Storage in National Models

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Presentation to NMRETA

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What new with Storage?

Massive interest and investment in Energy Storage

- 427 GW of storage in interconnection queues at the end of 2021. Likely ~500 GW by EOY 2022
- Storage now qualifies for ITC without being paired with RE
- 3+ GW of storage operating in the CAISO market, no longer an R&D technology
- Significant investment in non Li-Ion technologies and long duration storage.

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Storage in National Studies

- National Studies show a wide range of storage deployment
  - Between 15-400 GW of storage by 2035
  - NREL 100% by 2035: 200 GW of storage
  - Duration 2-10 hours, average just above 4 hours
- Longer duration storage typically not selected
  - H2 or fossil with CCS used for balancing over longer durations
- Limitations of models:
  - Lack of granularity (e.g., time slice approach)
  - Perfect foresight (e.g., no forecast error)
  - Outdated technology cost and policy assumptions and few models consider cost uncertainty
  - Few models are inter-sectoral (important for LDES)

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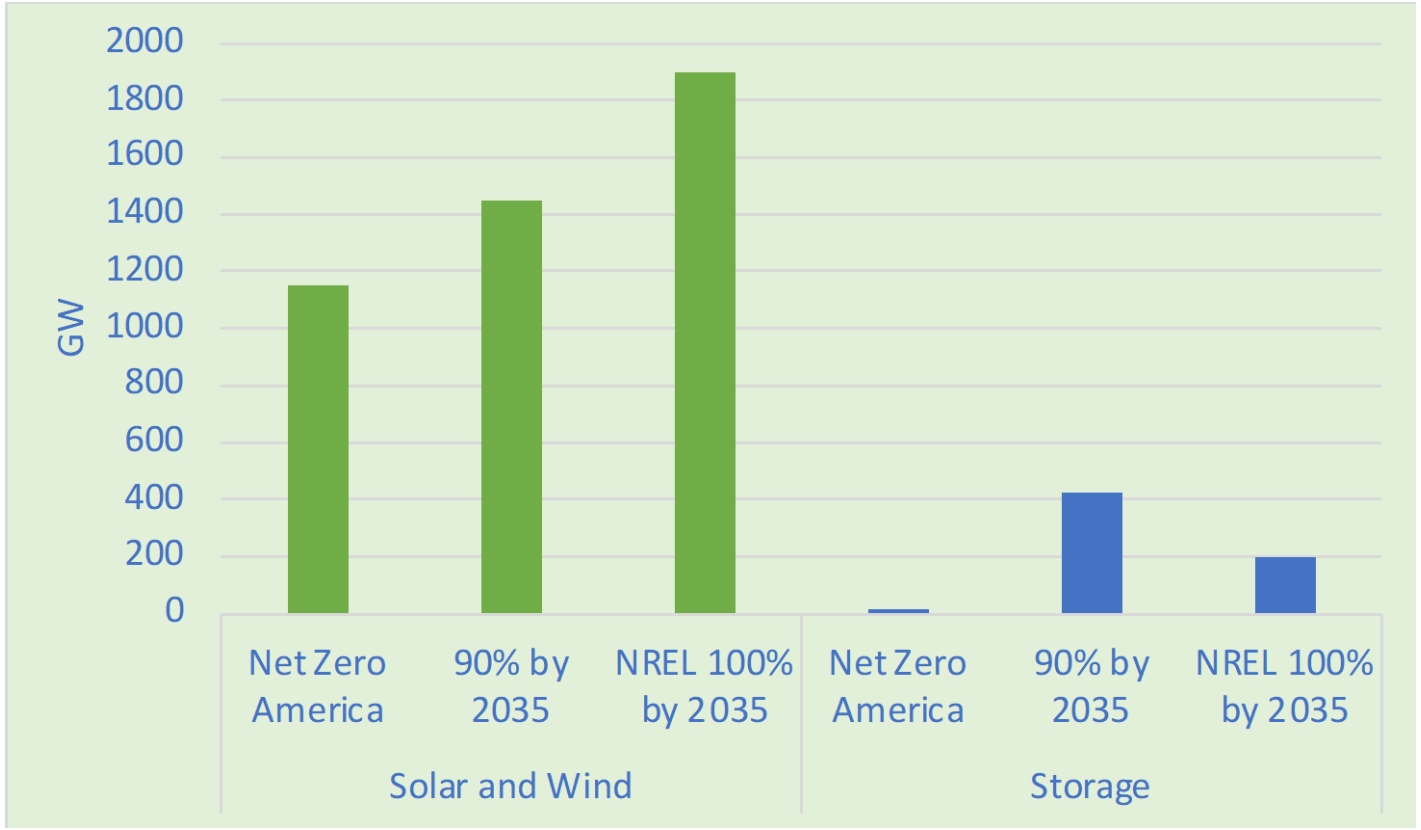
Wide Range of results seen in National modeling for Storage



Net Zero America (Net Zero by 2050, 2035 figures) – Princeton
90% by 2035 – GridLab and UC Berkeley
100% by 2035 - NREL

New Mexico low carbon grid in 2030

- Evolved Energy Research: Model of NM Grid in 2030
- High Wind/ Moderate Solar penetration
- Low wind period (July-October) compensated with net transmission flows and gas generation
- Flexible loads (50% newly electrified loads were flexible) and interregional coordination lowered storage needs

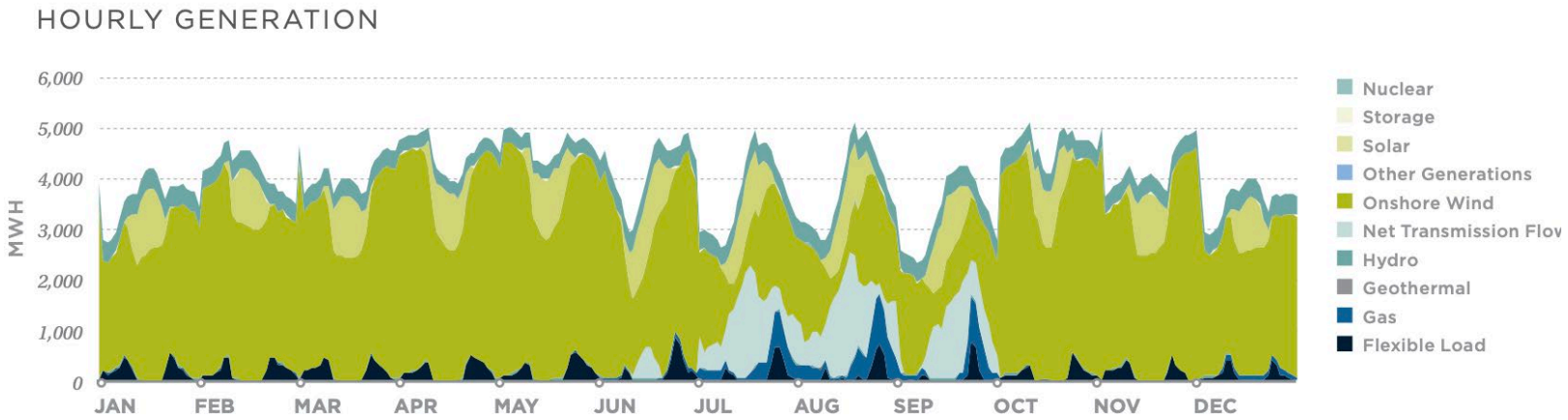


FIGURE 3. *a. Projected hourly electricity generation dispatched in New Mexico in 2030. In addition to flexible load (in navy), infrequent fossil gas (in orange) operates in the near term during summer months (June through September) where lower wind energy output coincides with peak demand. Critically, any fossil gas left online for reliability must not be left in communities overburdened by pollution.*

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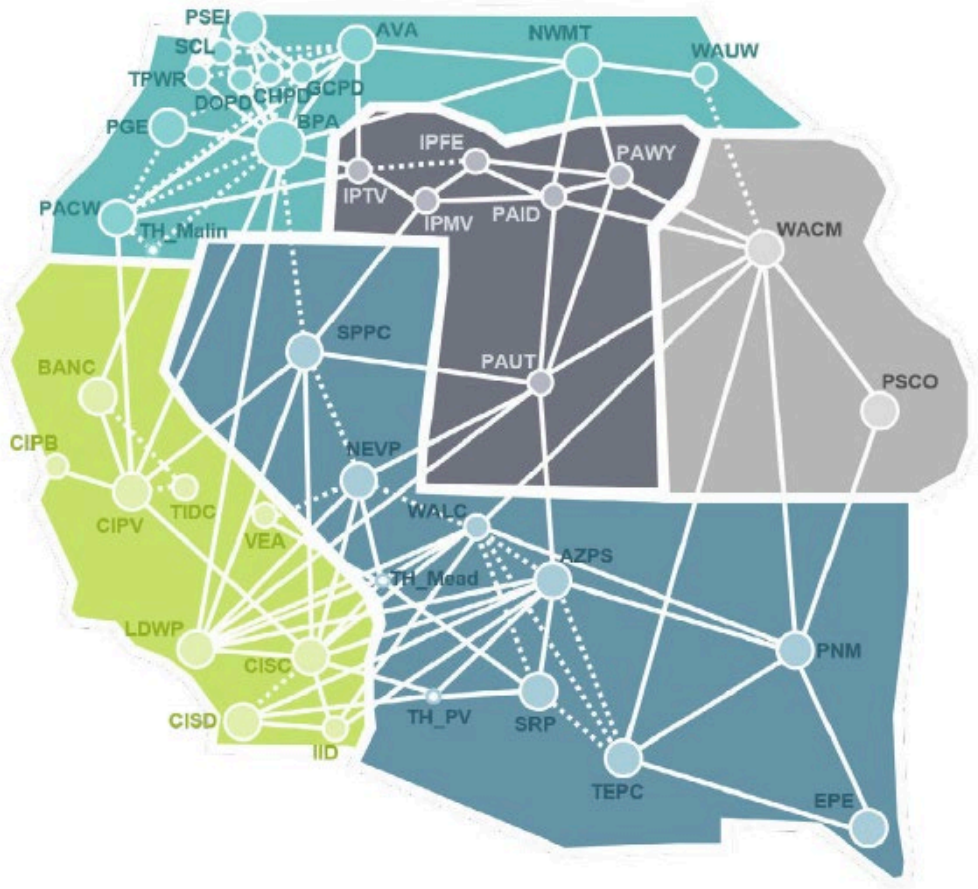
Storage vs. Transmission vs. H2

- Can inter-regional transmission substitute for long duration storage?
  - DOE National Transmission Study
- NM is a net energy exporter, will H2 production for export mean H2 becomes the obvious long duration storage technology?
- As modeling tools evolve, will the picture around storage, transmission and H2 become clearer?



Western United States case study zonal topology

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Emerging themes and opportunities

- Transmission/ storage tradeoffs: Identifying where these can complement through more holistic planning processes
- Market design: Ensuring fair and effective market participation rules for energy and Ancillary Services
- Intersectoral planning: Least cost portfolios and LDES value will depend on intersectoral interactions