Pacific Northwest
NATIONAL LABORATORY

GCAM Training 1 Overview

June 28, 2022

U.S. DEPARTMENT OF ENERGY BATTELLE

PNNL is operated by Battelle for the U.S. Department of Energy

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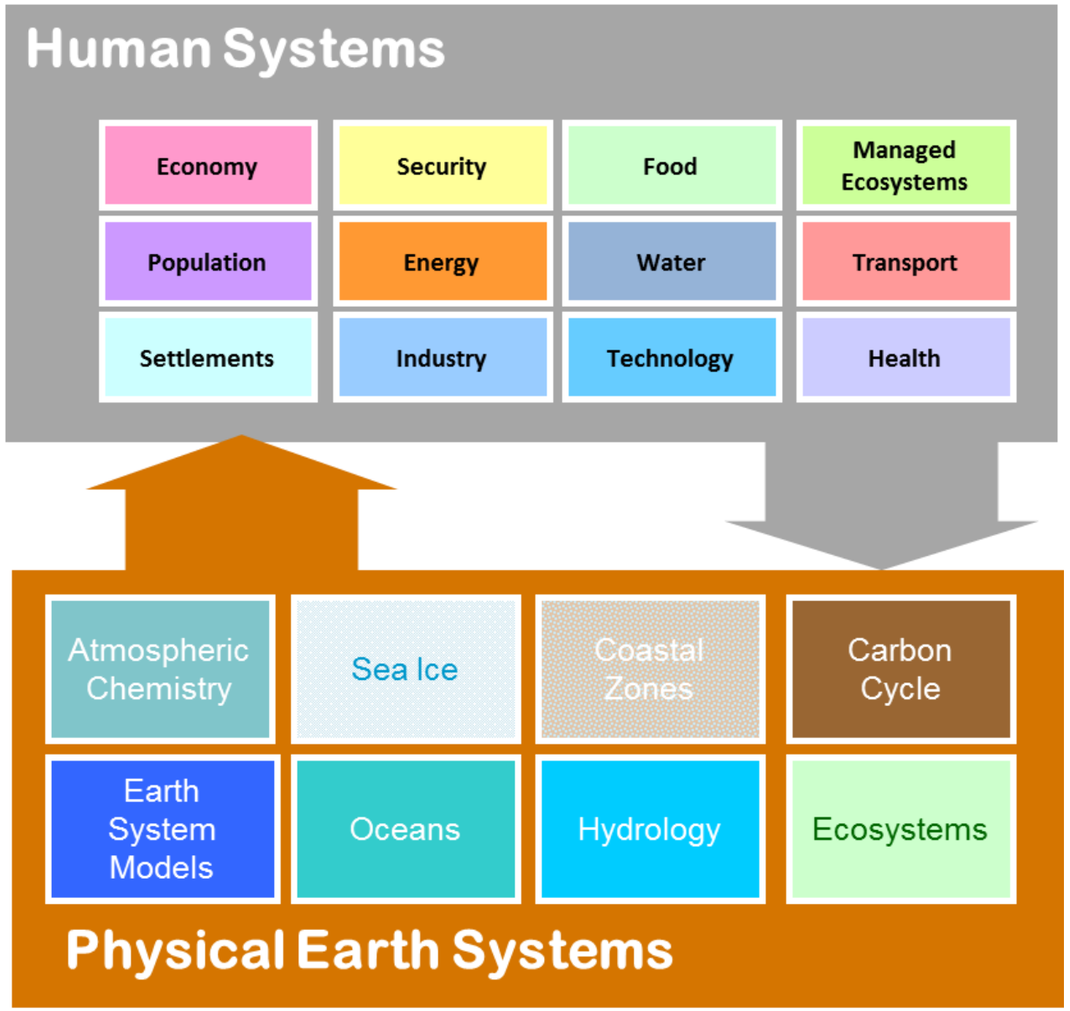
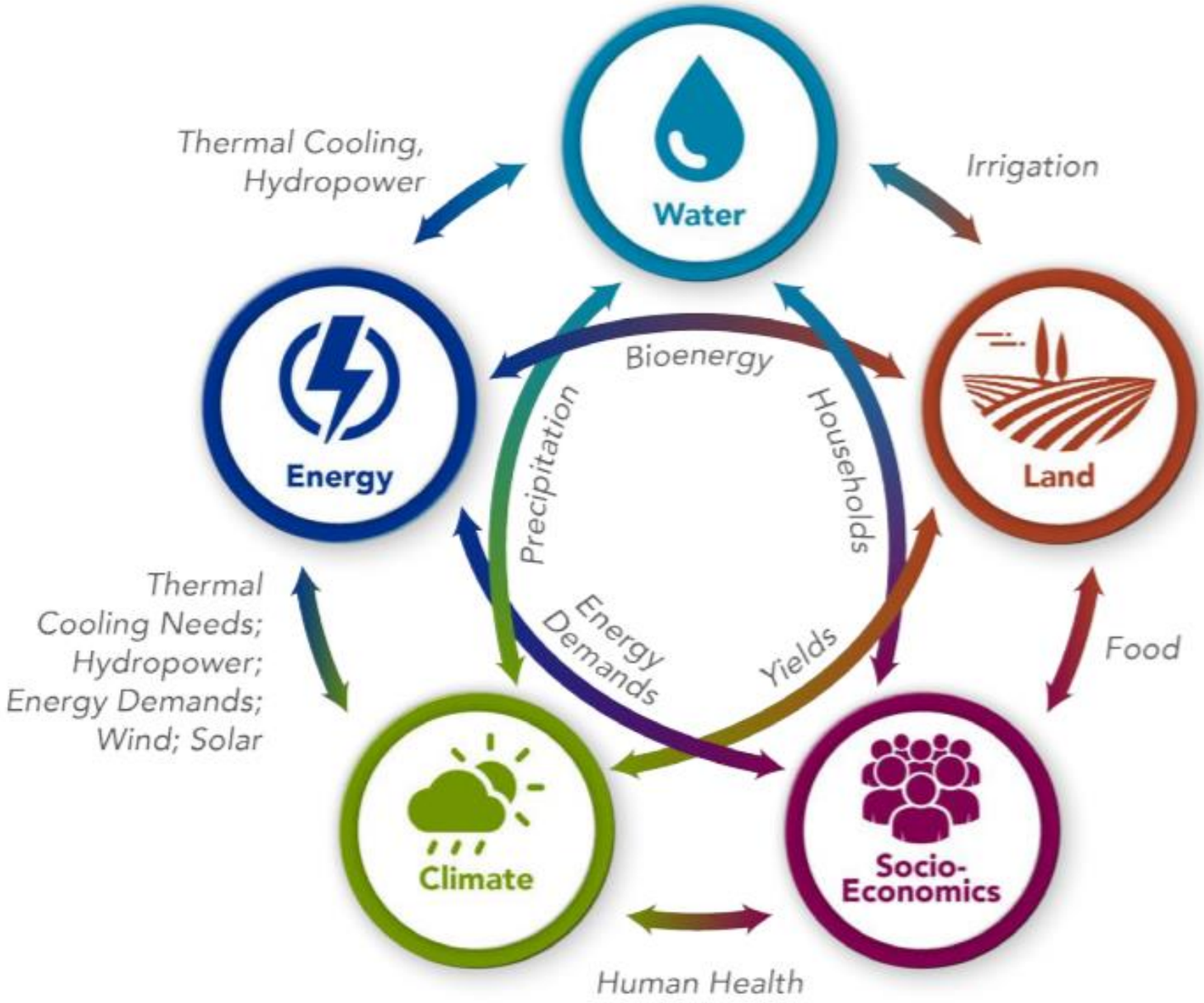
Introduction – Integrated Assessment Models (IAMs)

- Provide nexus insights otherwise unavailable from disciplinary research alone.
- Capture complex non-linear system Interactions
- Support national, international, regional, and private-sector decisions.
- Examples: AIM, GCAM, IGSM, IMAGE, MESSAGE, REMIND



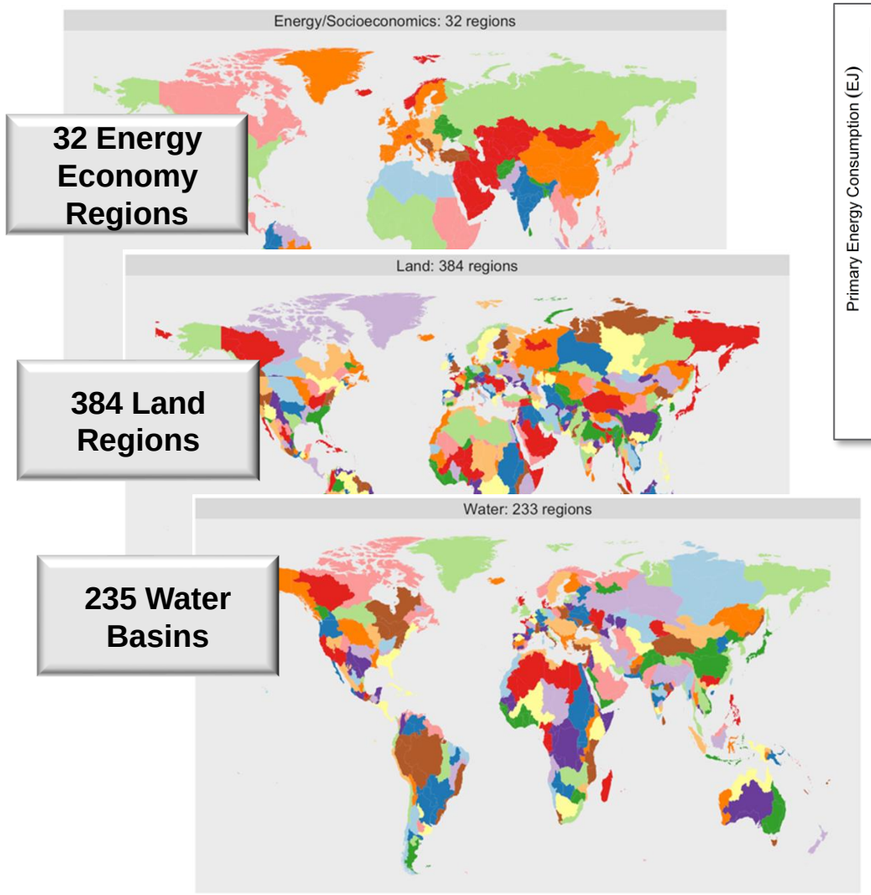
Overview of GCAM

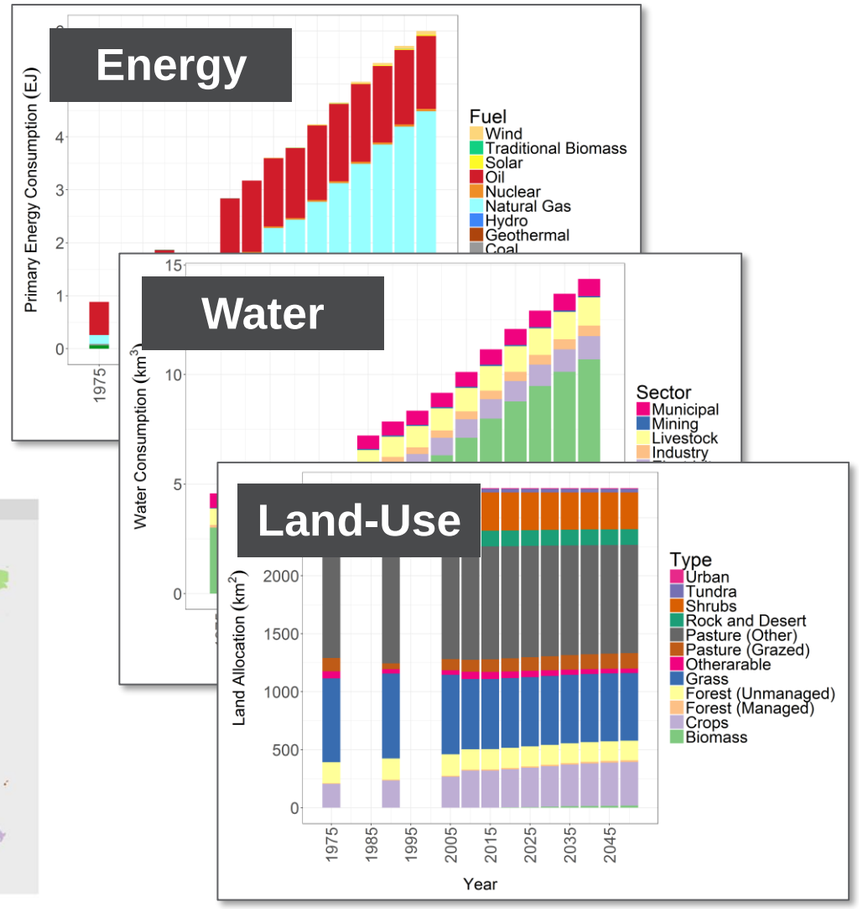


GCAM

GCAM is a global long-term integrated assessment model

GCAM links **Economic**, **Energy**, **Land-use**, **Water**, and **Climate** systems

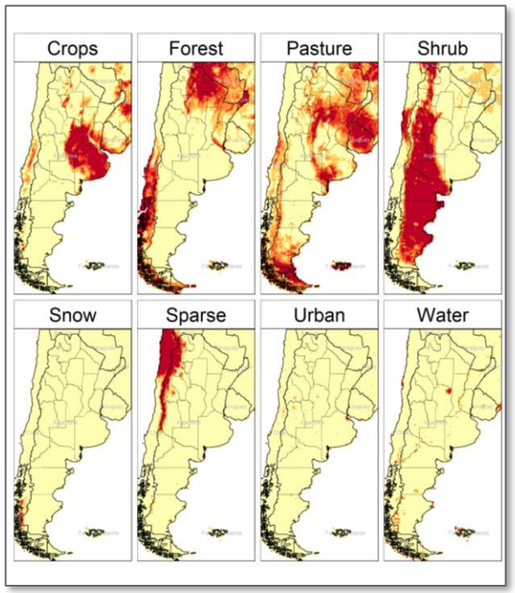




Regional – 5 year

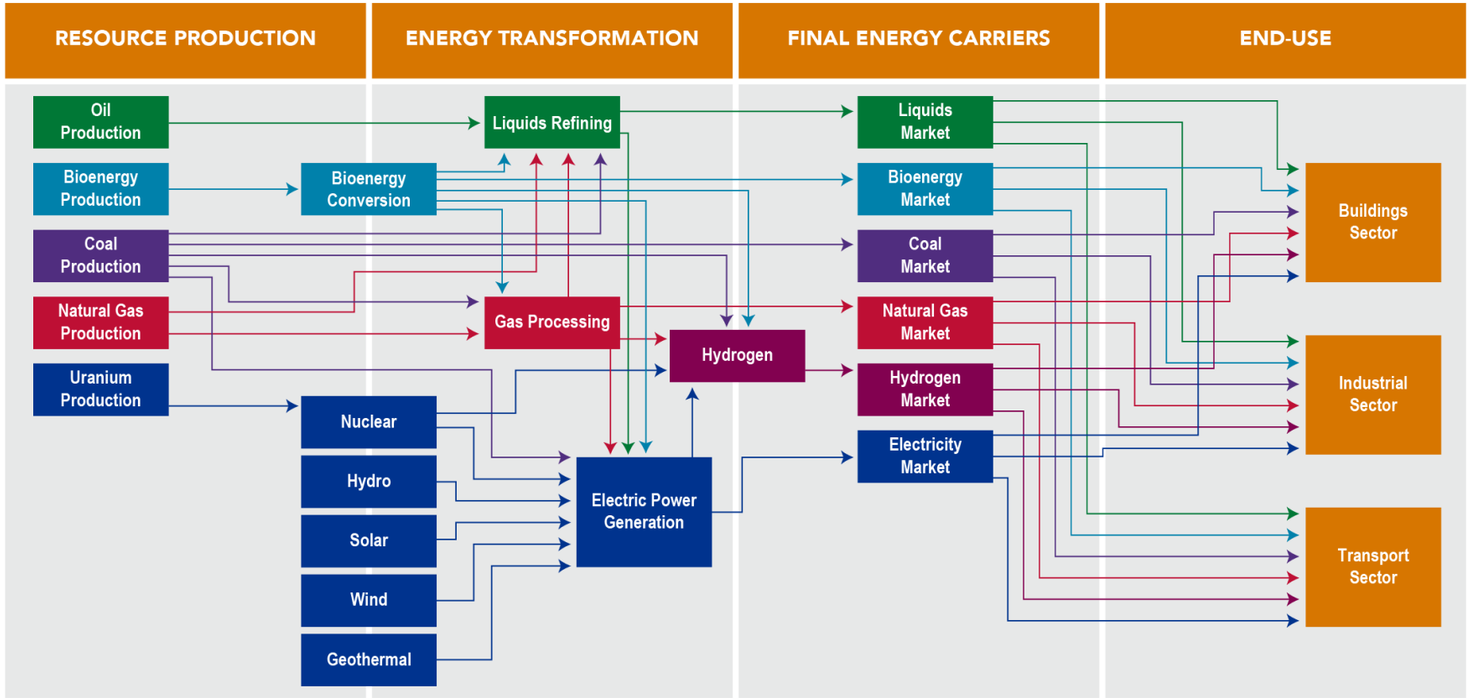
Downscaling Tools

Gridded – Monthly

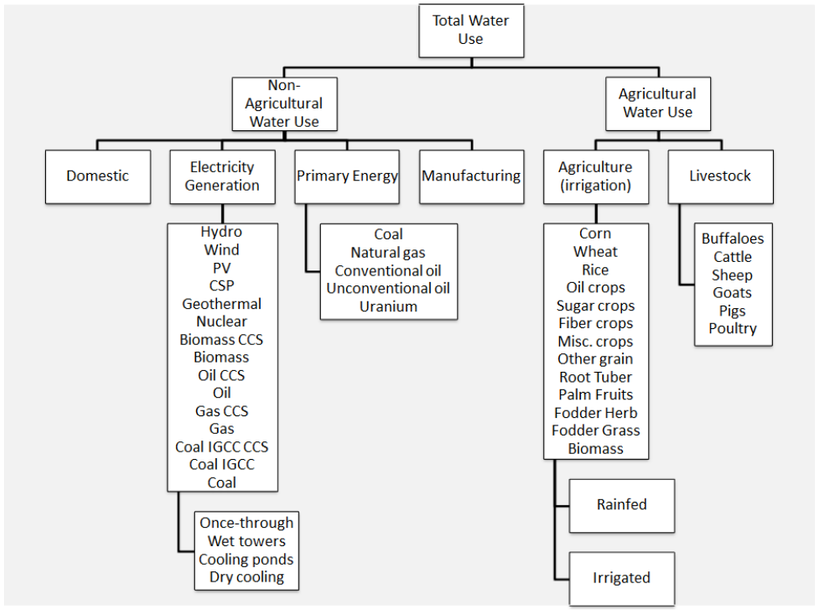


GCAM - Systems

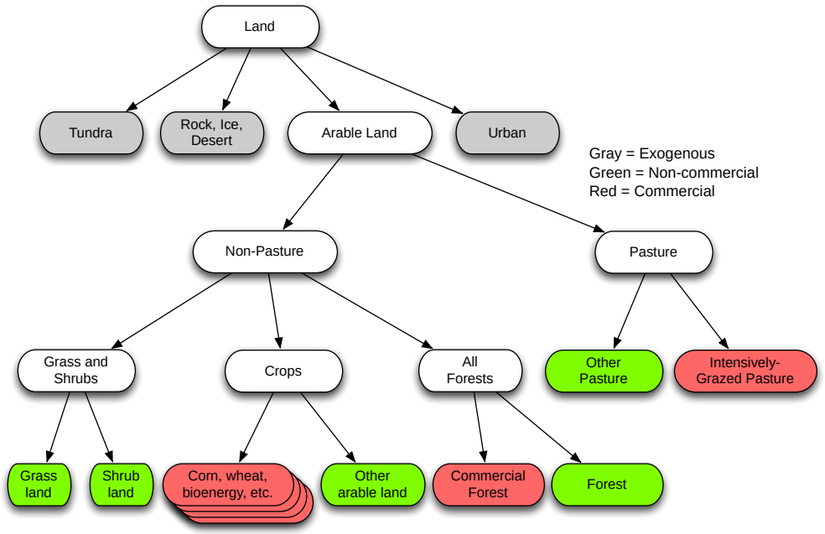
The Energy System



Water

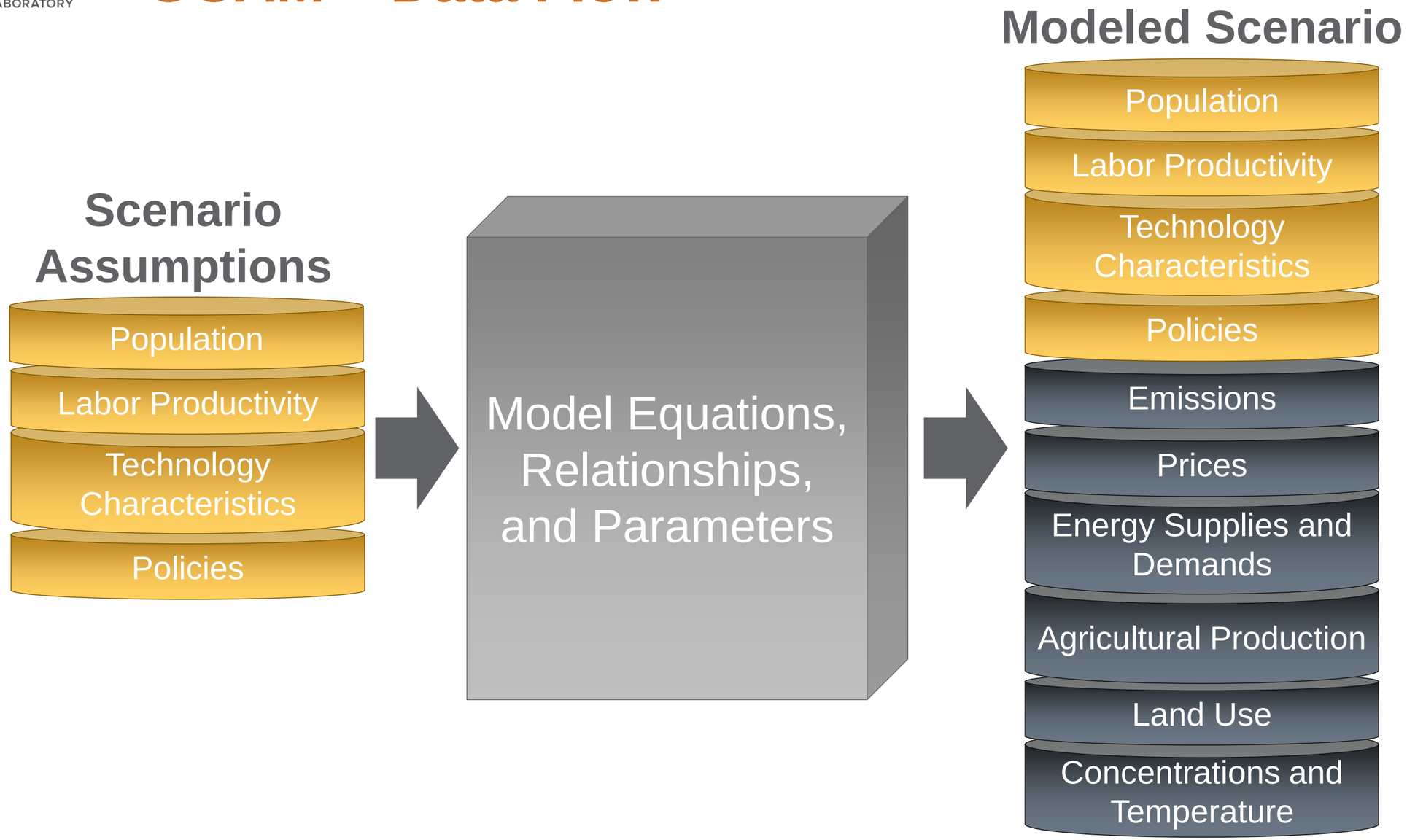


Land

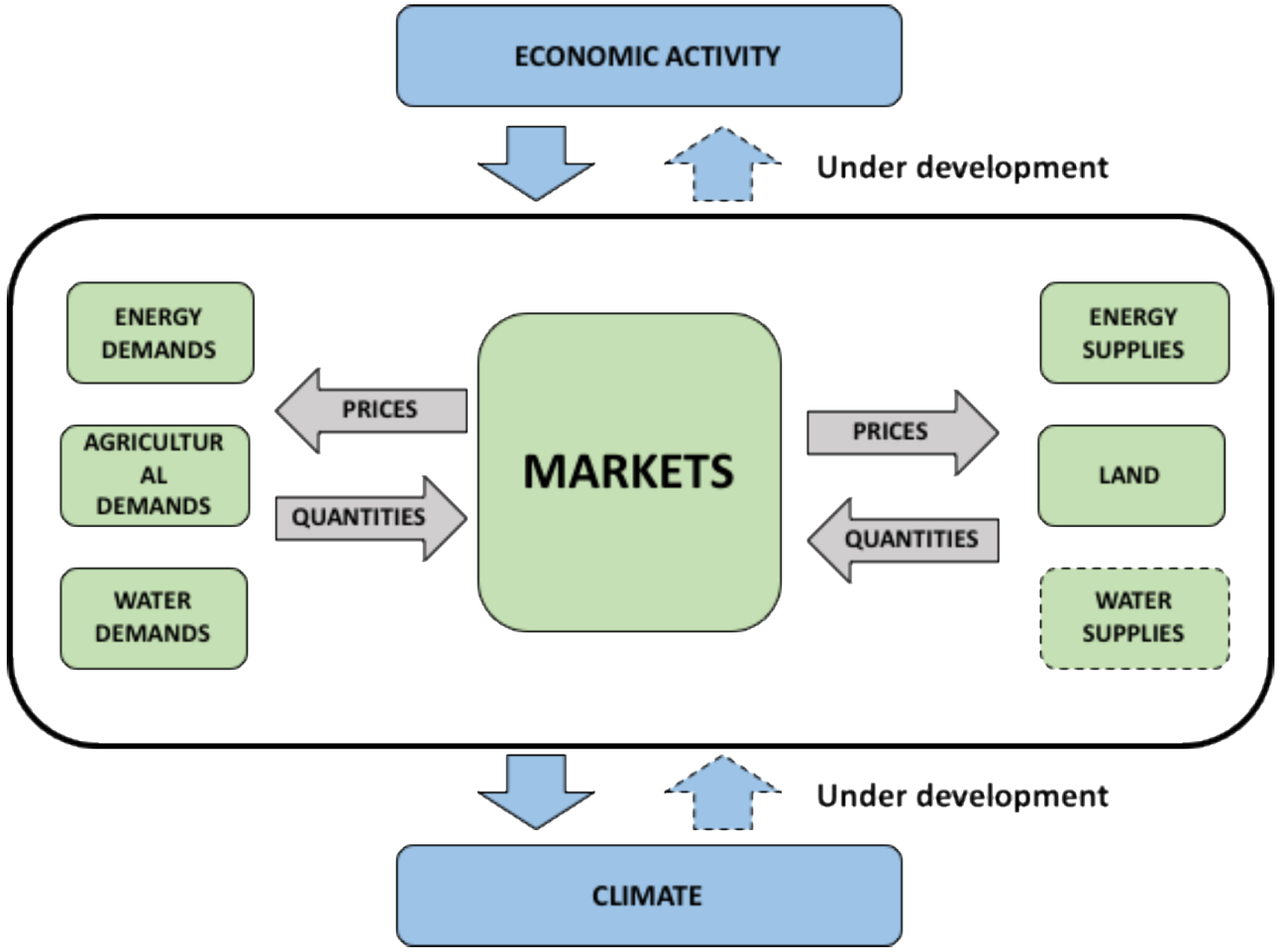


GCAM Documentation: http://jgcri.github.io/gcam-doc/toc.html

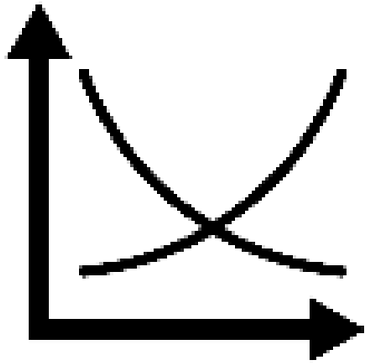
GCAM – Data Flow



GCAM – Modeling Framework



Market Equilibrium Solution



Example Projects

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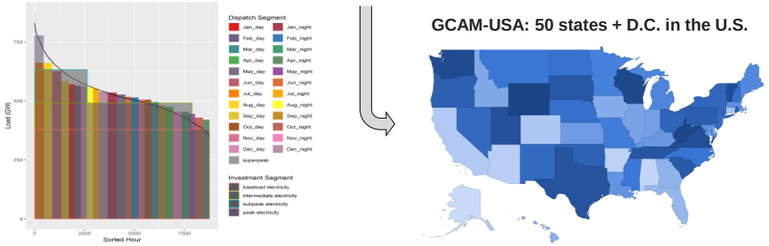
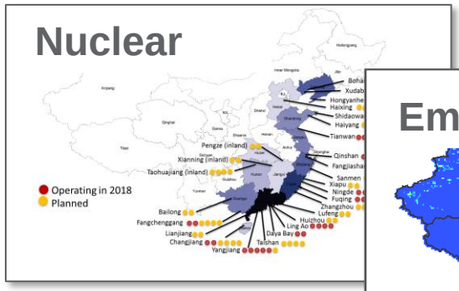
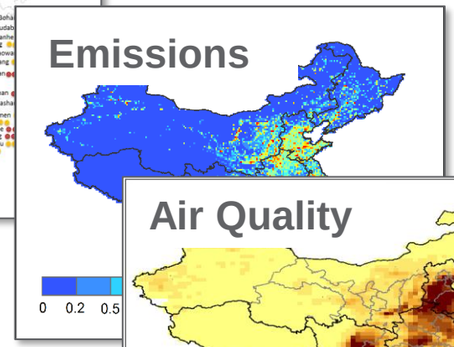
US – States – Sub-annual Electricity Dispatch Profiles

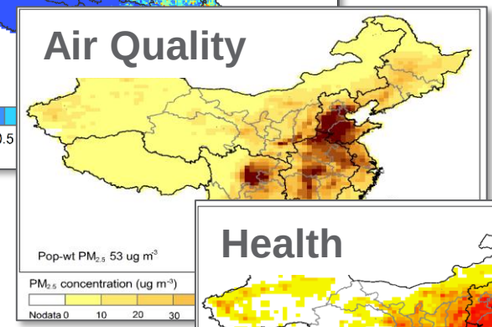


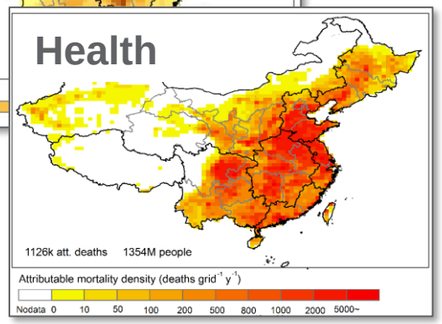
GCAM-USA: 50 states + D.C. in the U.S.

China – Provincial – Emissions/Health

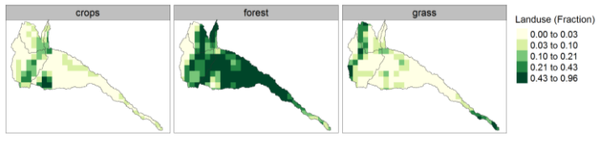


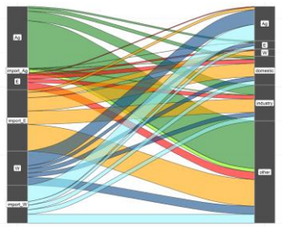


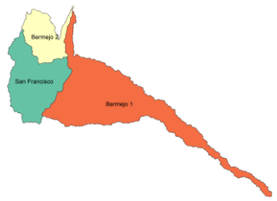




IDB – Sub basin – Nexus

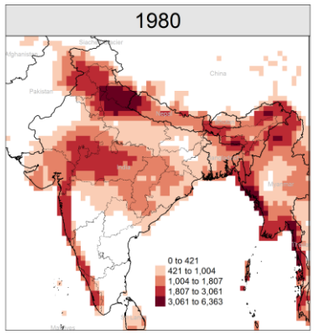




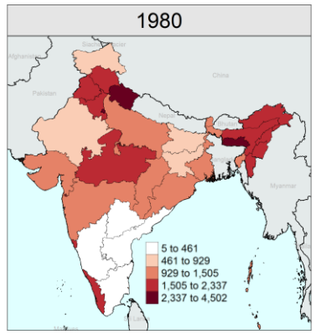


India – States/Basins – Water Scarcity

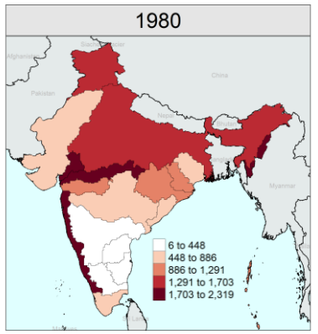
Gridded



States



Basins



Conclusion

- GCAM is an Integrated Assessment Model used to capture long term multi-sector global dynamics
- Represents socio-economics, energy, water, agriculture, land-use, water and climate systems.
- Dynamic recursive model operating on 5 year time steps, with 32 energy-economic regions, 235 water basin and 384 land-use regions.
- Solved using a market-equilibrium approach to balance demands and supplies in regional markets for different commodities.
- Open source: https://github.com/JGCRI/gcam-core/releases
- Extensive Documentation: http://www.globalchange.umd.edu/gcam/
- GCAM wiki page: http://jgcri.github.io/gcam-doc/

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Thank you