TENNESSEE VALLEY AUTHORITY

TVA Future Energy Storage

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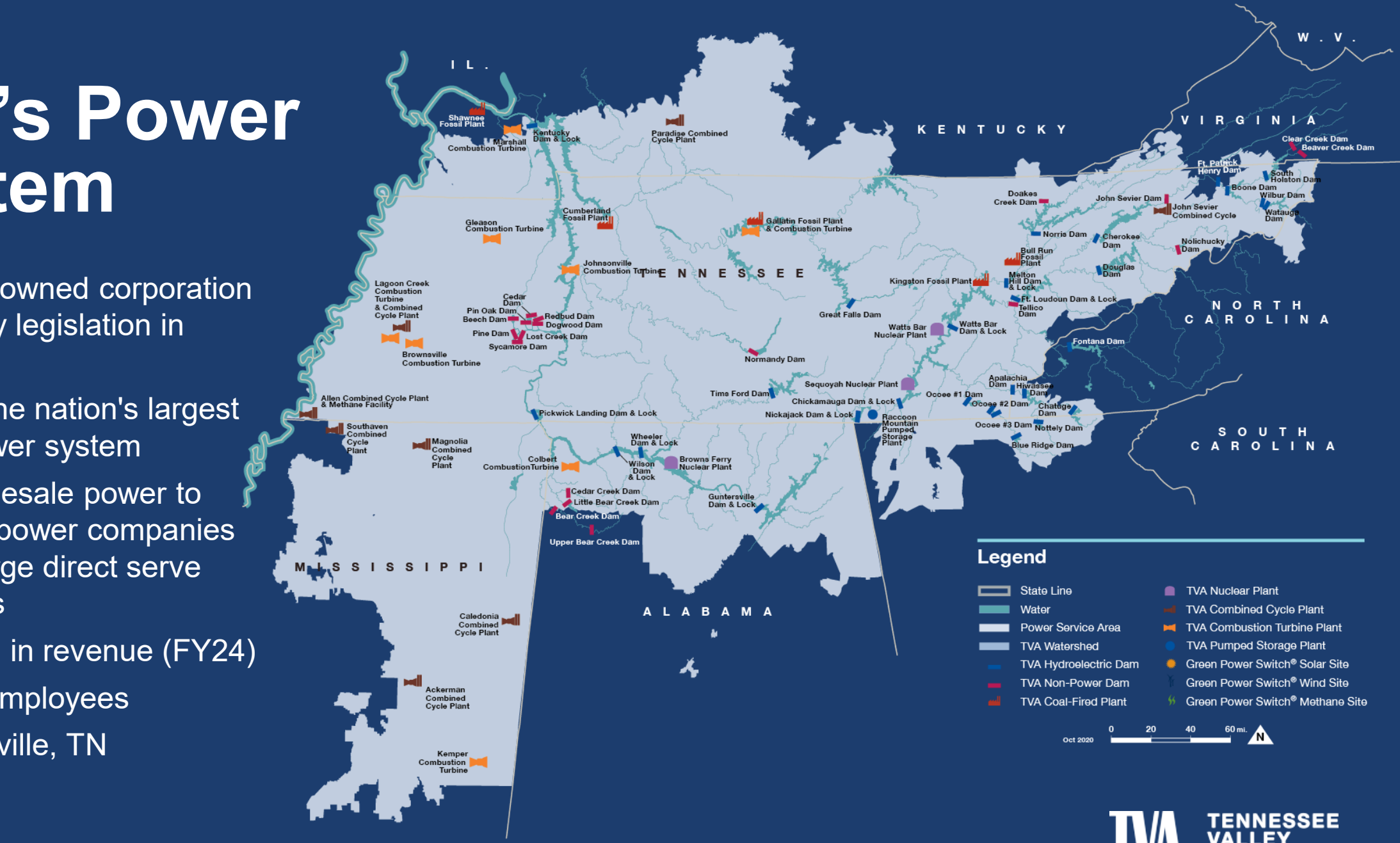
TVA's Power System

- Federally-owned corporation created by legislation in 1933
- Operate the nation's largest public power system
- Sells wholesale power to 153 local power companies and 58 large direct serve customers
- $12 billion in revenue (FY24)
- ~11,300 employees
- HQ: Knoxville, TN



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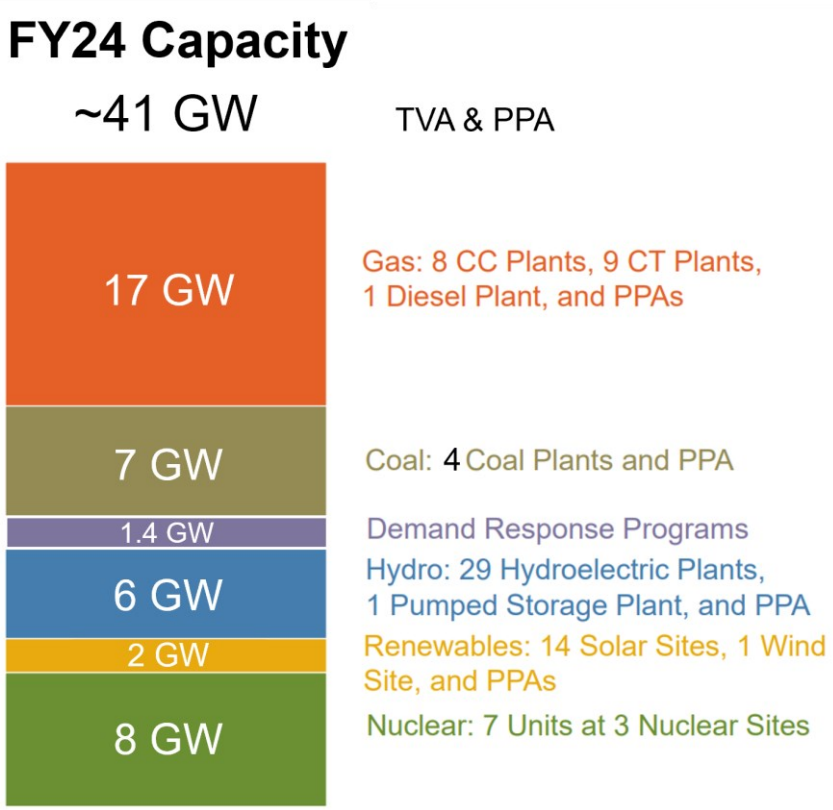
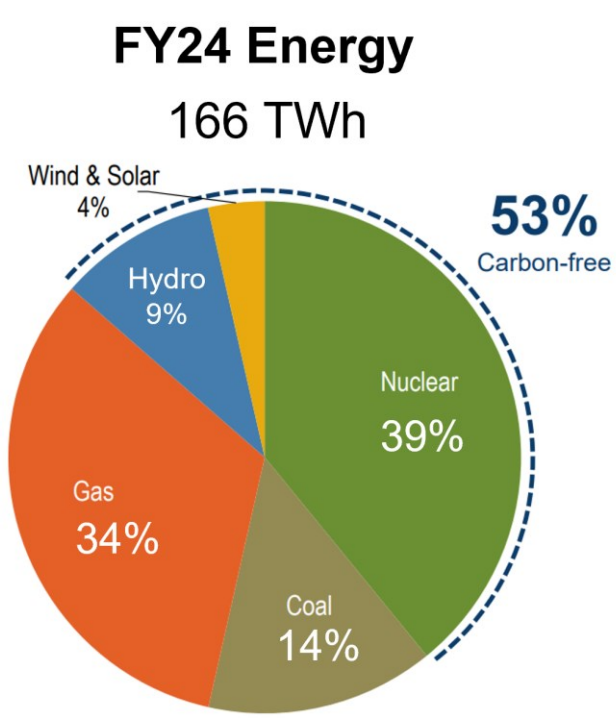
Resource Portfolio[1]

Own and Operate:
- 69 plants/sites over seven states
- 16,000 miles high-voltage lines, substations, switchyards, etc.

Power Purchase Agreements:
- ~8,304 MW
- 18% of kWh's

- Connected to Southern, Duke, MISO, PJM





[1]TVA 2024 10-K Report, SEC

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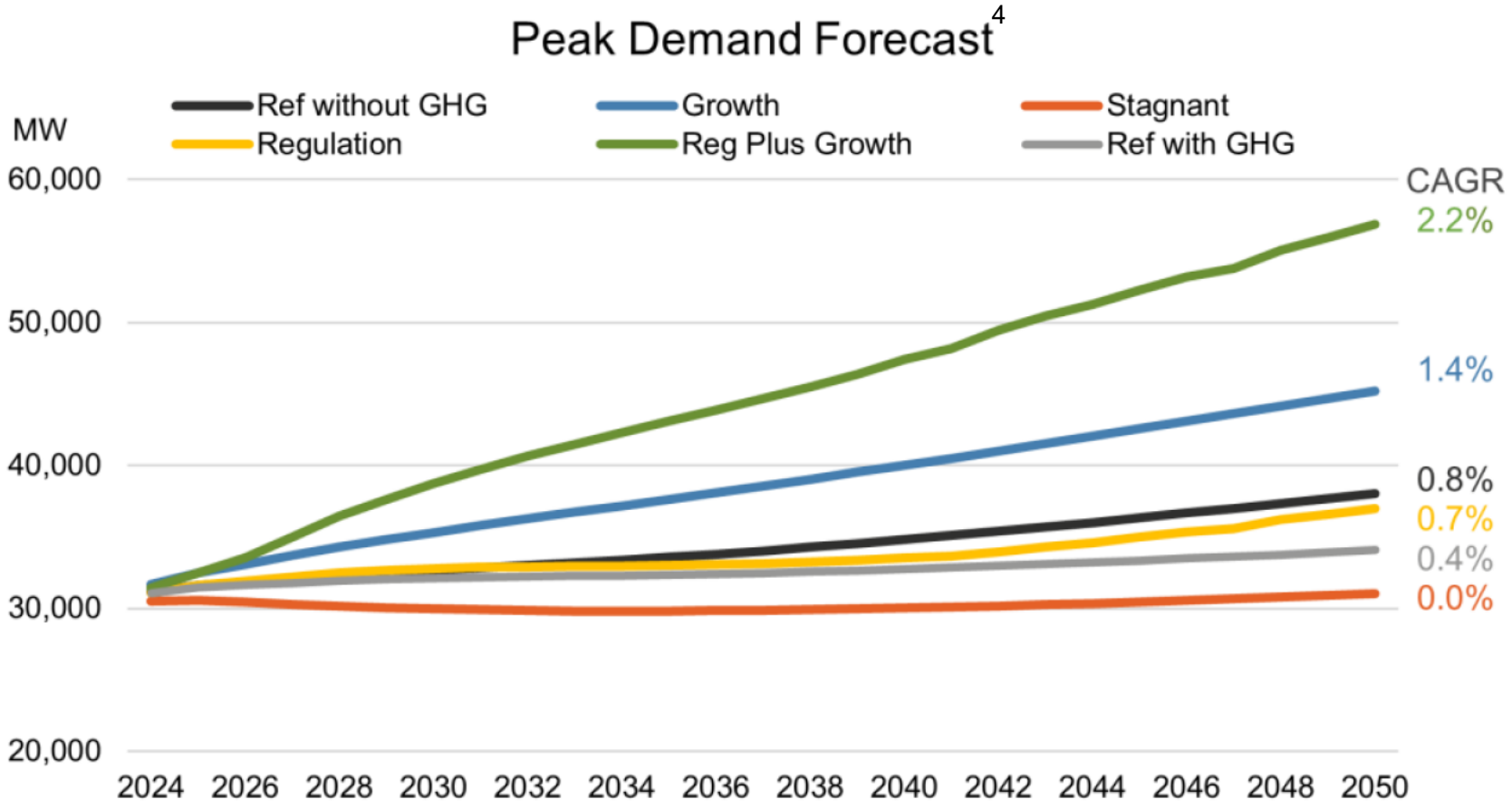
TVA's Changing Grid and Energy Transition

- TVA is expecting load growth
- Need balanced energy portfolio at least cost
- Investing in gas, solar, nuclear
  - Gas: 4,900 MW[1]
  - Solar: 2,802 MW, contract pending PPA[2]
  - Nuclear: 300 MW[3]
- Future grid assets such as renewables, nuclear will require energy storage due to reduced flexibility and dispatchability



Dispatchable generation is critical

[1] FY2024 TVA Annual Report

[2] TVA 2024 10-K Report, SEC

[3] TVA Submits Nation's First Construction Permit Application for BWRX-300 SMR

[4] TVA 2025 Draft Integrated Resource Plan

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Storage Options

Raccoon Mountain Pumped Hydro Storage

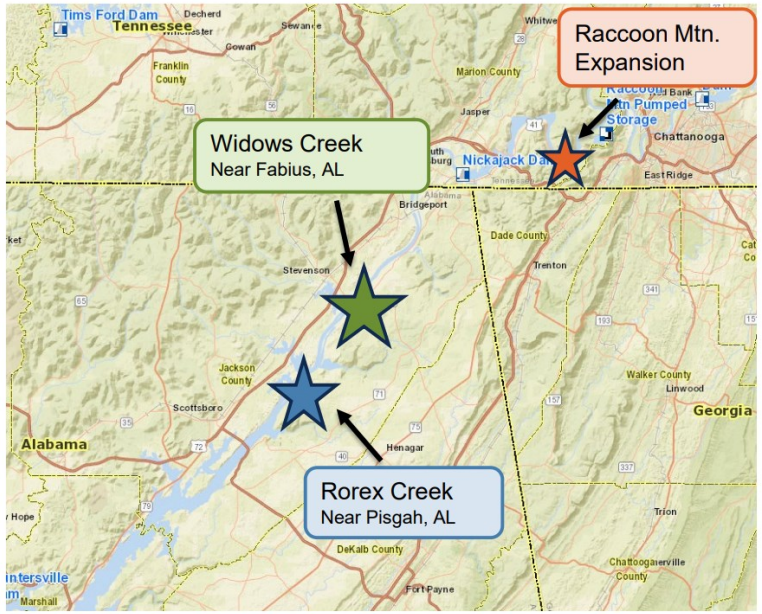
- 1,715 MW with 22 hours of storage
- Charges offpeak, discharges during load peak
- Helps reduce ramping of baseload/load following plants
- Could practically have a lifetime of 100 years

TVA Vonore Battery Energy Storage

- 20 MW / 40 MWh
- Brings high-quality power to industrial customers served by Loudon Utilities Board.
- Transmission deferral, grid resilience, flexibility
- Maximize learning about battery storage projects

TVA Potential Energy Storage Projects

Draft 2025 IRP – Up to 6 GW of storage by 2035



In the Works

- Kingston Energy Complex
  - 100 MW Lithium-Ion Battery Storage
- Pumped Storage Hydro Buildout Options:
  - Rorex Creek or Widows Creek AL (1200-1600 MW)
  - Alternative: Expand Raccoon Mountain (800 MW)
  - TVA Asks for Public Input on Proposed Pumped Storage Hydro Project

Longer Duration Energy Storage

Needs/Requirements To Compete

- 10-24 hours of storage
- Round Trip Efficiency >70%
- Deployment time: 2-5 years
- >20-year lifetime w/o major refurbishment
- Smaller footprint and better siting flexibility compared to Pumped Hydro
- Safer than Lithium Ion Battery

What's Missing

- Understanding lifetime ownership cost
- Understanding technical maturity and scale-up risks
- Operational data from pilots
  - Trial/demo selections based on solid operational data
  - RTE, degradation rate, standby losses, OPEX, system reliability
- Understanding transient operations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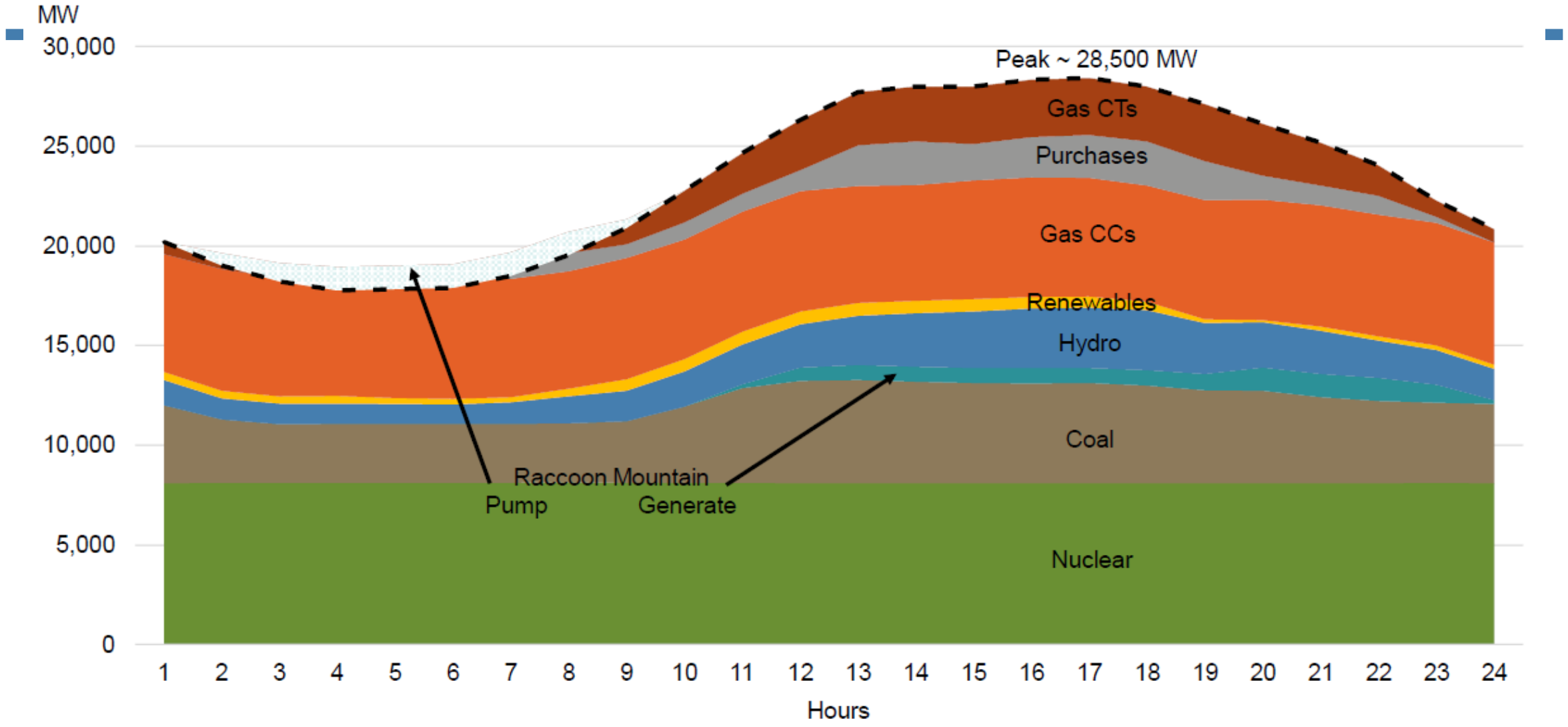

A-6: TVA Power System Dispatch for Typical Hot Summer Day

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System Flexibility and Capacity

Must Balance Generation and Load

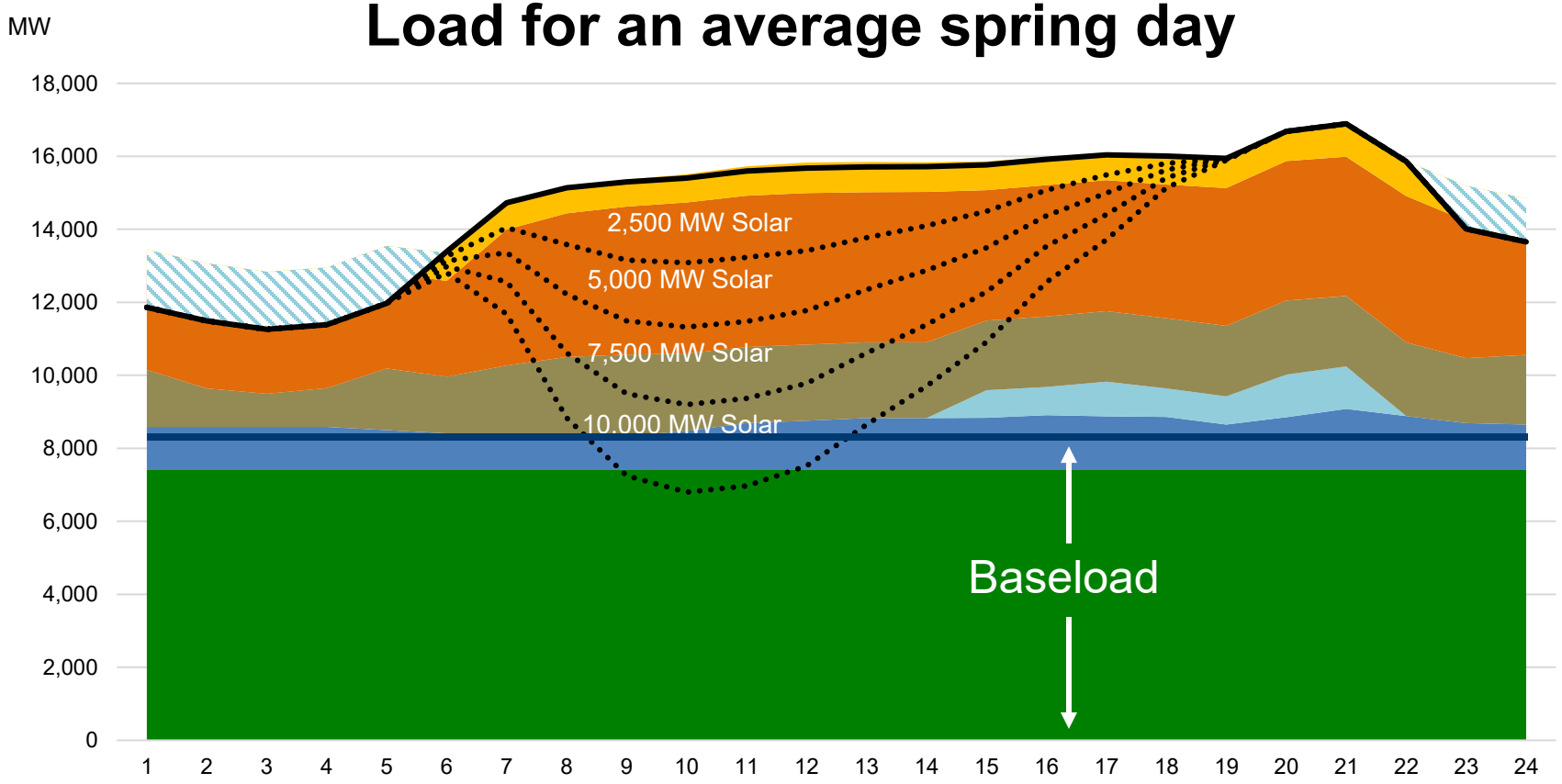
- Not enough is bad
- Too much is also bad

Major Issues

- Variability
- Winter Capacity
- Large Ramps
- Curtailments

Potential storage needs

- 1,000 MW of 4 hr (batteries)
- 1,000 MW of 8+ hr (PSP + emerging tech)



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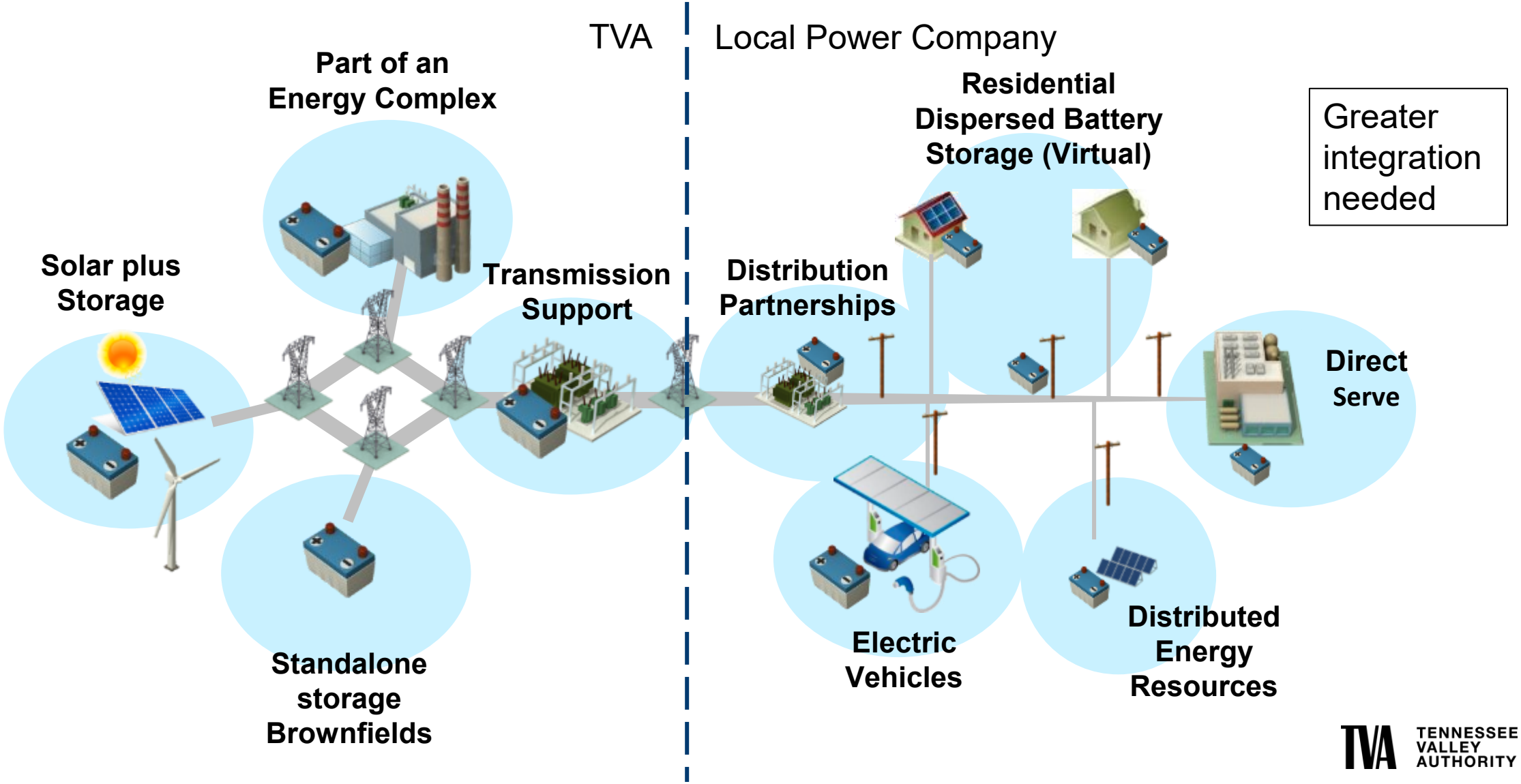
What roles might energy storage play?



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- Construction at Raccoon Mountain began in 1970 and was completed in 1978
- 528-acre lake overlooks the Tennessee River near Chattanooga, TN
- 230 feet high and 8,500 feet long. Largest rockfill dam ever built by TVA
- Pumps water from Nickajack Reservoir to the reservoir built at the mountain top
- Area around Raccoon Mountain is a state-designated Wildlife Observation Area. Recreation opportunities for hiking and biking