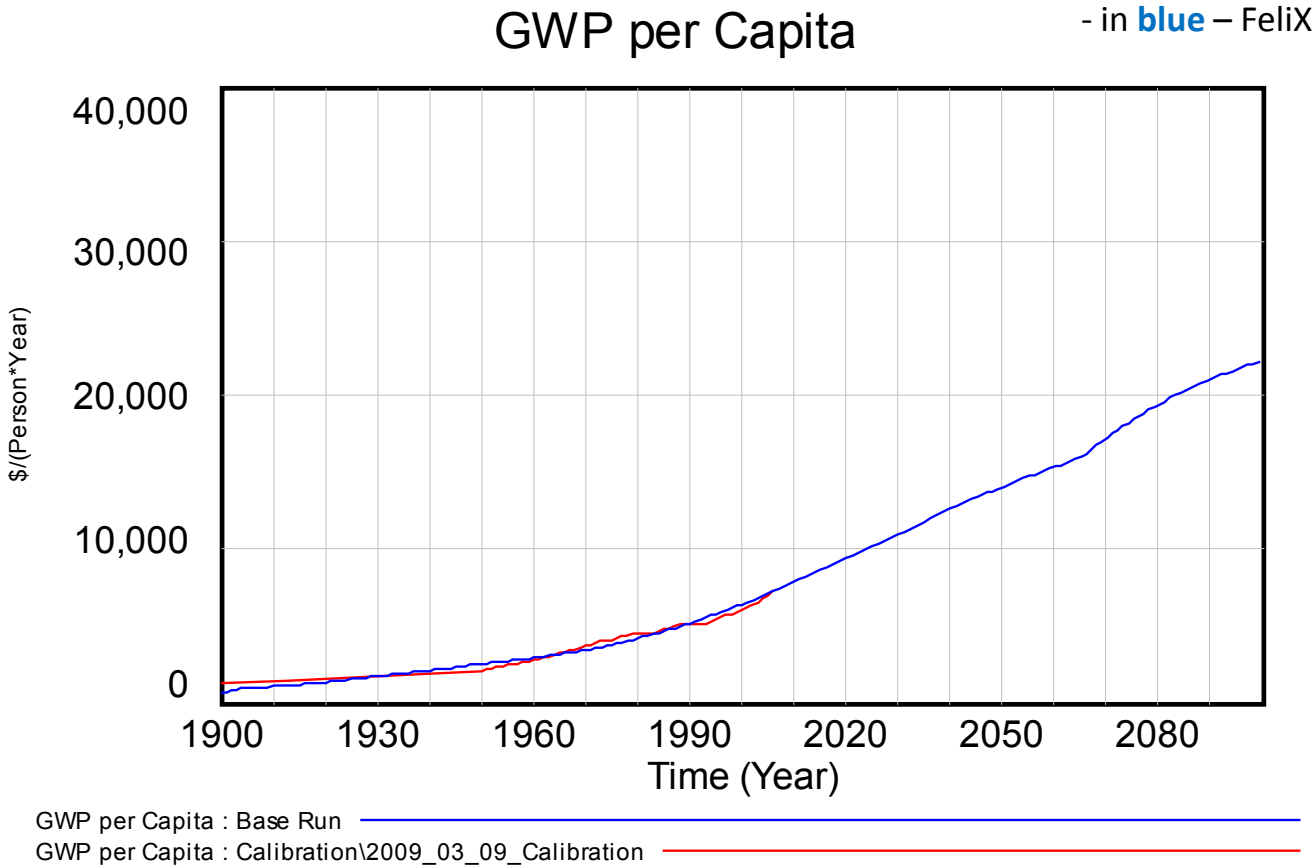

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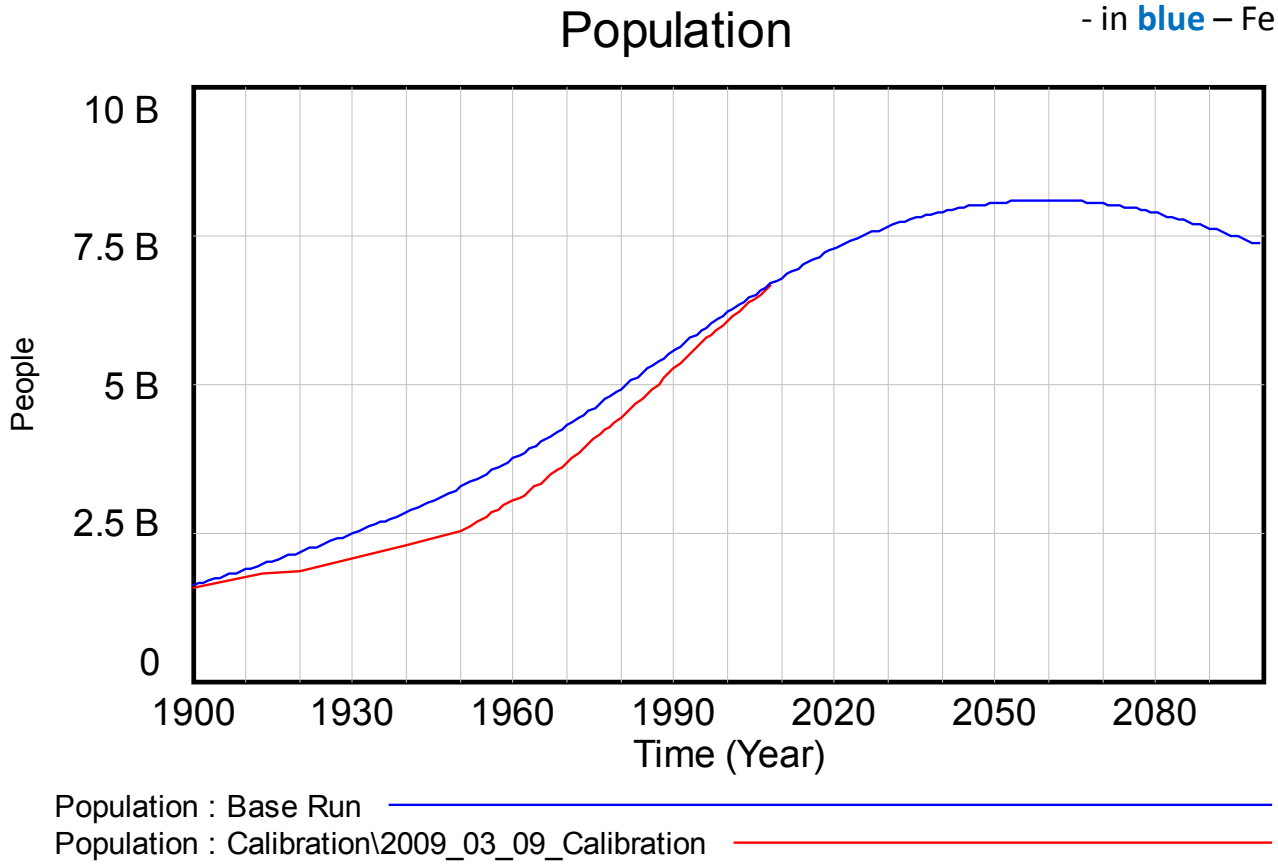

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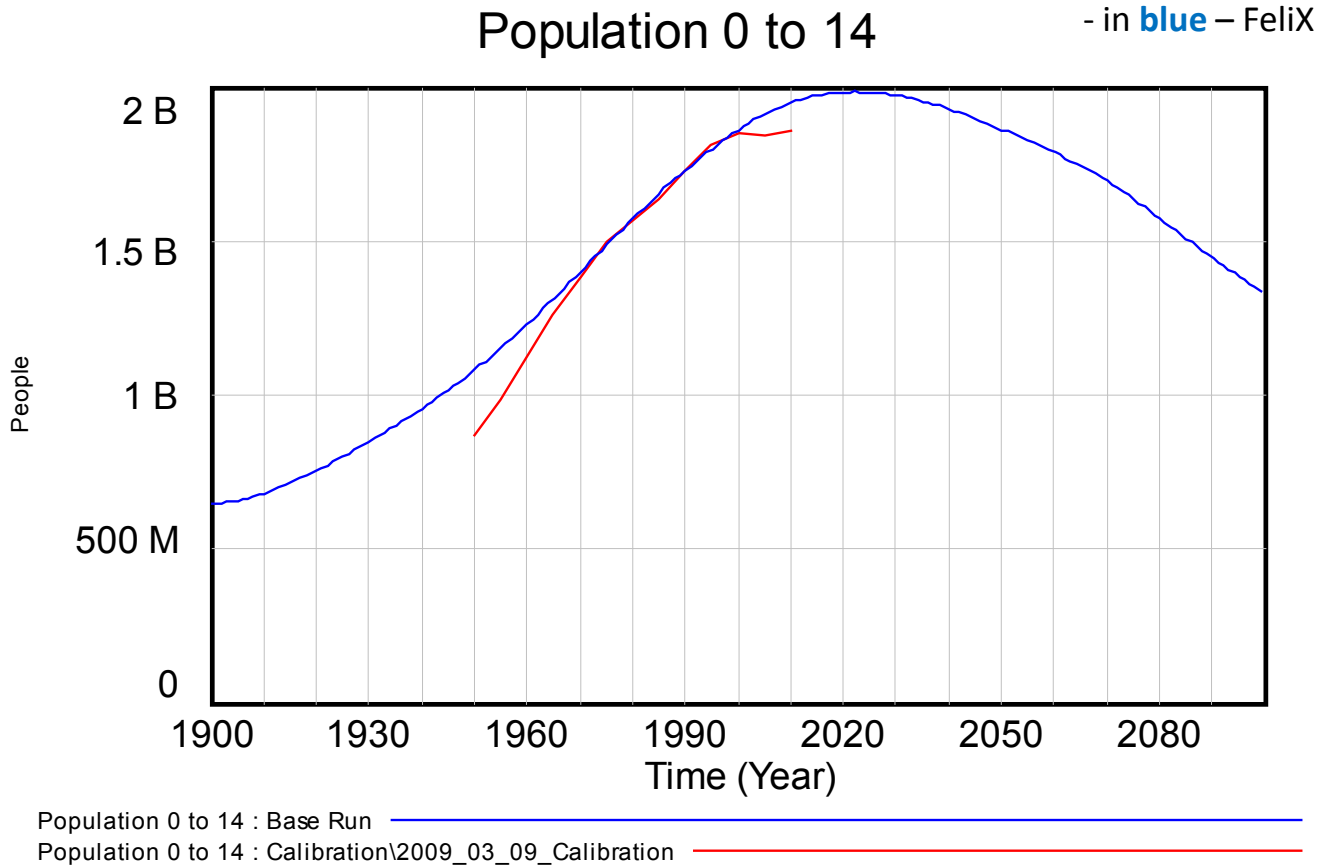

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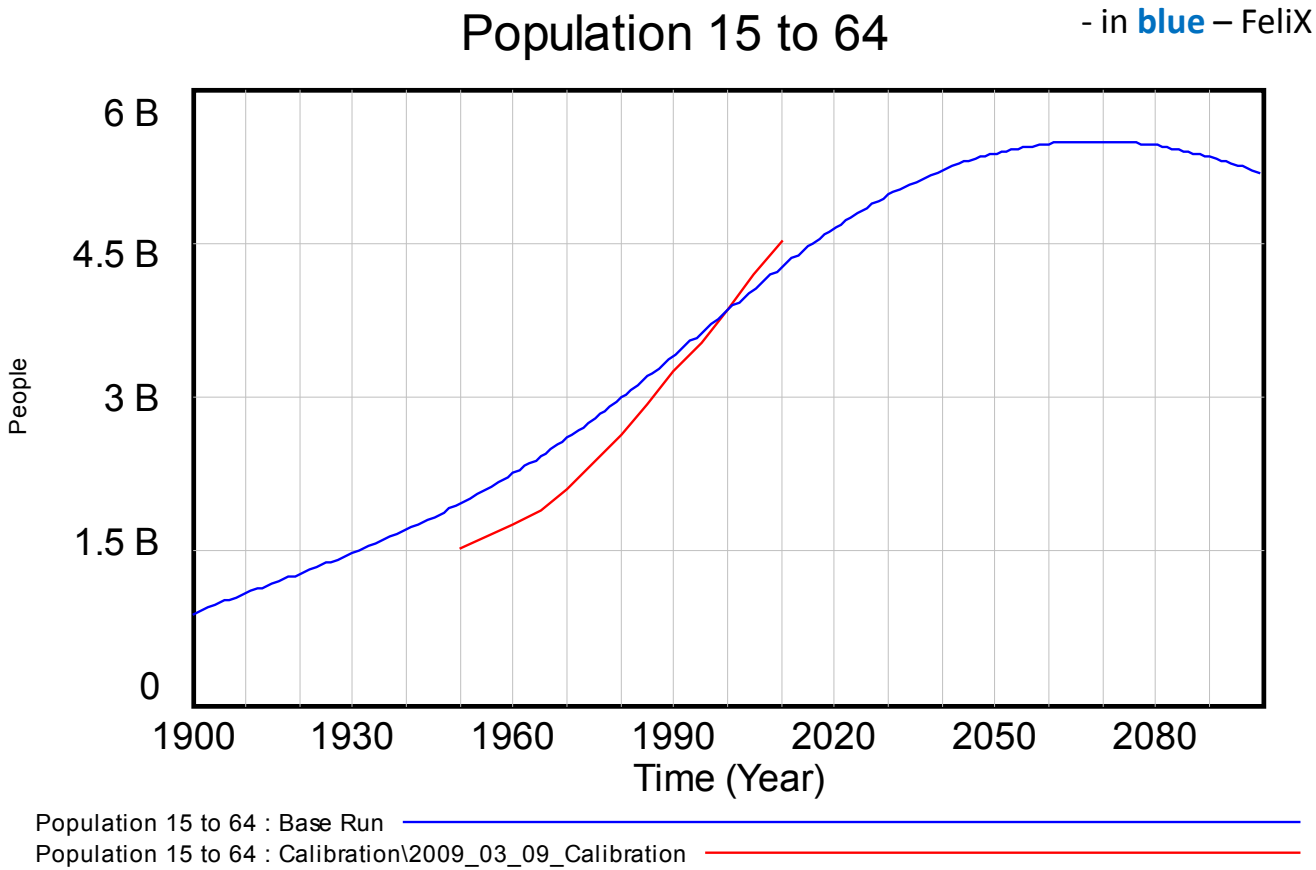

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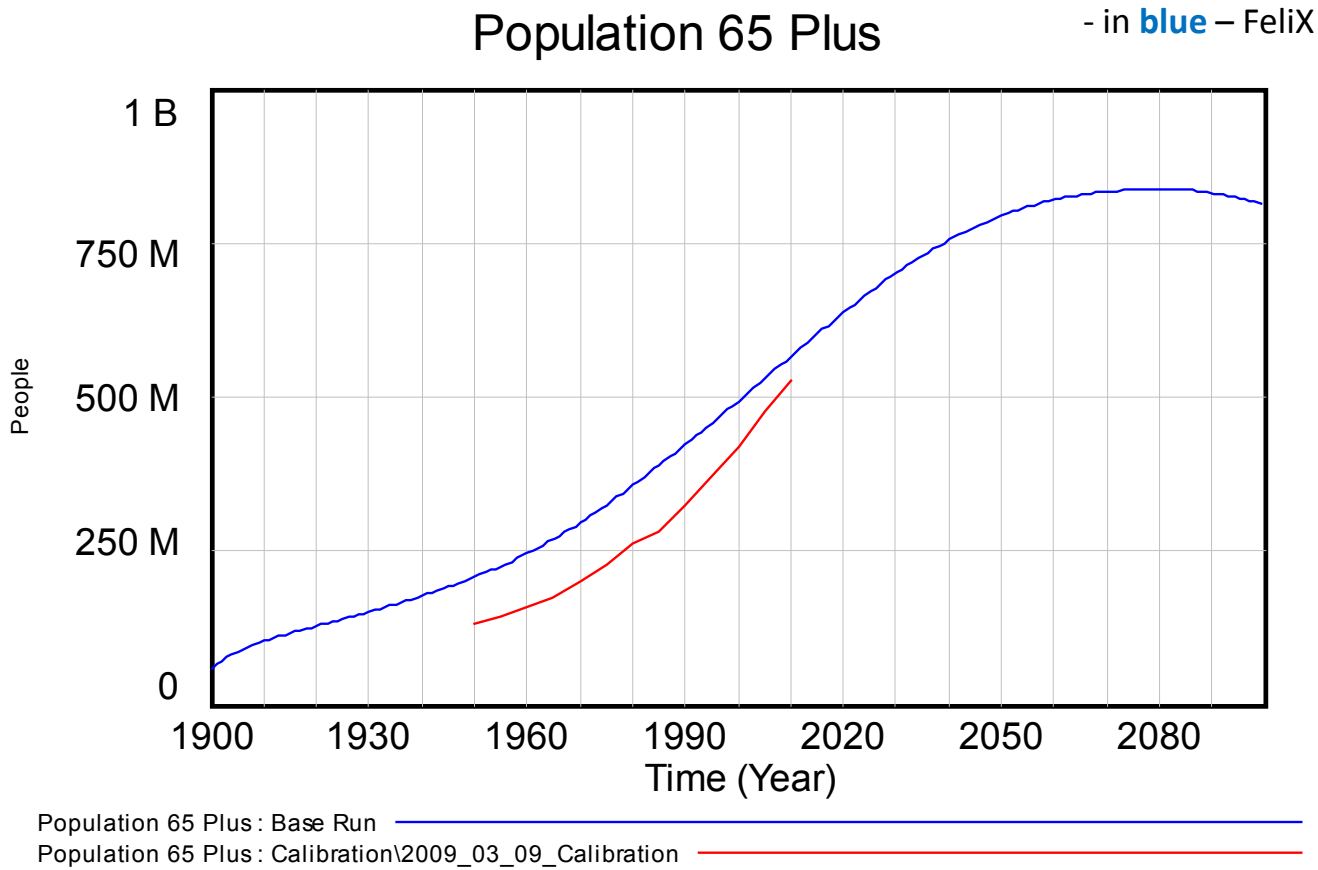

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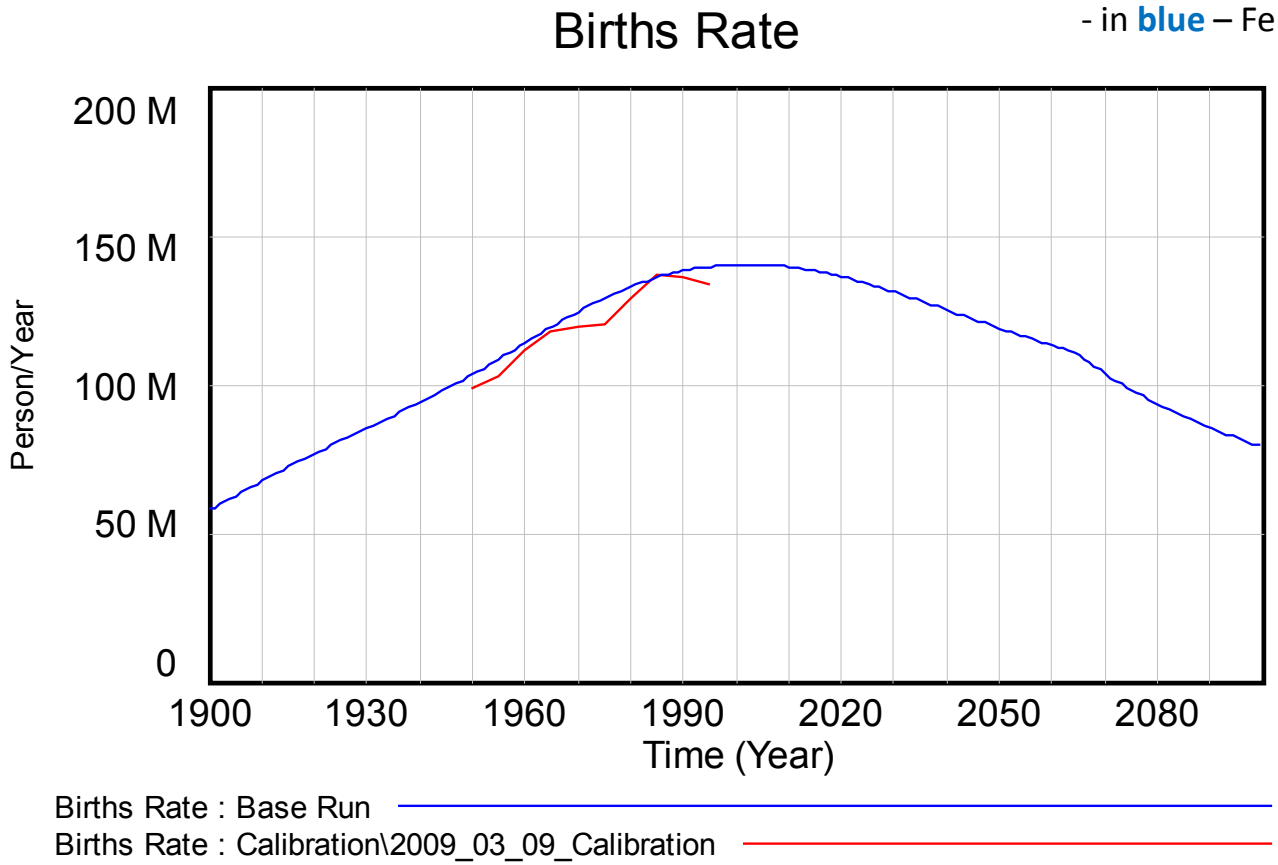

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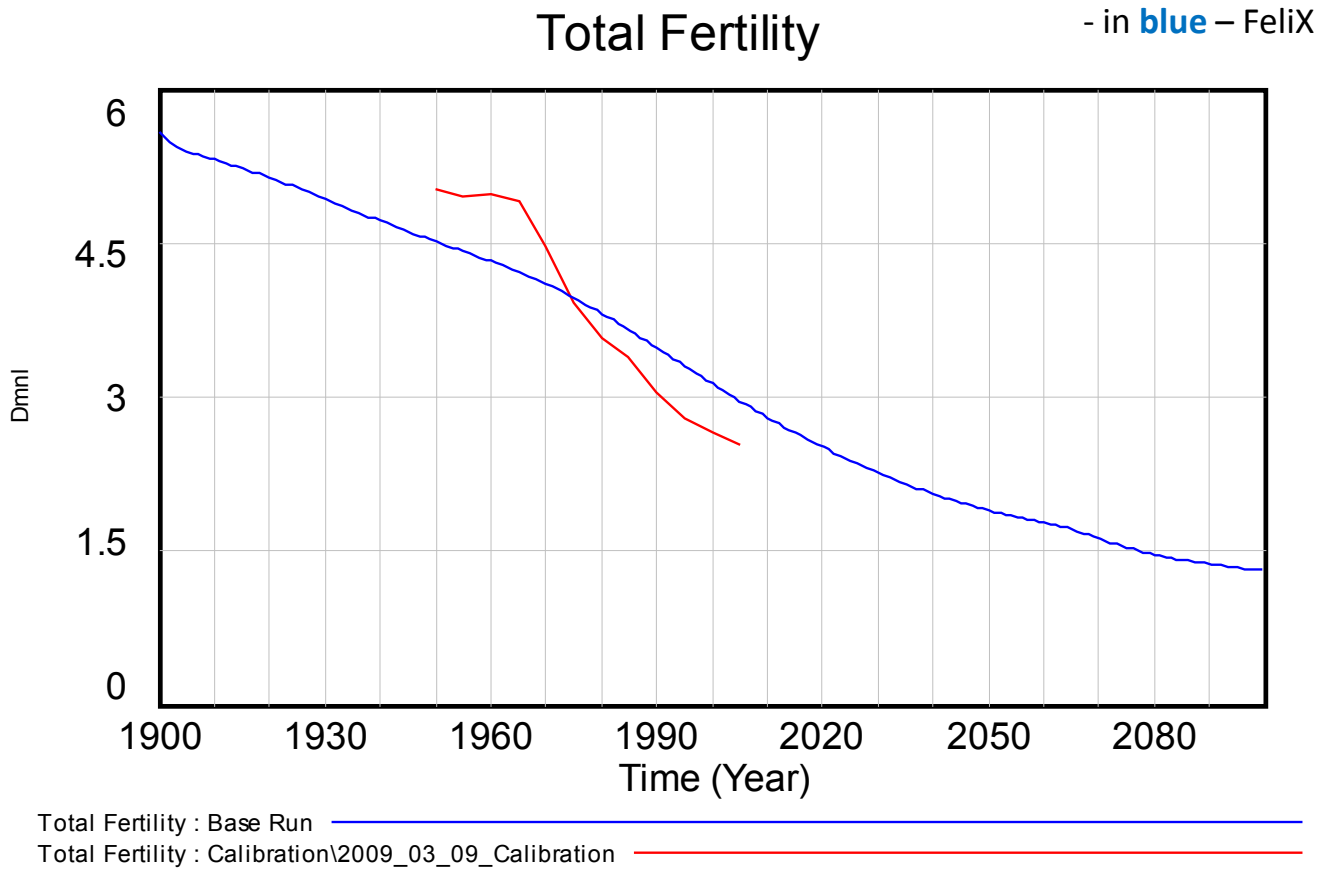

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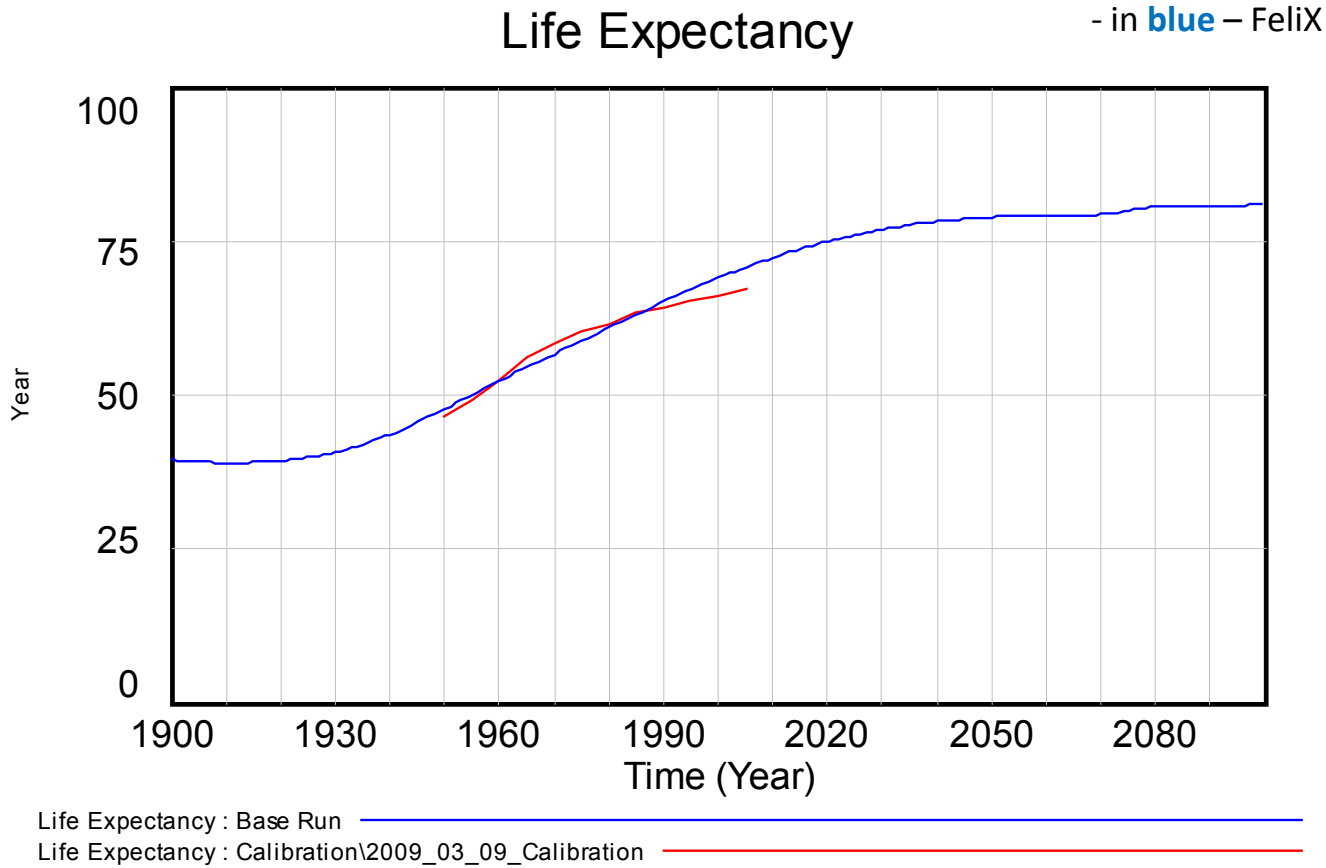

Energy Sector

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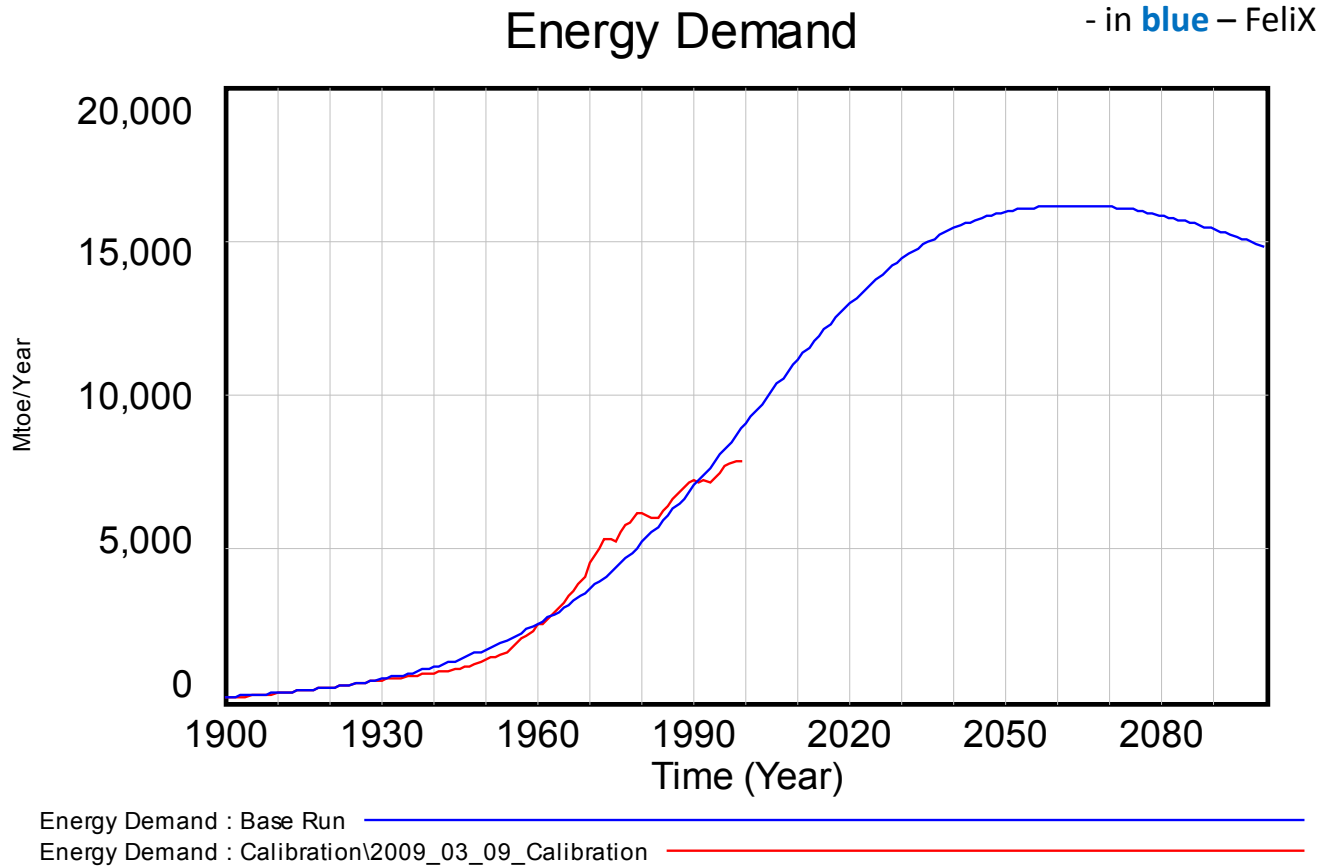

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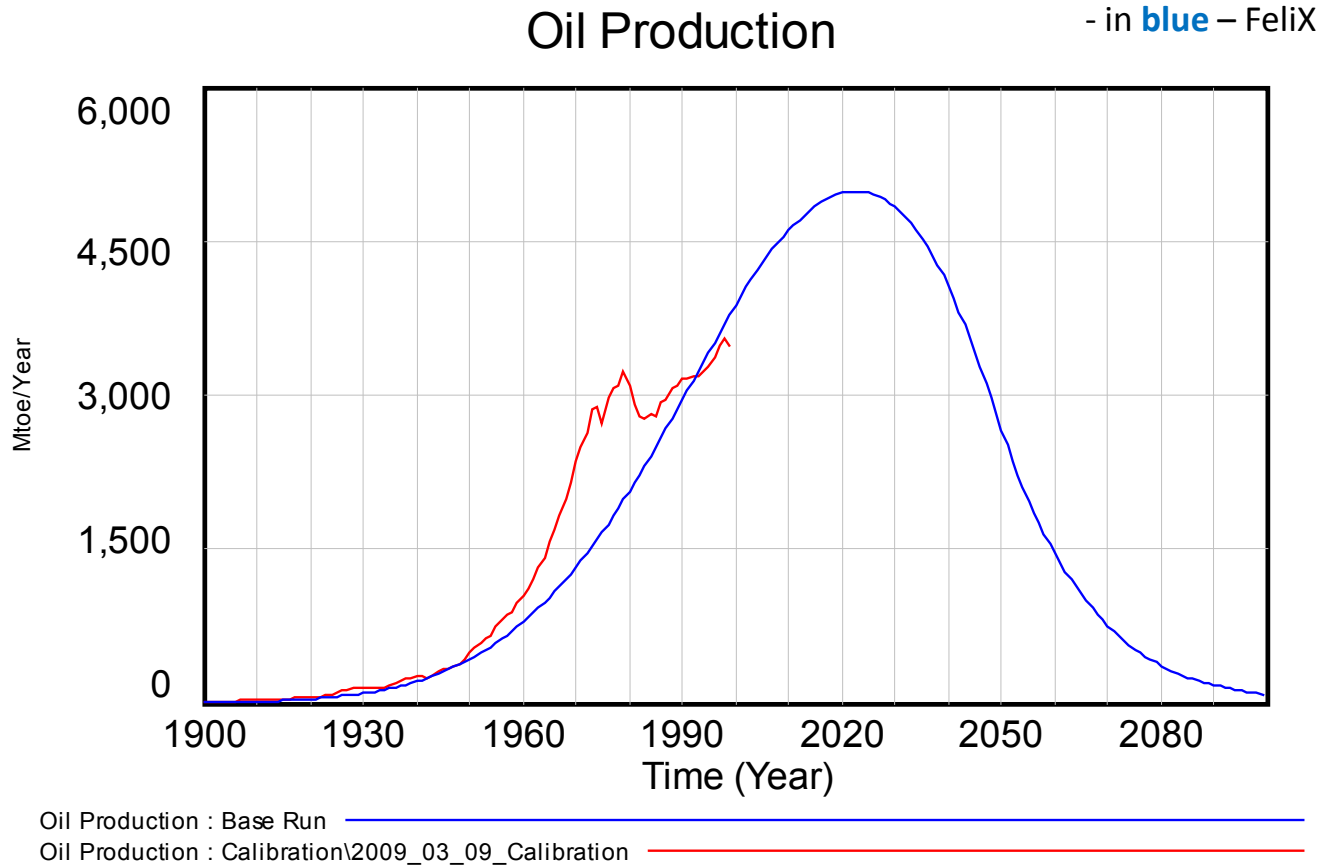

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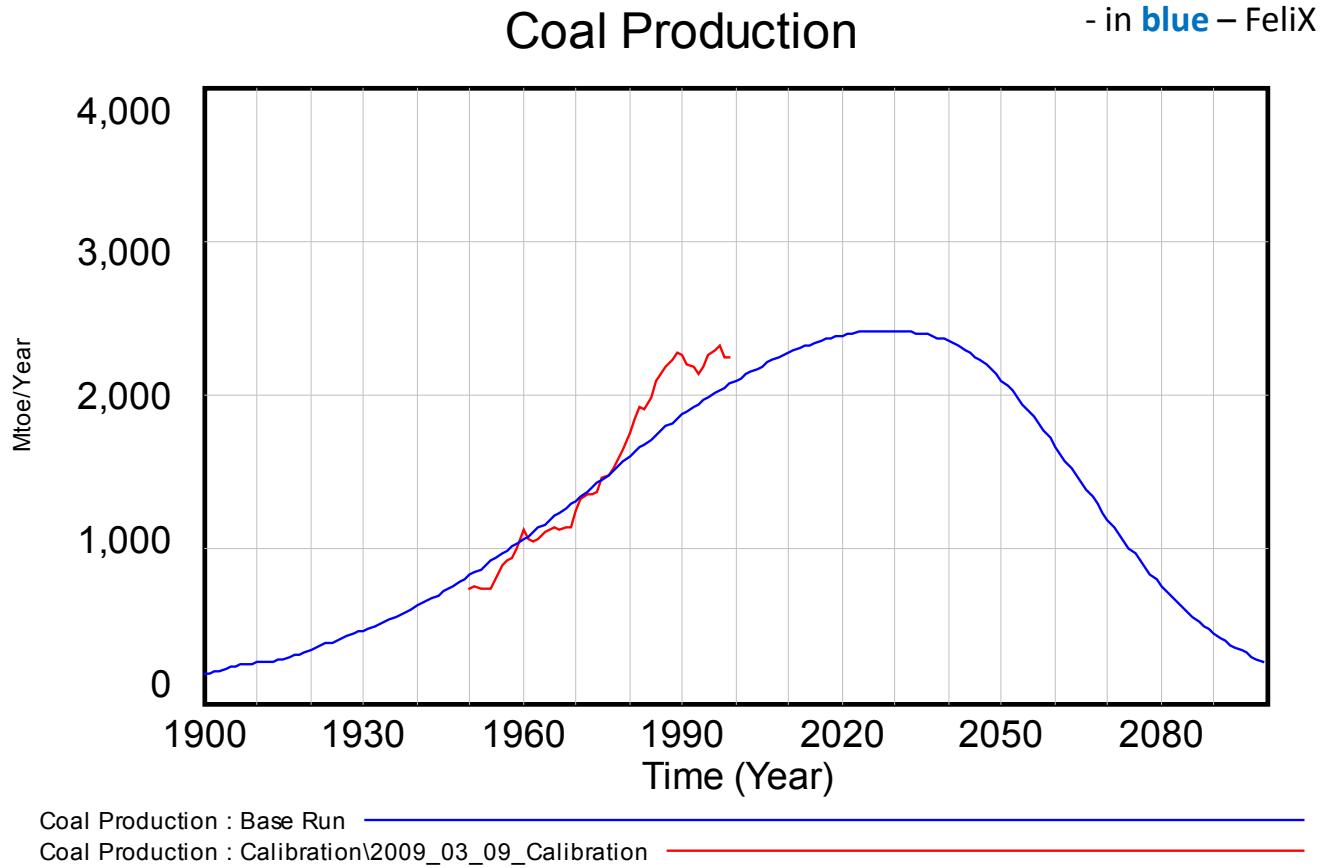

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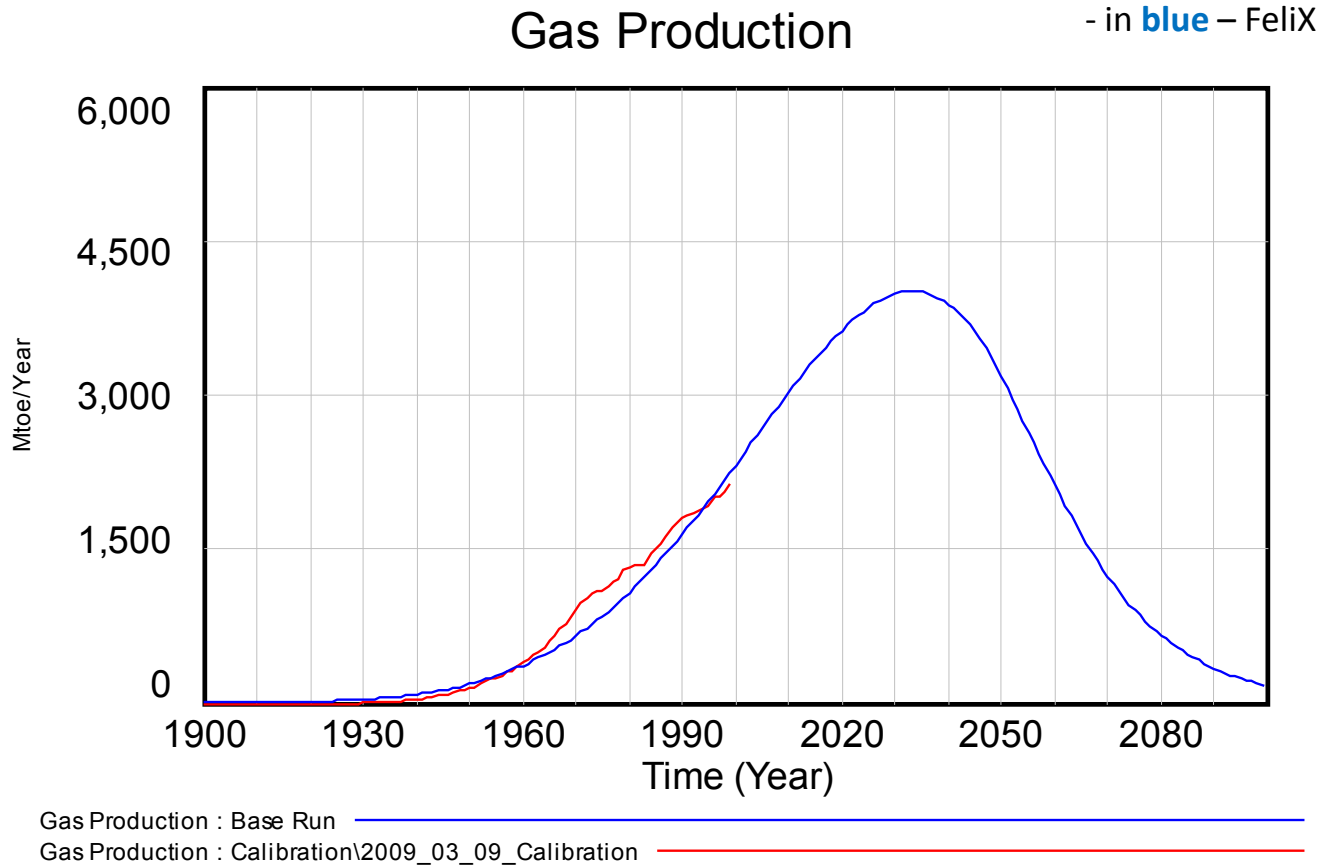

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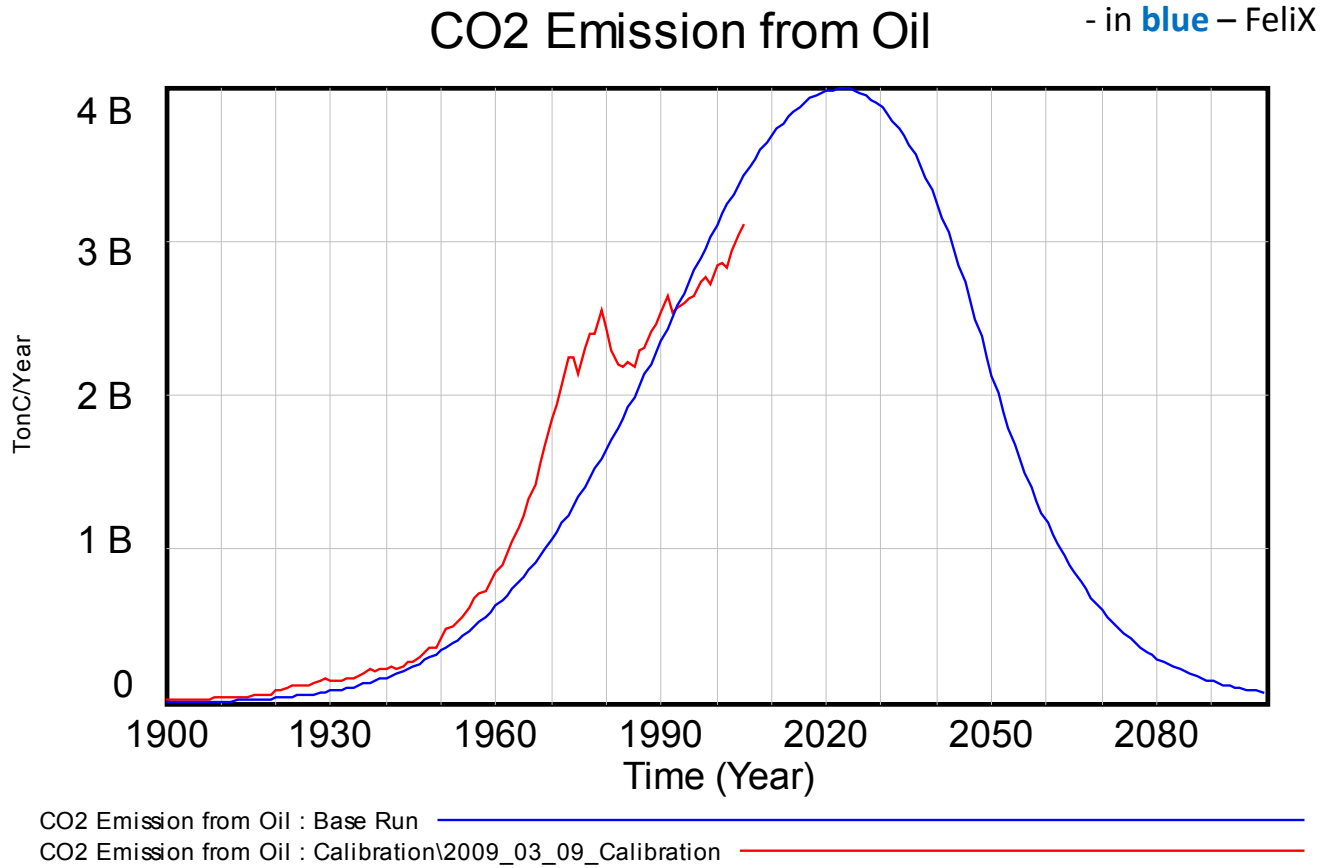

Carbon Cycle Sector

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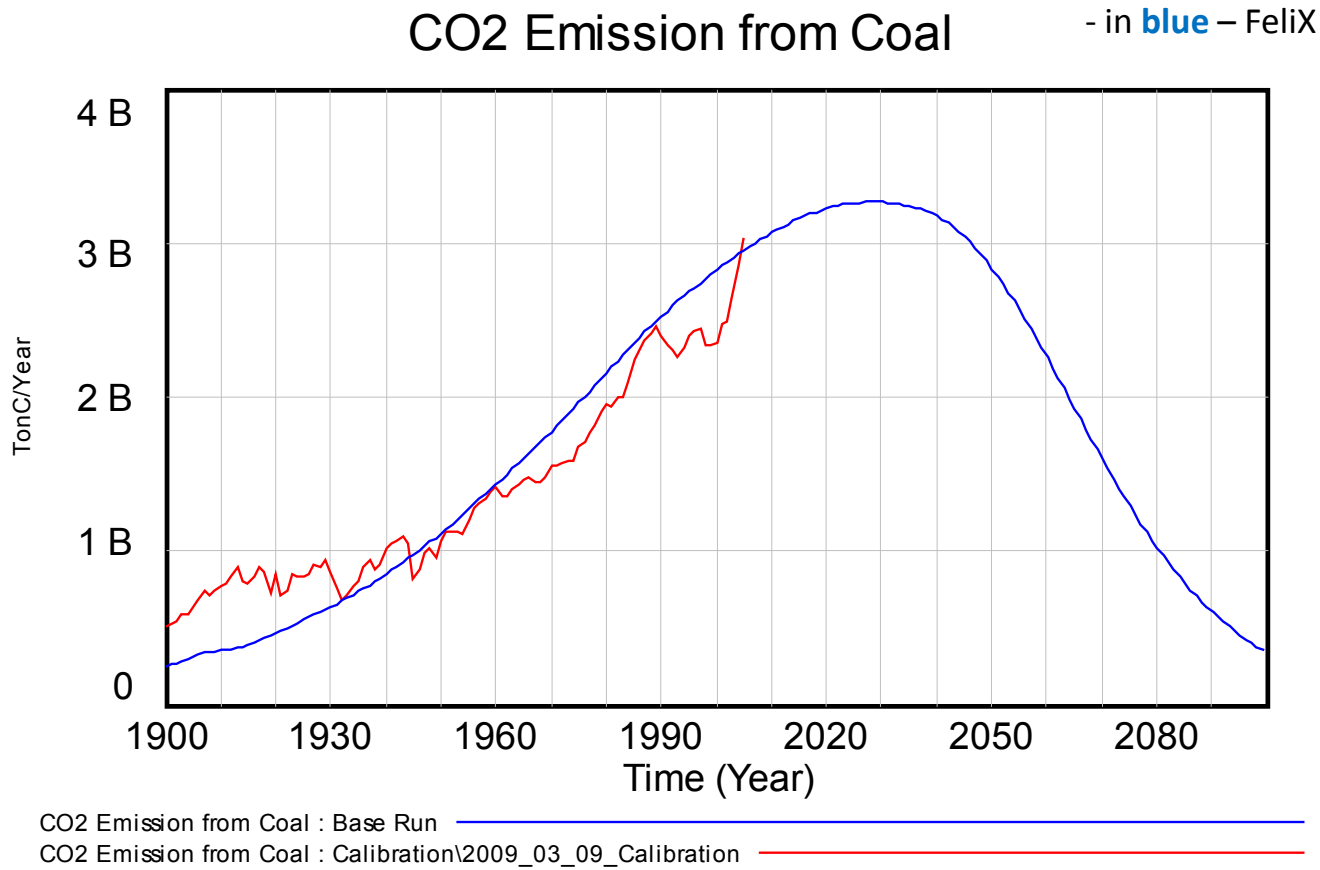

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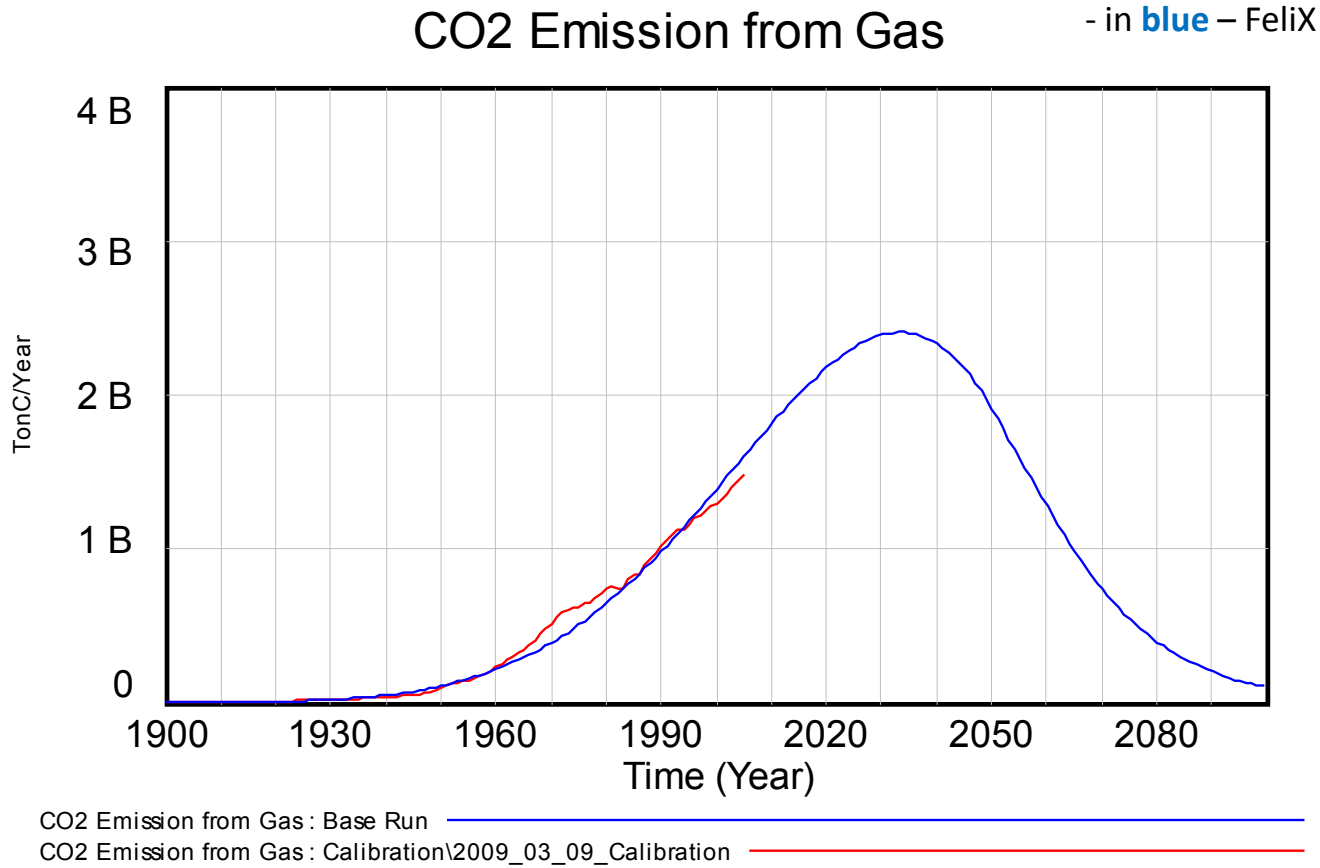

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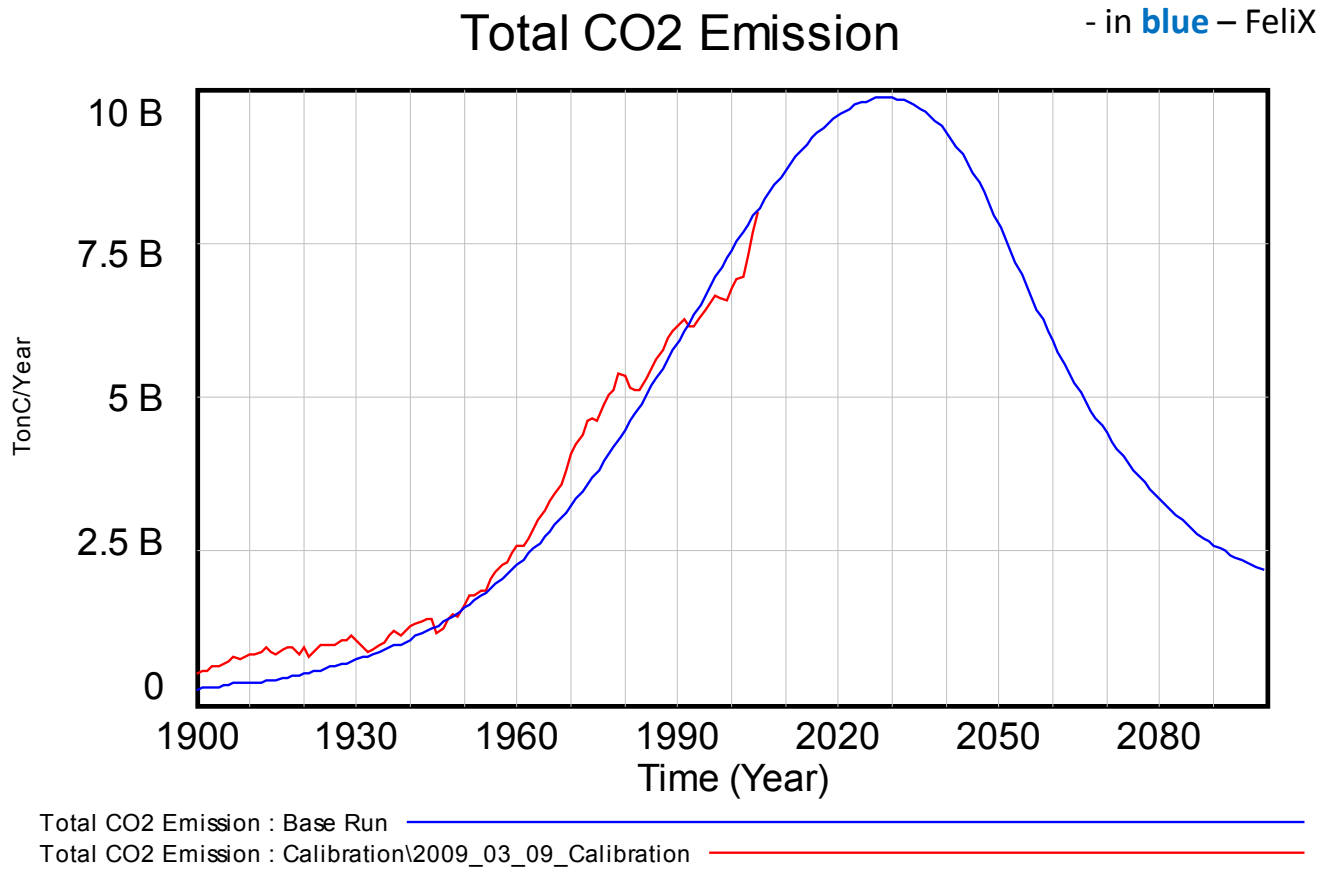

Land Use Sector

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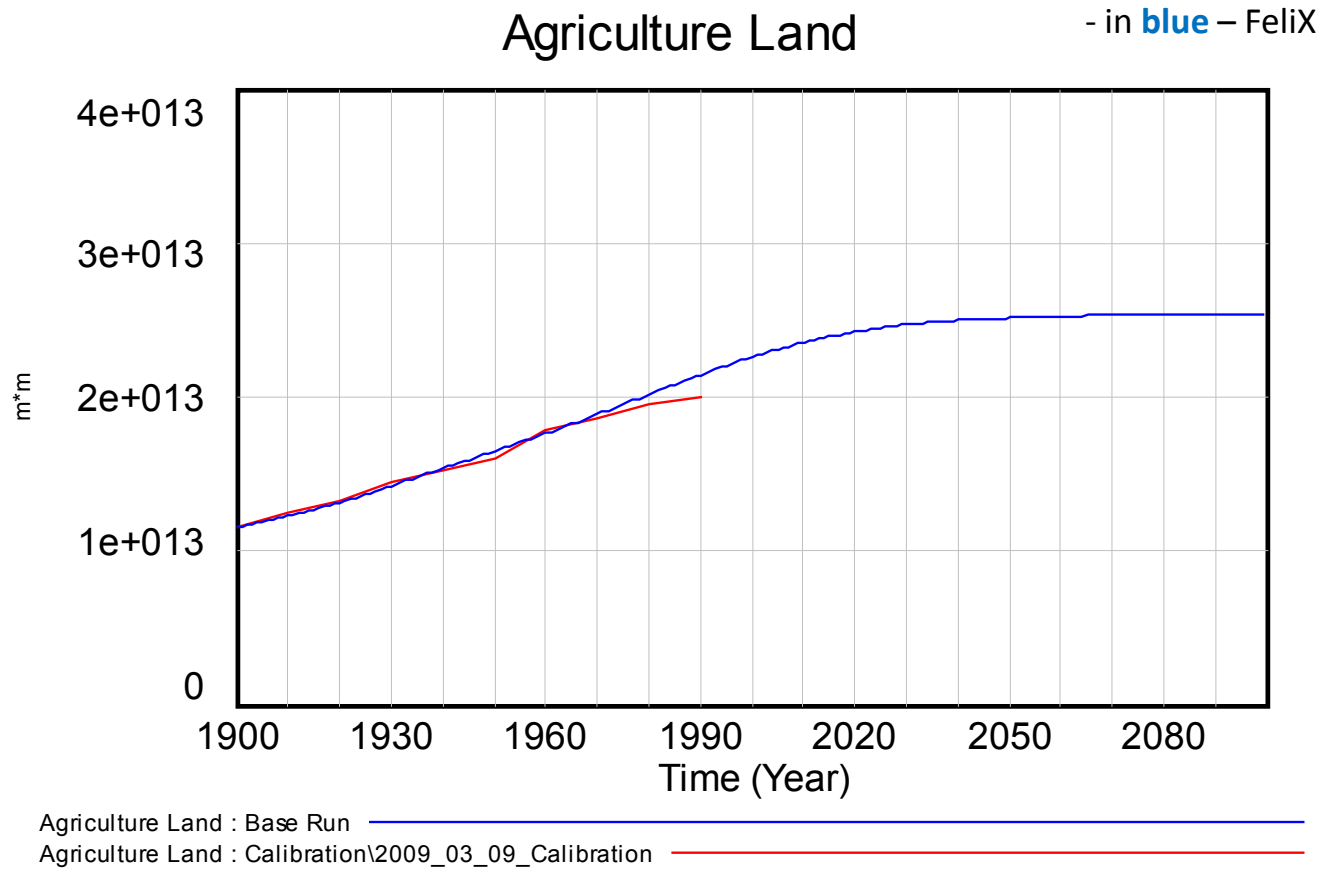

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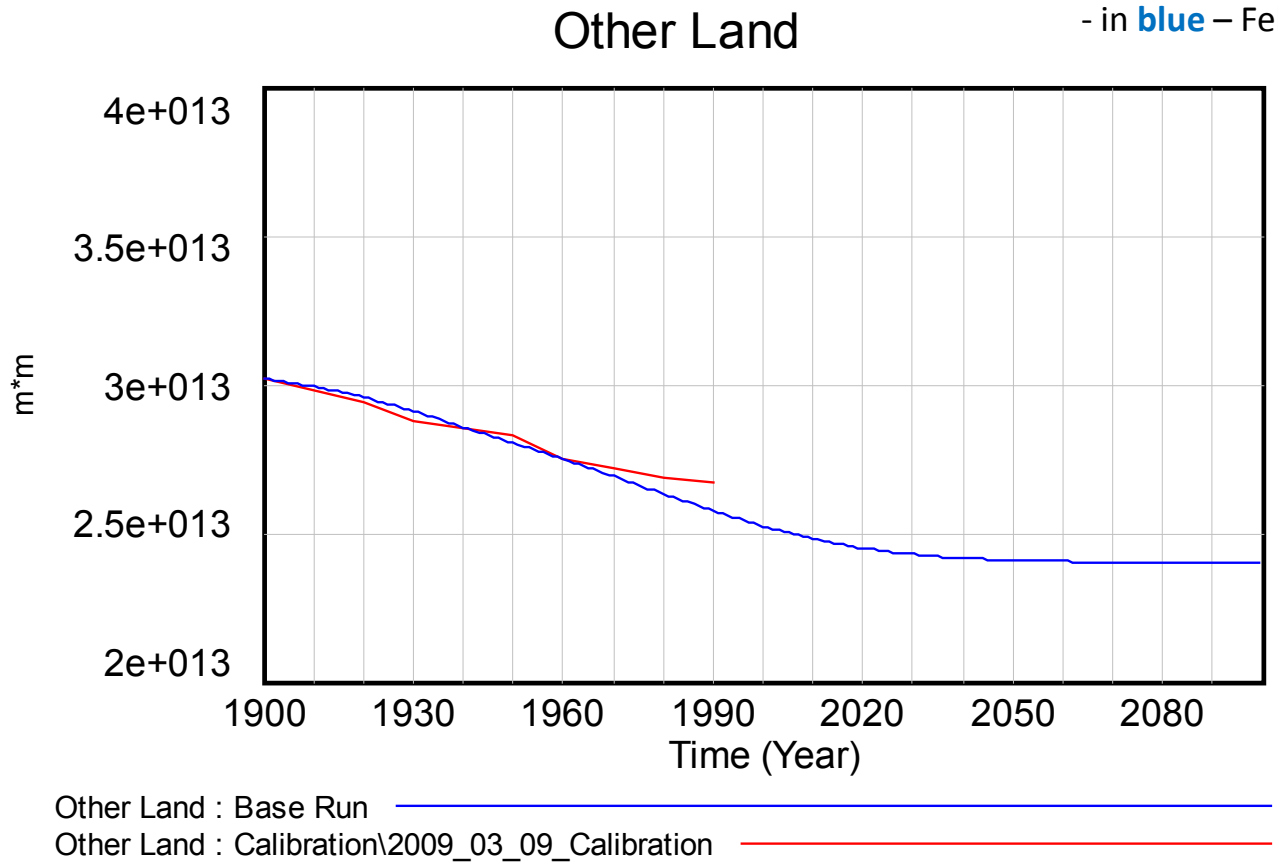

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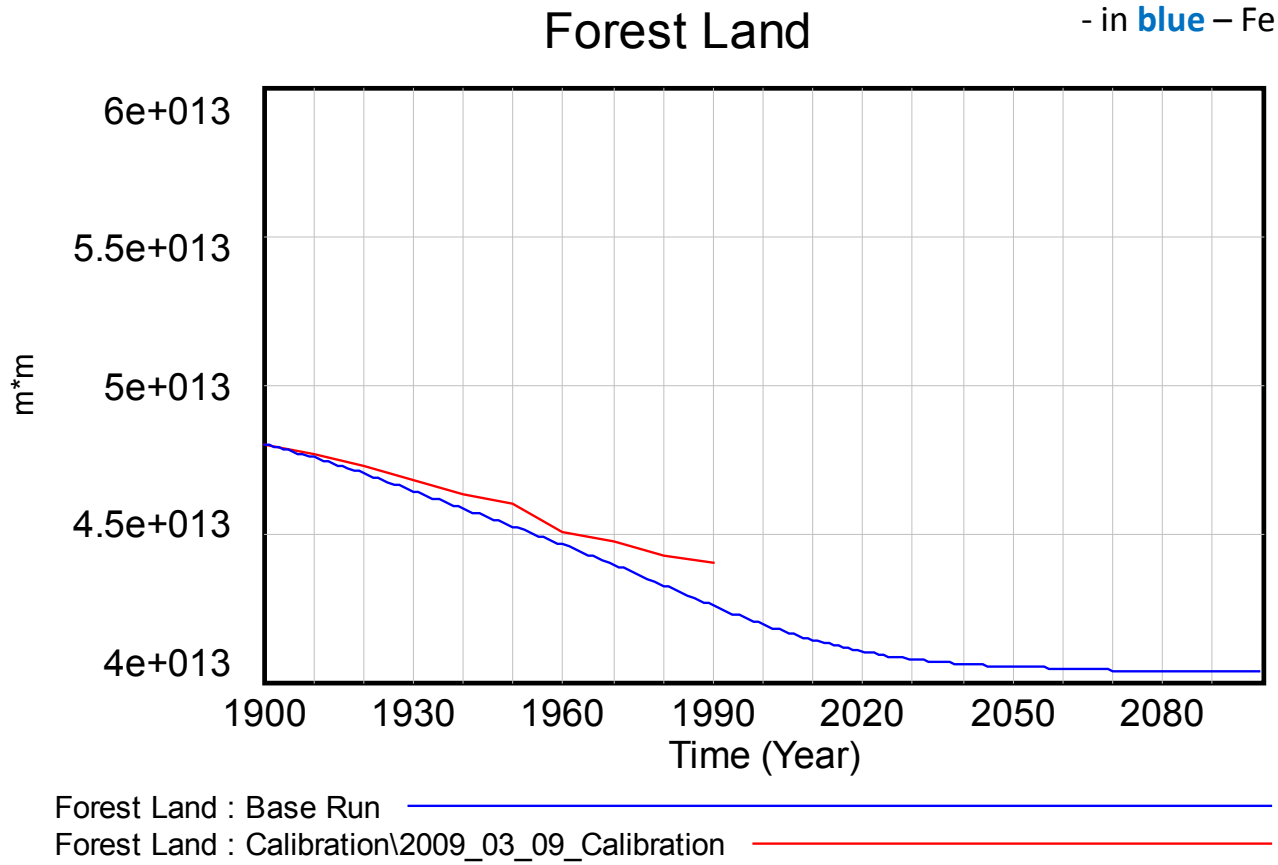
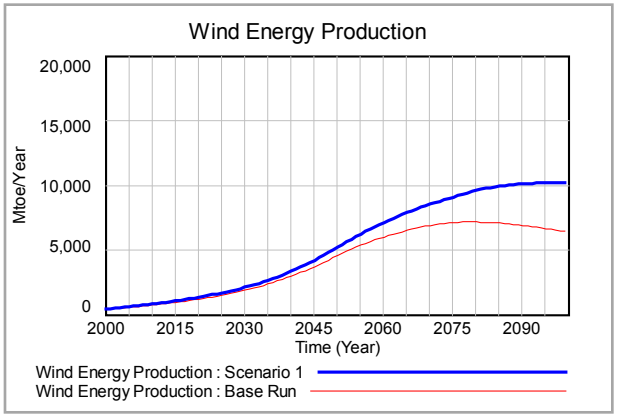
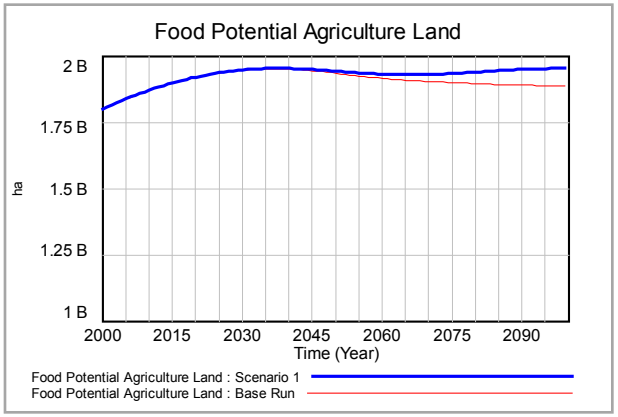
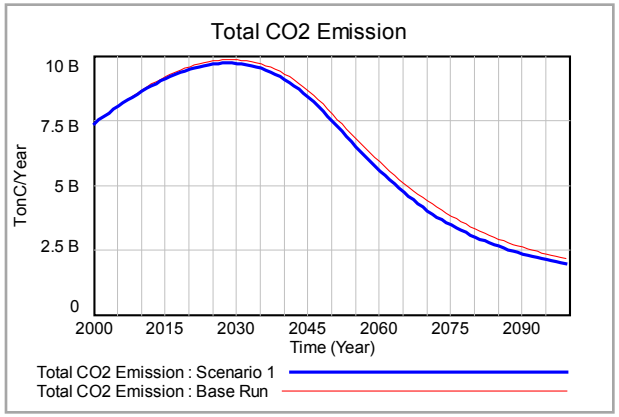


Energy Scenario

GEOSS through discovery of ***additional*** or more ***appropriate*** locations for wind energy installations, as far as available area and weather conditions are concerned, leads to a greater competitiveness of this energy source.





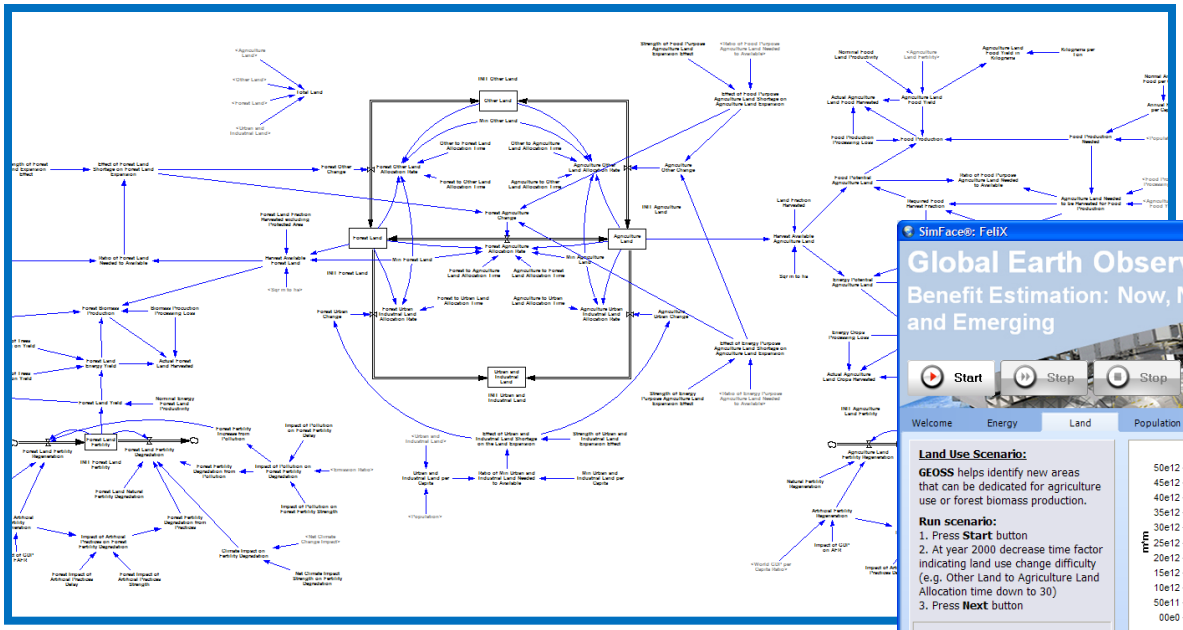


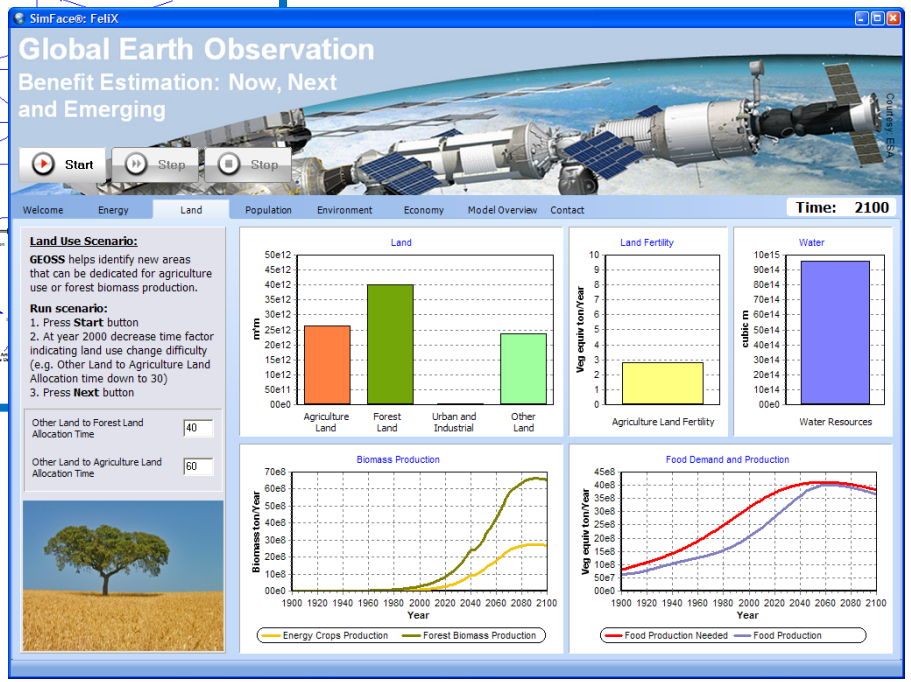
Wind Energy Market Share
Non-GEOSS scenario → 43%
GEOSS Scenario → 68%

67,242,112 ha saved for food production.
Note: at that time the energy is produced from biomass, solar and wind (nonrenewables constitute only about 2%)

About **15 billions TonsC** less in the atmosphere in case of GEOSS scenario compared to non-GEOSS scenario over the considered period.

Model vs. Simulator





- User friendly!
- Pre-defined GEOSS scenarios

- Access to code
- Freedom to design of specific simulation experiments
- The whole model overview

but

- Requires specific modeling skills