# GCAM-USA Overview

Gokul Iyer on behalf of the GCAM-USA team

GCAM-USA: State-level model for the U.S.

- GCAM-USA is a version of GCAM with state-level detail in the United States

- The 50-state version is embedded within the global version of GCAM
  - Conditions and markets in the U.S. are consistent with international conditions

- GCAM-USA is part of the release version of GCAM.
  - It is a community tool and is available for download from our website.

- Recent developments and updates will be available shortly.

GCAM: 32 geopolitical regions
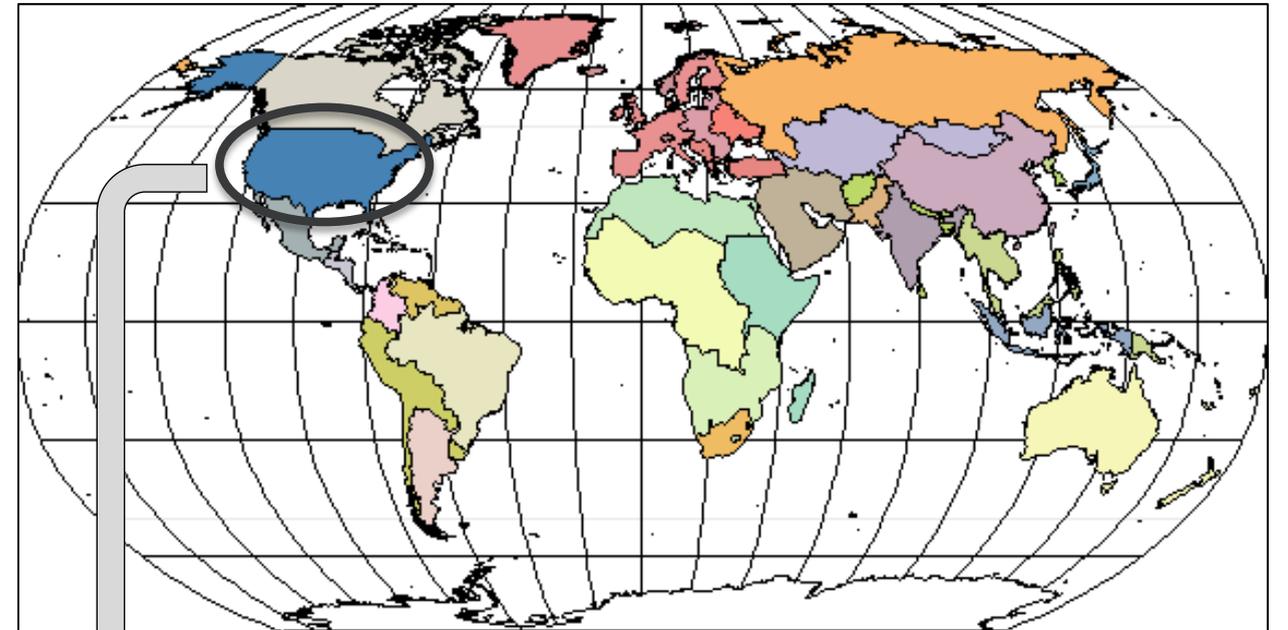
GCAM-USA: 50 states + D.C. in the U.S.
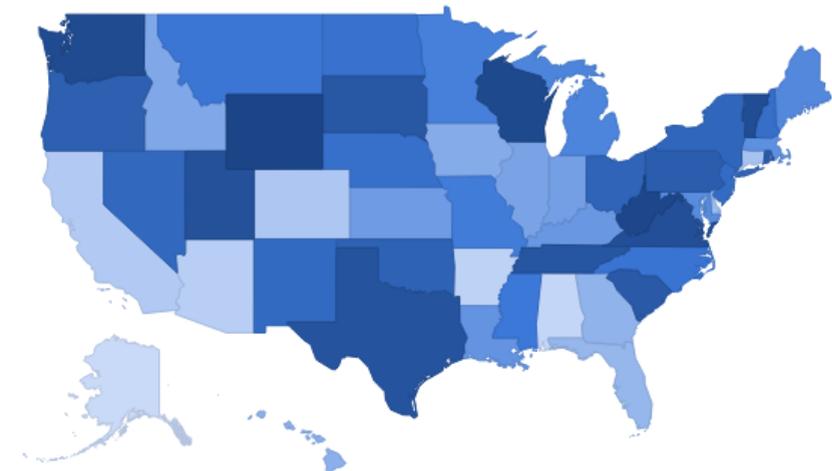
Current level of detail in GCAM-USA

| Socio-Economics	Energy Resources	Energy Transformation	Final Energy	Water Demands

• Population
• Labor Productivity (GDP)
	• Oil*
	• Coal*
	• Natural Gas*
	• Biomass**
	• Solar
	• Wind
	• Geothermal
	• Carbon Storage
		• Refining
		• Gas Processing*
		• Hydrogen*
		• Electricity
			• Buildings
			  • Commercial
			  • Residential
			• Industry
			• Transportation
			  • Passenger
			  • Freight
				• Electricity

Represented at the national level
** Represented at the same level as land-use regions

Key features of GCAM-USA

- Electricity trade in fifteen grid (NERC) regions

- Load duration curves to capture intra-annual variation of electricity demand

- Up-to-date assumptions on population and GDP, energy supply and demand technology cost and performance.

- State specific nuclear and coal retirements and technology vintages

- State-level reference scenarios capture recent dynamics and trends

- Ability to model state-level policies (e.g. renewable portfolio standards)

Electricity trade in 15 grid regions

- Representation of electricity trade is important to reconcile supply and demand of electricity at a sub-national scale.

- Our representation focusses on net trade across grid regions as well as free trade among states within a grid region.
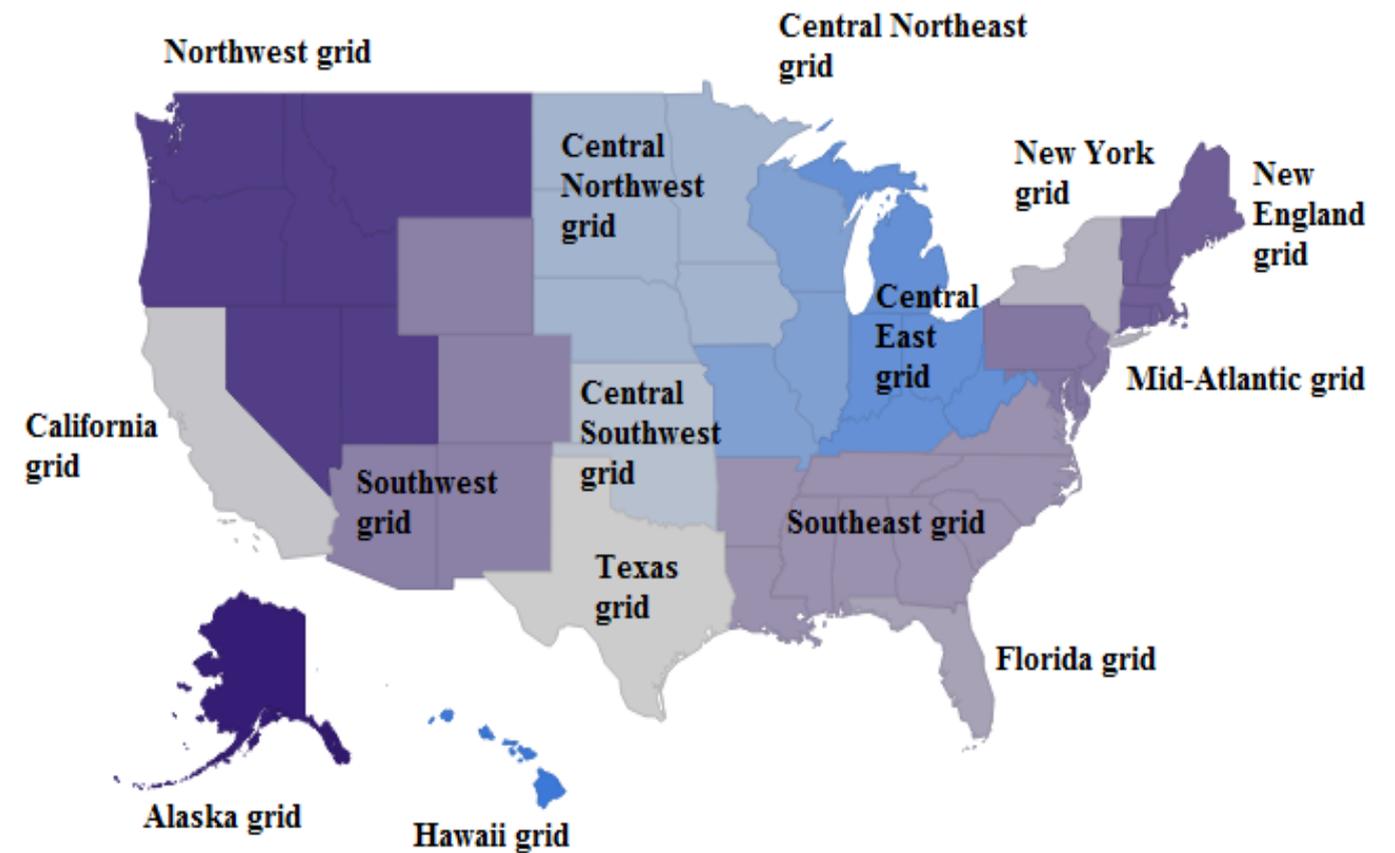
Grid regions are consistent with NERC regions

Load duration curves

- Load duration curves in GCAM-USA capture supply-side dynamics of time-varying demand:
  - Power plants serving baseload also serve demand in all higher segments through the peak load.
  - Peaking capacity will operate only during the peak.
  - Storage can purchase off-peak to sell at peak.

- Load duration curves are divided into four segments.

- Each grid region can have its own load duration curve but shapes are assumed to be uniform for now.
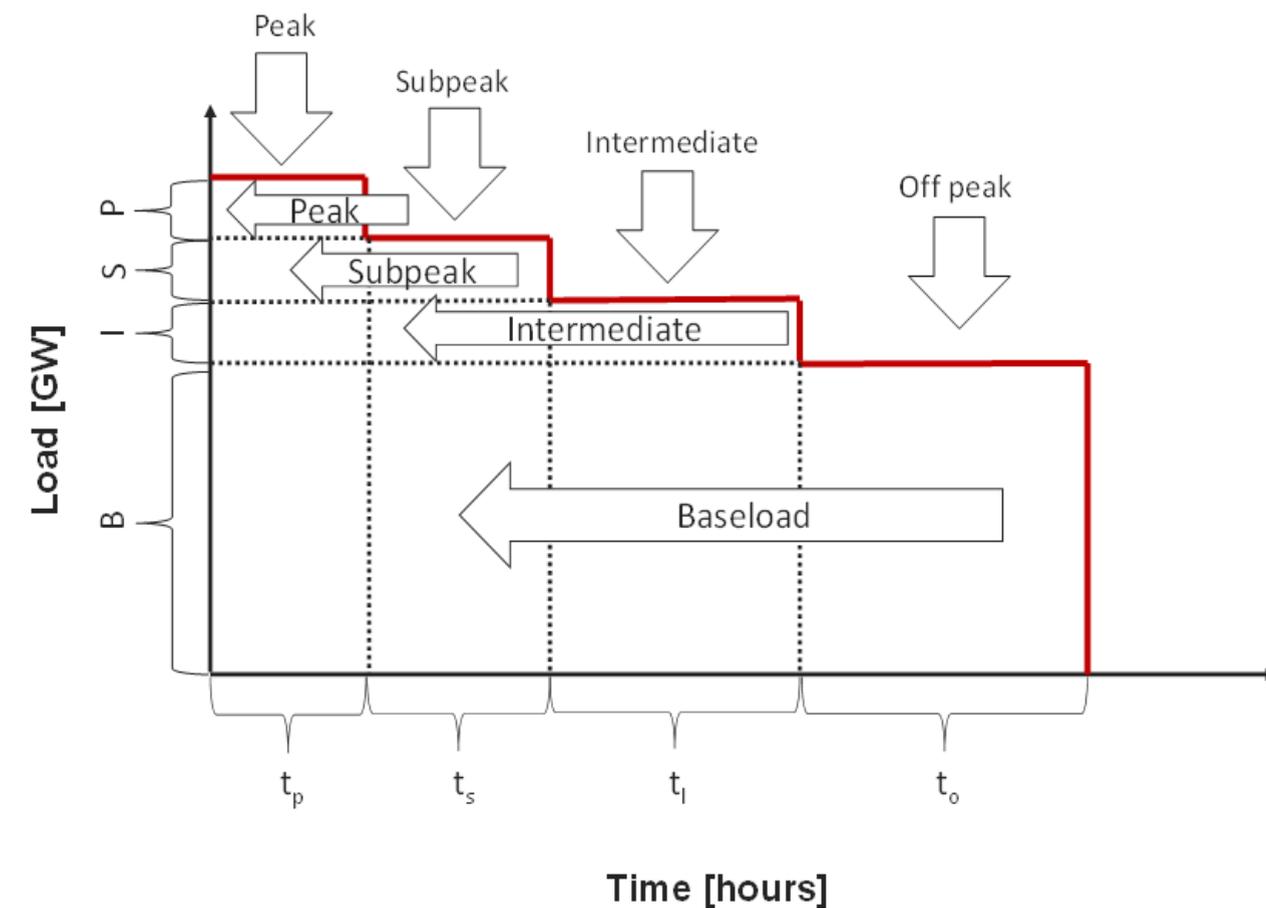
Ongoing and future model developments

- Separating modeling decisions for electric capacity expansion (investment) and capacity dispatch (operation)
- Changing sub-annual dynamics in response to climate
- Improved modeling of resource depletion
- CCUS Retrofits, EOR, and 45Q
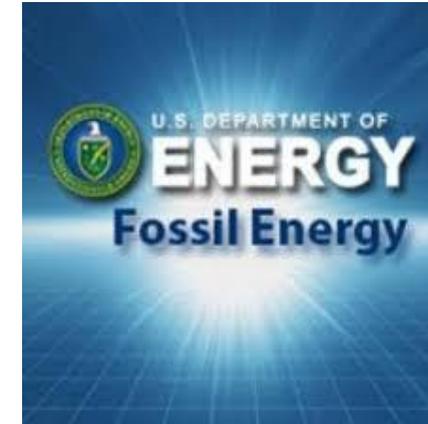- Water supplies and demands
- Detailed industrial sector

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