IAM COMPACT

Expanding Integrated Assessment Modelling:
Comprehensive and Comprehensible Science
for Sustainable, Co-Created Climate Action

IAM COMPACT Modelling Seminars

Model Presentation: MEDEAS & WILIAM

Group of Energy, Economy and Systems Dynamics (GEEDS), University of Valladolid

The IAM COMPACT project has received funding from the European Union's Horizon Europe Research and Innovation Programme under grant agreement No 101056306.

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- Developed within the framework of European projects:
  - MEDEAS. Guiding European Policy towards a low carbon economy. Modelling Energy system Development under Environmental and Socioeconomic constraints. H2020-LCE-2015-2 (691287)
  - LOCOMOTION. Low-carbon society: an enhanced modelling tool for the transition to sustainability. H2020-LC-CLA-01-2018 (821105). Still in development. It will end in November 2023!
- Developed with the system dynamics methodology, but includes IOT representation for economics.
- Developed with Vensim DSS software and later translated to Python.

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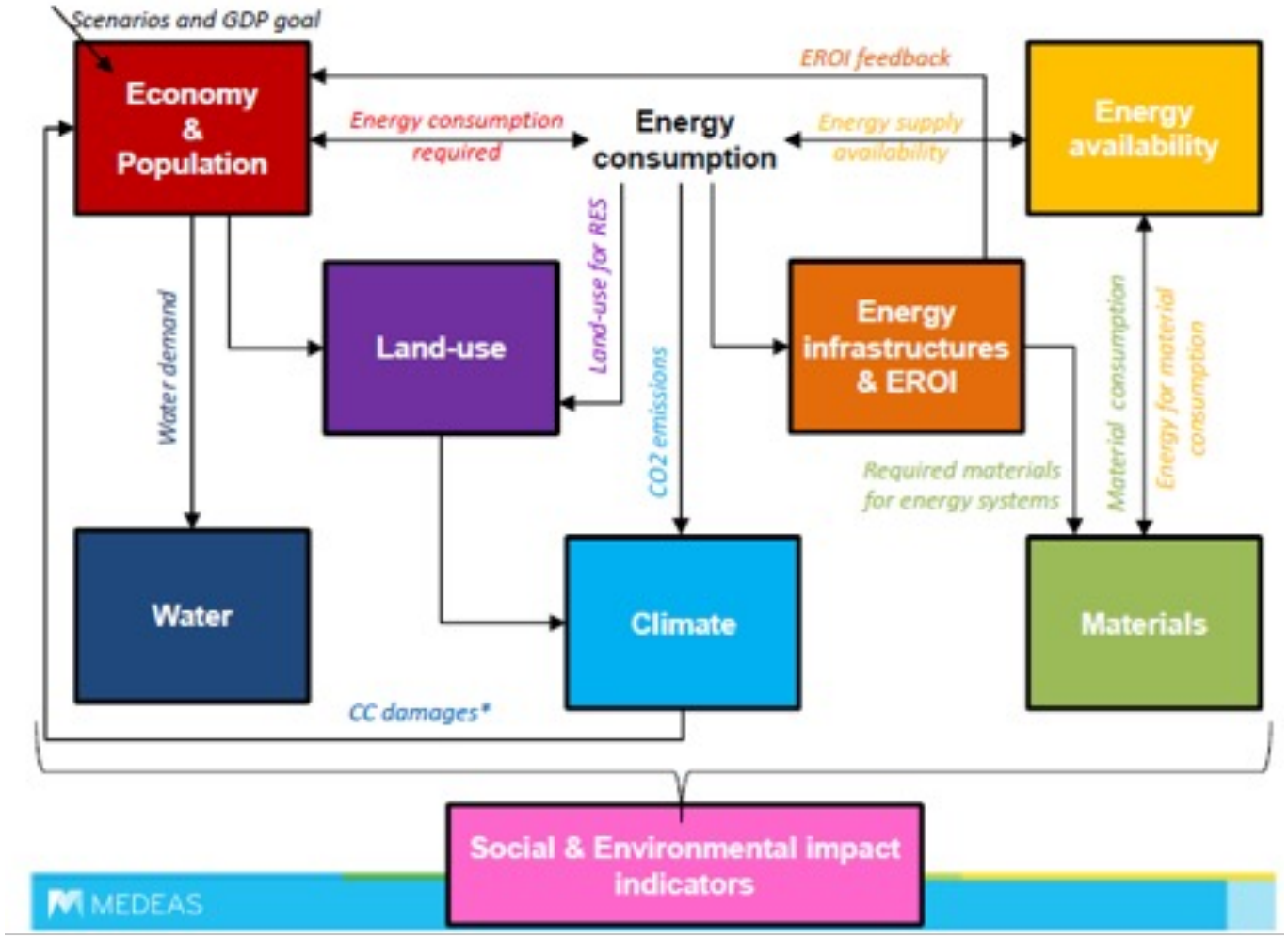
What does MEDEAS do?



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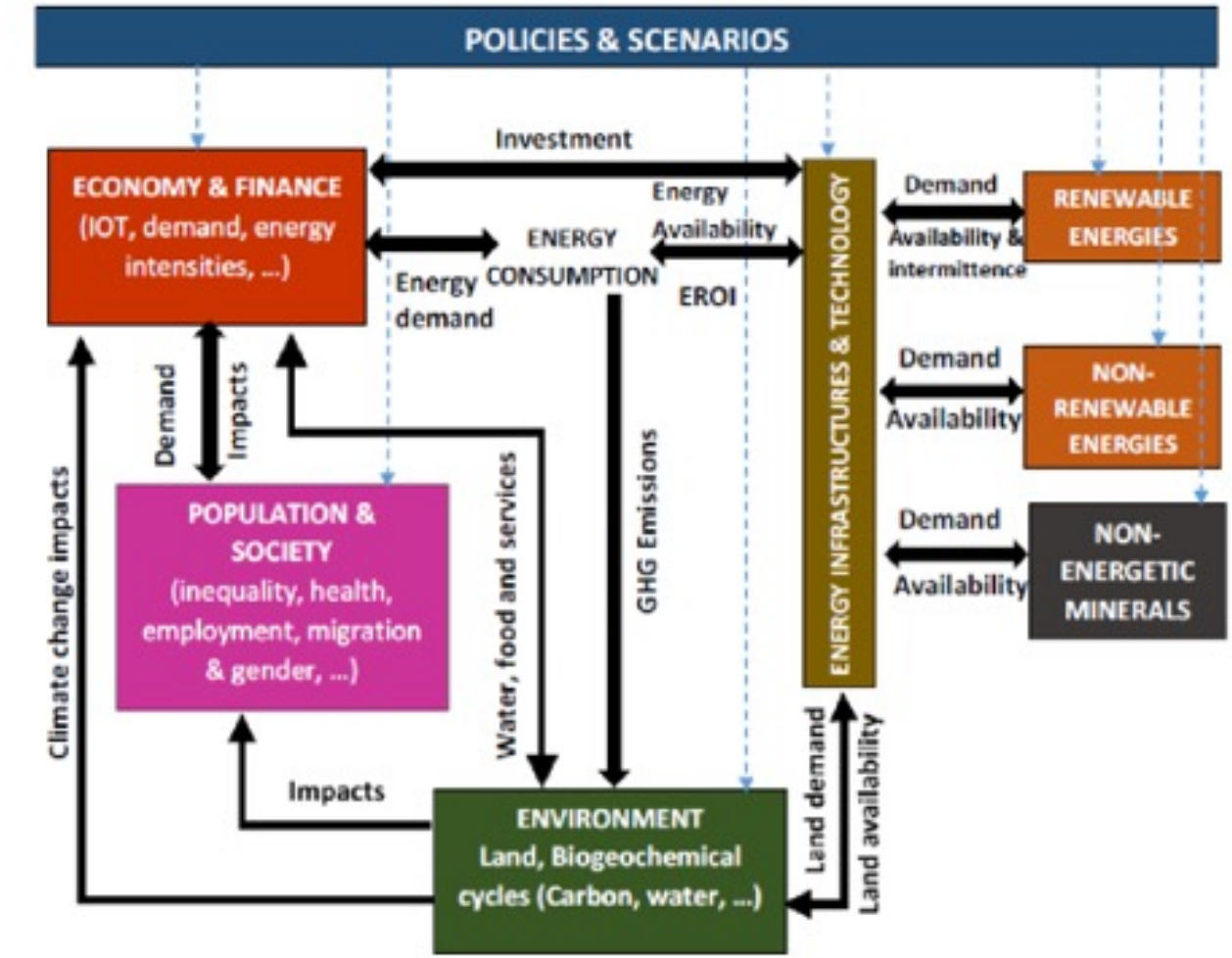
What does WILIAM do?



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MEDEAS model family

- MEDEAS-W.
  - Single world region.
  - 35 economic sectors. WIOD.
- MEDEAS-EU.
  - Single region.
  - 35 economic sectors. WIOD.
  - Receive scenario information from MEDEAS-W
- MEDEAS-AU, MEDEAS-BU, MEDEAS-SP
  - Single region. 35 economic sectors.
  - Receive scenario information from MEDEAS-W and MEDEAS-EU

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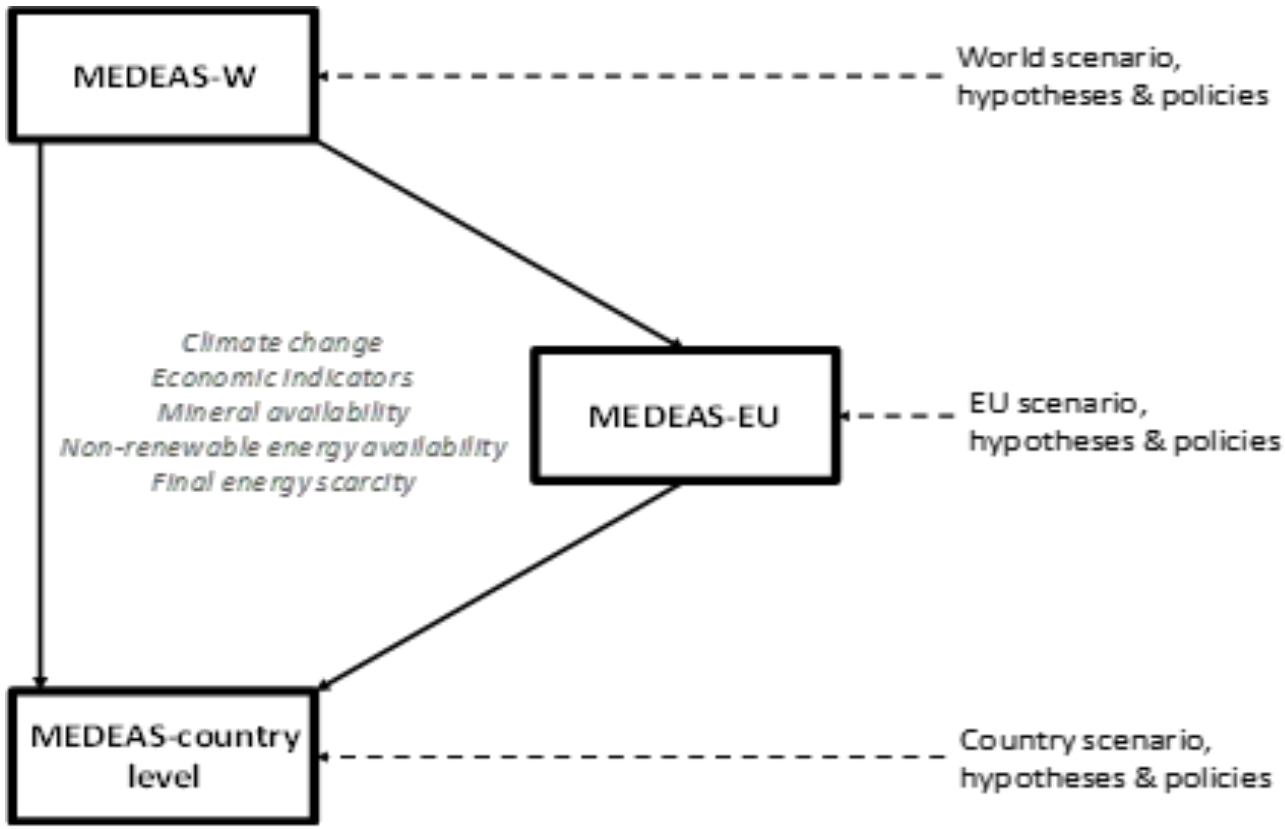
MEDEAS model family



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WILIAM model. Multiregional model

9 global regions + 27 country regions (EU-27). 35 regions.

63 economic sectors. (10 energy production sectors, 12 mining sectors)

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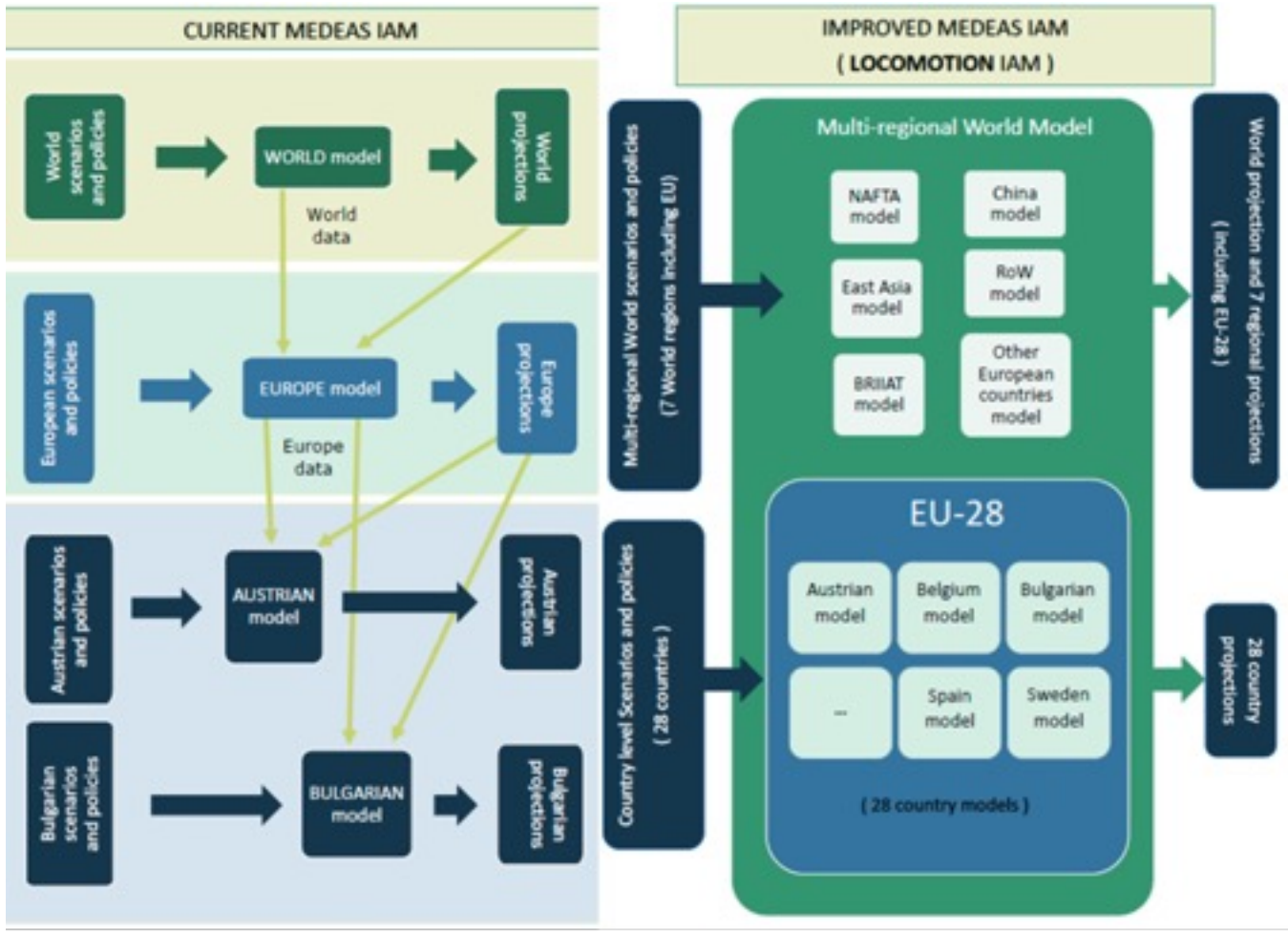
Regions and sectoral coverage



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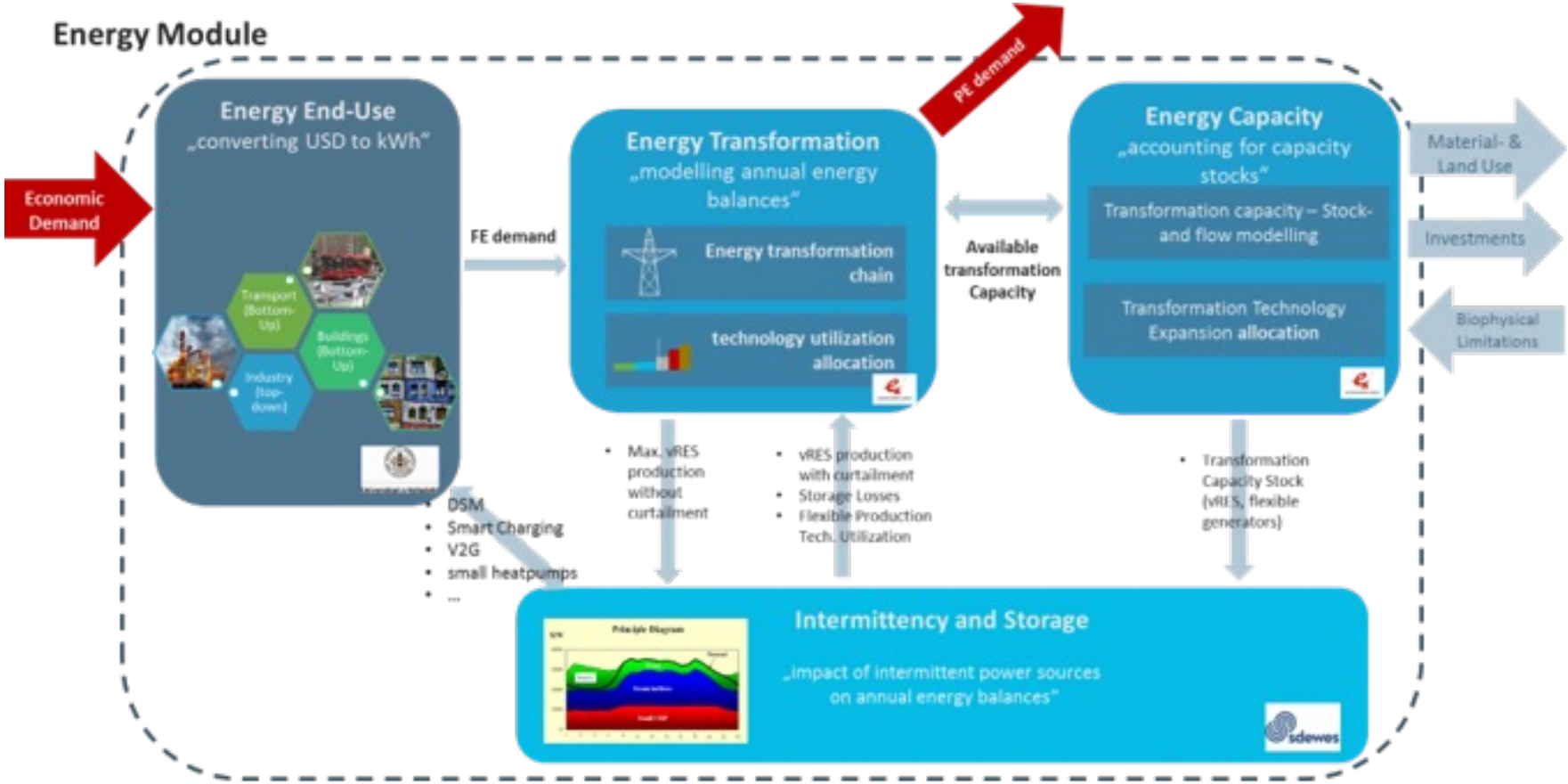
Energy system representation



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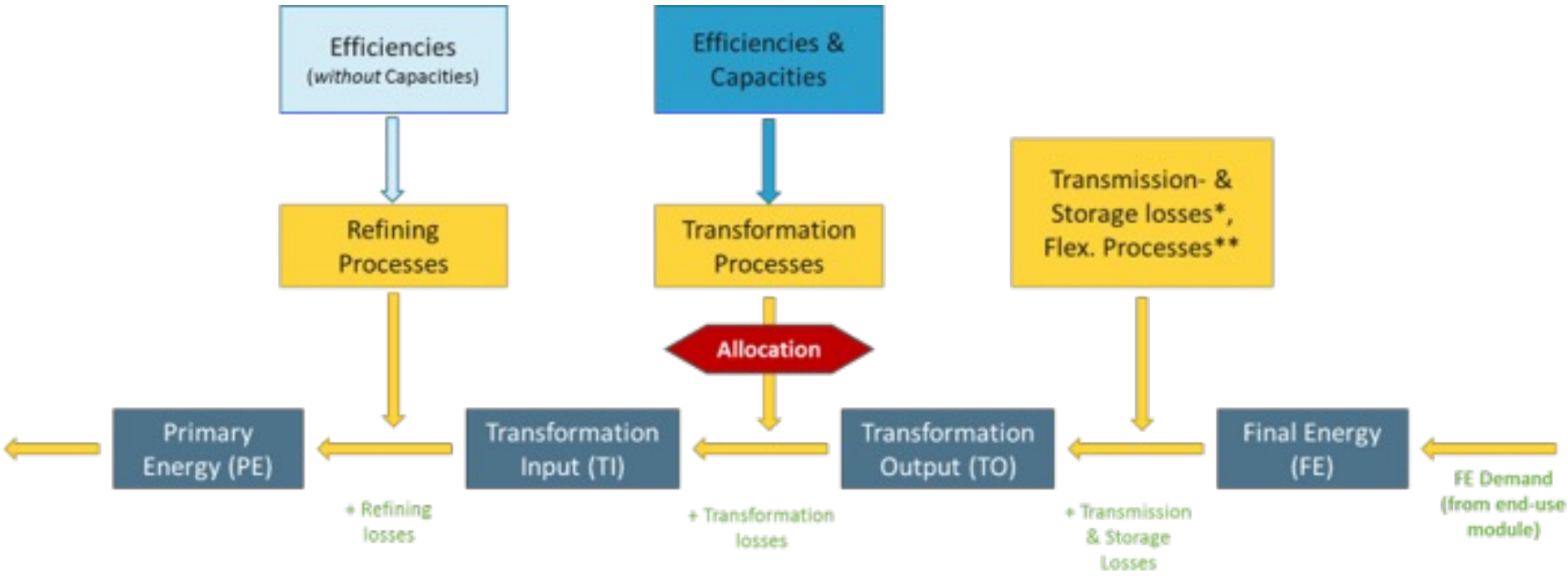
Energy system representation



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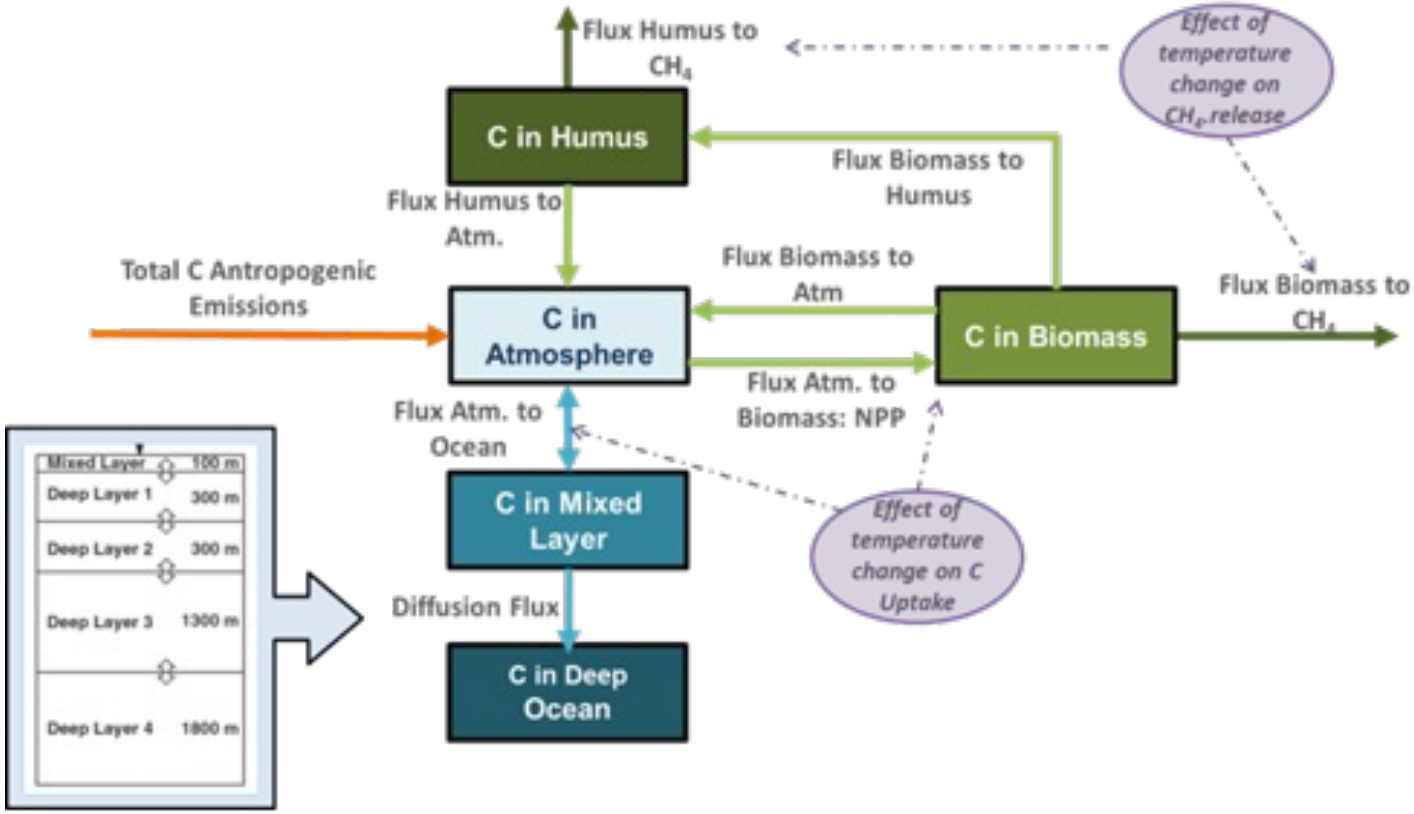
Based on C-Roads



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Green Growth

market tools and technological development

economic growth, absolute decoupling, global economic convergence; fast diffusion of low carbon technologies, sector coupling, efficiency improvements

Green Deal

Green Growth complemented with social policies

Features of Green Growth + social inequality reduction; public investments; welfare state; public ownership of energy utilities; job guarantee; public intervention

Post-growth

voluntary downscaling

relocalization, sharing economy, self-organization, commons, conviviality, voluntary behavioural changes; sufficiency; reducing material throughput

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- Representation of economic processes:
  - Policy-simulation (no optimisation/equilibrium)
  - Sectoral demand-driven production
  - Leontief production function (input-output analysis)
  - Energy demand by fuel and sector estimated through the sectoral final energy intensities by sector
  - Production of sectors (i.e. GDP) is endogenous: (Dependence on final energy and materials availability or prices. Affected by climate change damages)
- Biophysical abundance/scarcity drives inter-final energy replacements (MEDEAS)
- Prices (and policies) determine the energy mix. (WILIAM)
- Mineral availability. (19 critical minerals)
- Climate change damages
- EROI
- Land-uses linked to energy and food production, GHG emissions (WILIAM)

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Thank you!

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