



GCAM-USA: Developments, Ongoing Work, Interpreting Results

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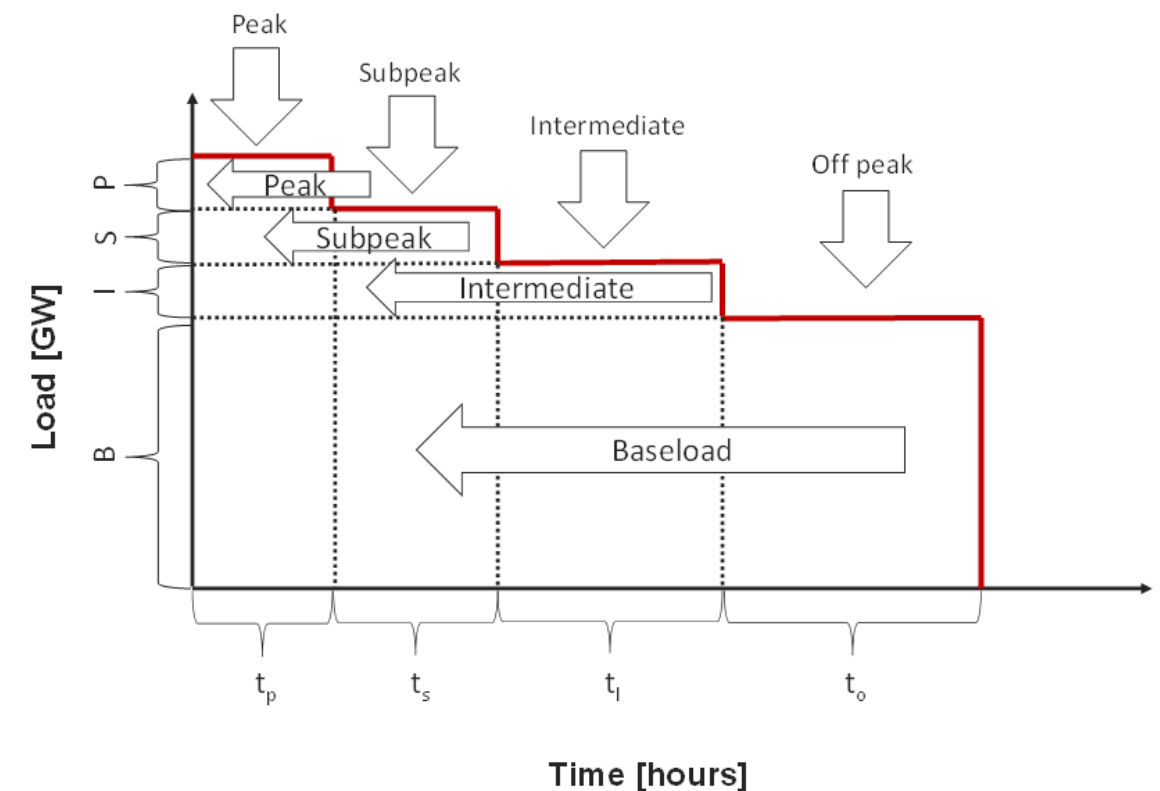
Latest Developments

- **Socioeconomics:**

- Updated population to match history (2015) and align future assumptions with downscaled SSP2 projections
- Updated GDP match history (2015) and align future economic growth rates with Annual Energy Outlook (through 2040) and GCAM-core over the long-term

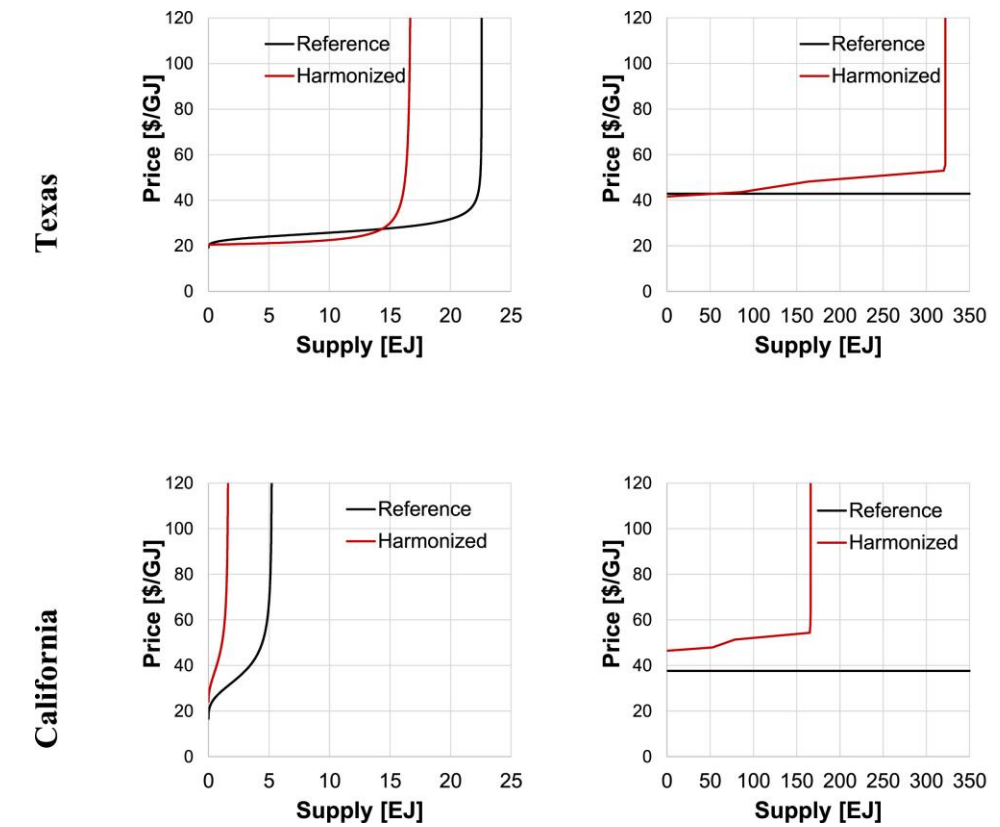
- **Electricity:**

- Added sub-annual load profiles (load segments)
- Created U.S. specific power sector technology cost assumptions
- Updated subsector share-weight assumptions
 - ✓ No new coal deployment without CCS
- Implemented state-specific coal and nuclear retirements
- Updated hydropower electricity generation assumptions to match AEO



Latest Developments

- **Resources:**
 - Updated state-level onshore wind, PV and CSP resource curves
 - Created state-level biomass supply sectors to improve emissions accounting
- **Refining**
 - Updated share-weights
- **Industry**
 - Added vintage structure for industrial energy use sector
- **Buildings**
 - Added more detailed building services
 - Increased technological detail for each building services
 - ✓ high-efficiency options
 - Updated technology cost and efficiency assumptions



Ongoing Work

- Add state-level water supplies and demands for all sectors
- Add non-CO2 emissions factors for all sectors
- Create more detailed industrial sector
- Improve representation of sub-annual dynamics in the electric power sector
 - Separate power plant investment and operation decisions
- Implement code change to facilitate better representation of renewable portfolio standards (RPS)
- Add state-level offshore wind resources
- Small improvements and bug fixes

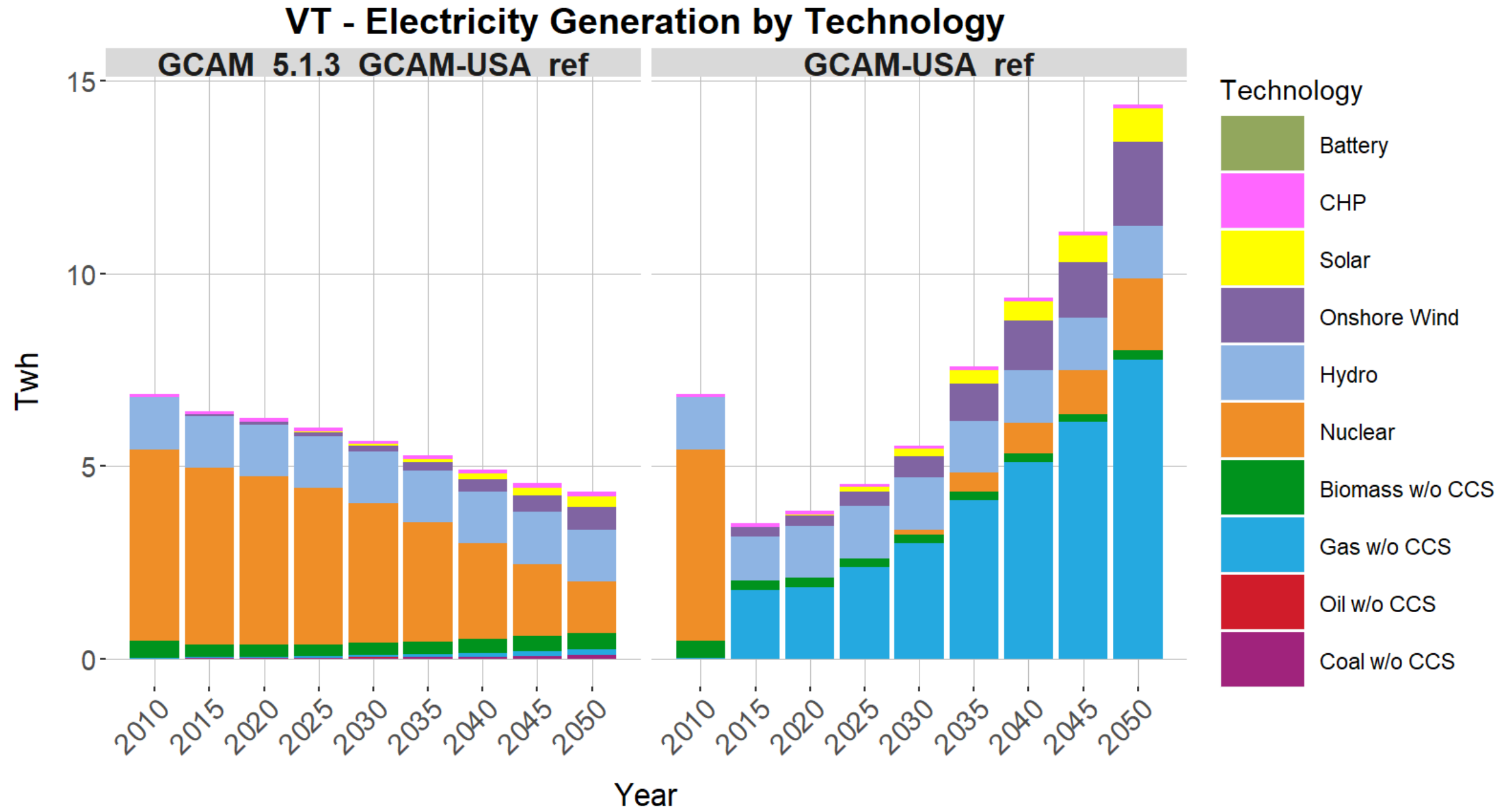


<https://www.jobs.ie/job-talk/wp-content/uploads/Late-to-work-768x576.jpg>

Interpreting Results

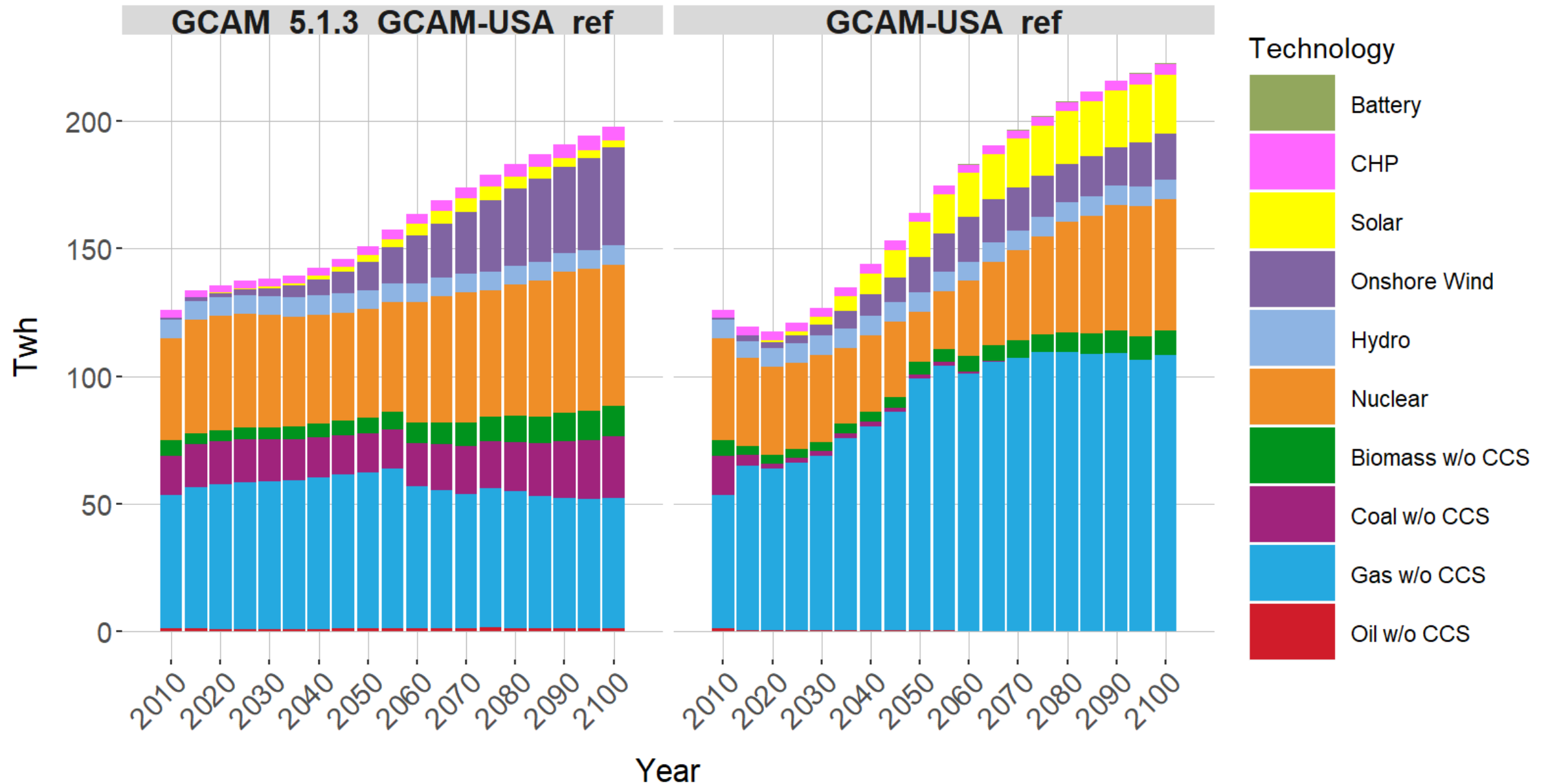
- State-level projections of energy demands in the end-use sectors are generally monotonic
- State-level results for energy supply sectors (esp. electricity and refining) may be non-monotonic
 - Real-world decisions at the state-level are discrete and often result in lumpy retirements and investments.
 - In GCAM-USA, investments in new technologies are shared out in physical quantities of energy produced, rather than capacity installed. Smooth functions are used to retire existing capacity, but are tuned to recent history
- GCAM-USA does not account for on-the-ground factors that affect technology deployment
 - e.g. land use restrictions, electricity transmission infrastructure
- GCAM-USA does produce monotonic results for the energy supply sectors at more aggregate spatial scales (grid-region or national level) based on a scientific, detailed, bottom-up accounting framework.

Interpreting Results



Interpreting Results

New England grid - Electricity Generation by Technology



Thank you

