INNOVATIVE PATHWAYS TO 100% RENEWABLE ENERGY

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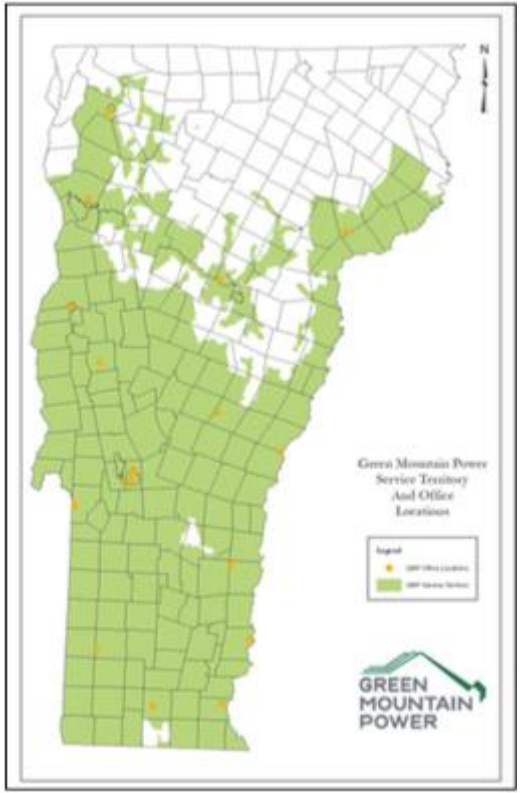
Green Mountain Power

- Over 264,000 Vermont customers in 202 towns
- Regulated electric utility (VT Public Utility Commission)
- Generation, transmission, distribution of electricity
- Purchase most of our power supplies
  - Mostly renewable, some nuclear
- Operate hydro, wind, solar, small peaking plants



GMP Power Supply Context

- Serving our Vermont electric customers
  - ~700+ MW peak, ~4.3 million MWh/year
  - ISO-NE regional market
- Renewable Energy Standard ("RES")
  - 75% renewable by 2032; New distributed renewables 10% by 2032
  - Transformation (Tier III): displacement of fossil fuels, 10% of sales by 2032
    - Ex: cost-effective electrification (in transportation, heating, process)
- Extraordinary buildout of distributed solar capacity (~50% of peak)
  - Flexible Net Metering; Standard Offer program; some utility projects & bilateral PPAs
- GMP's goal is carbon-free supply by 2025; fully renewable by 2030

Some of GMP's Customer-Focused DER Tools

Resource	Primary Resource/Activity
Home battery storage	**Reliable backup supply for participating customers; GMP uses limited operation for grid/market savings**
Controlled EV Charging	**Level 2 home chargers**
Flexible Load Management Pilot	**Building system controls (e.g., HVAC), industrial processes**
Curtailable Rider	Ski area snowmaking, up to 40 MW

- Present operation: primarily for peak reduction
- Future: likely more energy arbitrage, grid-focused use cases

Home Battery Storage

- Automated backup power, via two Tesla Powerwalls (total 10 kW, 27 kWh)
- GMP owns equipment; associated costs & lease revenue are reflected in GMP cost of service
  - Margin to benefit GMP's other customers
- First via pilot programs; now a tariff. 16+ MW so far
- GMP may charge/discharge for grid benefits; estimated value is used to reduce the lease price
  - Initial focus on peak shaving
  - New in 2021: participating in ISO-NE's Frequency Regulation market
- Related offerings
  - "BYOD" for customers who buy/lease battery storage via other vendors
  - A portion of units directed to low-income customers

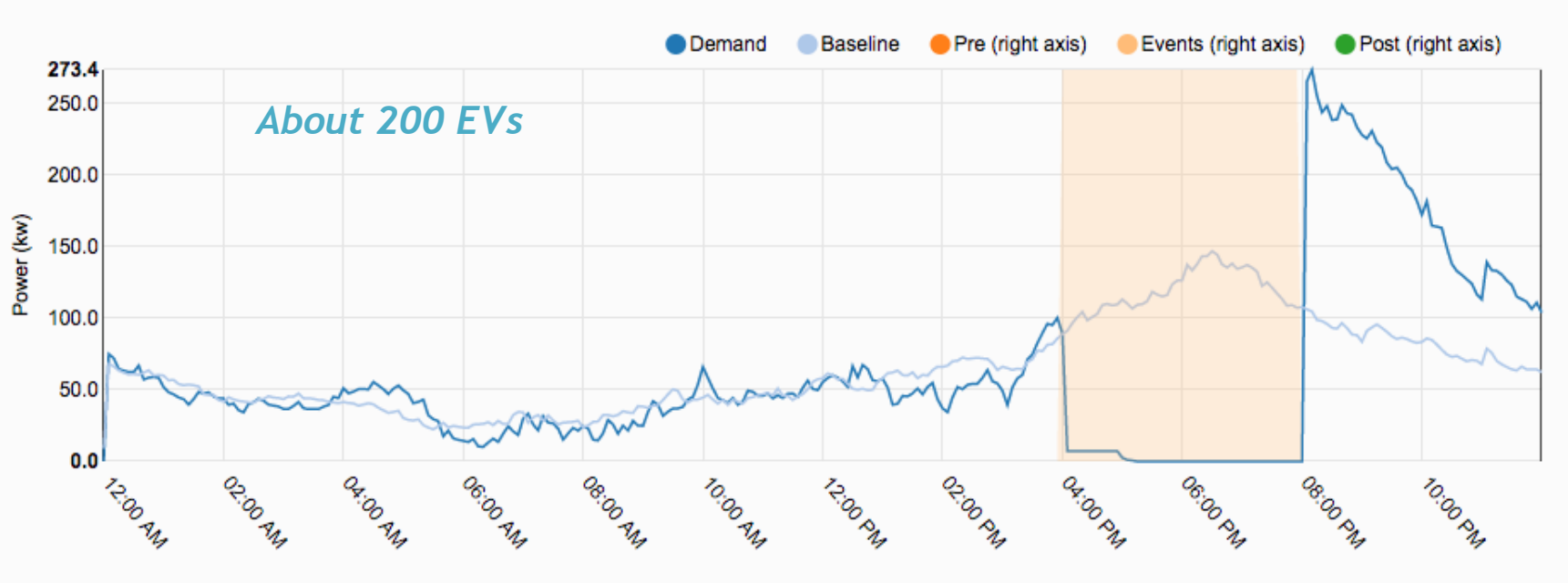
Home Battery Fleet Discharge During a Peak Event

- Tesla dispatches Powerwall fleet (via Gridlogic plaform) to manage Vermont monthly peaks
  - We collaborate on ISO annual peaks
- Discharge for this peak event was called from 16:00 to ~18:30, then gradual recharging

Controlled Home EV Charging

- Key tool to manage cost & grid impacts, as EV load scales up
- GMP offering: free Level 2 charger for customers who buy/lease an EV
- Participating customers must enroll in one of two EV-supportive rates
  - Managed charging: reduced residential energy rate during all hours – charging curtailed during limited # of dynamic peak events/month
  - Fixed TOU: lower energy rate, only during defined off-peak hours
- Managed charging: GMP calls events during forecasted peak conditions
  - During events, charger output is reduced/stopped (instruction via internet).
  - Customer may opt out (i.e., charge) during a peak event, at 60 cents/kWh
  - So far, strong performance and few opt-outs

Controlled EV Charging: a Peak Event (March, 2021)



- Peak event was called during the shaded area; participating charging load was reduced to near zero.
- Estimated coincident charging load 100 to 150 kW (less than 15% of max enrolled charging load)
- Note substantial “snapback” jump in demand immediately after the event

Flexible Load Management “FLM 2.0” Pilot Program

- Shifting loads in commercial buildings and industrial processes
  - HVAC controls, refrigeration, thermal energy storage, process adjustments
  - Goal = automated instruction & response, little impact on customer comfort/operations
  - Build experience & tools to expand this sector
- Strong partners in implementation
  - Efficiency Vermont (customer recruitment, evaluating opportunities, baselining)
  - Dynamic Organics (communication w/building management systems, customer dashboard, advisory, etc.)
- Participating customers paid for load reductions during peak event windows
  - Performance vs. customer-specific baseline consumption levels; 70% of projected savings
- Foundation for future use cases (e.g., energy arbitrage/shifting)

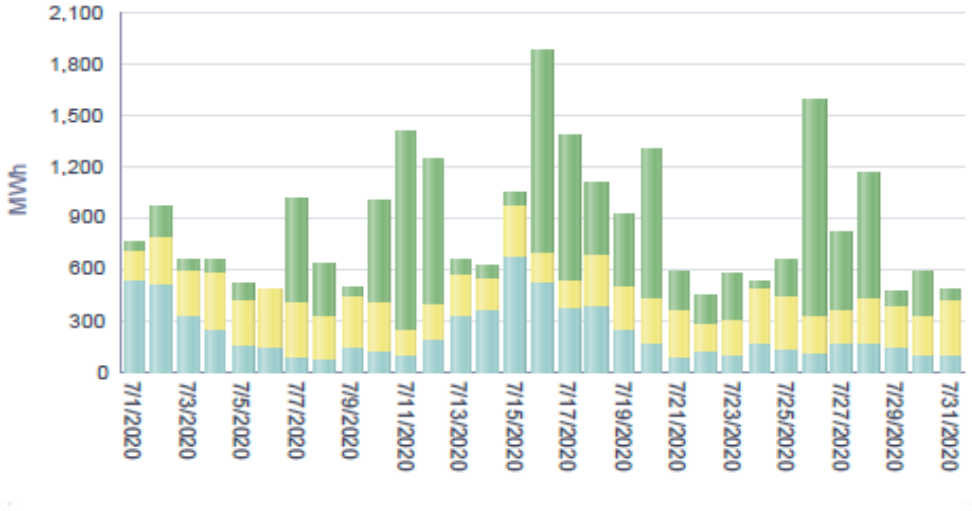
Looking Forward: Supporting The Renewable Transition

Major Renewable Power Sources for GMP Today

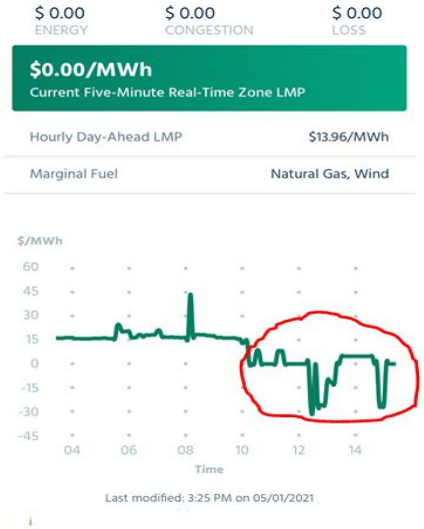
- Mostly from plant-contingent, intermittent sources
  - Wind 173 MW
  - Hydro 150 MW (mostly run-of-river)
  - Solar 330 MW
  - Also some shaped/dispatchable renewables (hydro & biomass)
- Characteristic seasonal output profiles, fluctuations
- Increasing volumes over time as we build to 100%

Future Use Cases Supporting The Renewable Transition

- Energy shifting in bulk, around core renewable generation sources
- Longer duration tools (e.g., flexible load, storage technologies) needed



Daily output of a fleet of hydro, solar and wind plants



Sustained Negative Real Time LMPs

Future Trends and Tools

- Sustained changes in **patterns** of net electric load, power market prices
- And **daily/hourly/real time** fluctuations based on renewable power output
- Leveraging flexible load and distributed storage to address more use cases
  - Energy arbitrage, alignment of generation and consumption
  - Deferral of grid investments (e.g., renewable hosting capacity), complementing other tools
  - New wholesale grid products/services (e.g., operating reserves)
  - Seeking more value from responding to real time conditions
- Systems and increasing expertise to manage distributed resources
  - Orchestrating multiple distributed resource types together
  - More sophisticated patterns of deployment
  - Improved forecasting and automation