

OPPORTUNITIES FOR
ENERGY RESILIENCY
IN AUSTIN

Technology-centric Programs to
Enable a Sustainable Future

Arushi Sharma Frank
ERCOT Representative, Tesla

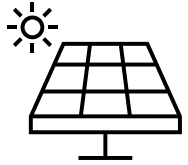
RMC Meeting Nov. 16, 2021



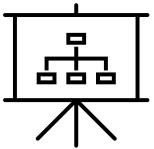
T O P I C S

- What is Demand-Side Resiliency?
- 5 Pillars of Effective Demand-Side Energy Resiliency Policy
- Benefits of Demand-Side Resiliency Programs
 - Customer Devices – Demand Response
 - Solar & Storage – Residential
 - Virtual Power Plants & Smart Homes
 - Residential Plug-in EV Charging
 - Renewable Microgrids
- Discussion

WHAT IS DEMAND-SIDE RESILIENCY?



Demand-Side Technologies
Devices affecting Grid Energy Demand

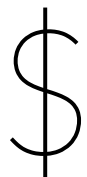


Demand-Side Programs
Rates, Policies incenting Grid Energy Demand Time-Shifting, Off-Grid Consumption

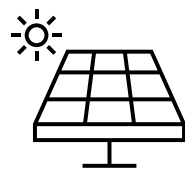
EFFECTIVE DEMAND-SIDE RESILIENCY PROGRAMS

5 PILLARS

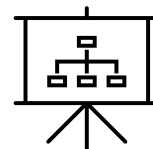
- Send Clear Economic Price Signals



- Utilities and System Operators Approve Technology



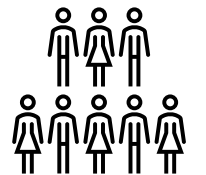
- Rate Design and Programs Value All Benefits



- Design for Customer Experience



- Create Accessibility to Technology



BENEFITS: DEMAND SIDE ENERGY RESILIENCY PROGRAMS

Customer Devices – Demand Response

- Load Shift (DD Response)
- Reduce Energy Bill
- Reduce Fossil Fuel Reliance
- Avert Rolling Blackout
- Reduce Utility Cost to Serve

Solar + Storage – Residential

- Whole-home Backup in Outage
- Reduce Energy Bill (Self-Consume)
- Absorb Rooftop Solar
- Reduce Fossil Fuel Reliance
- Reduce Utility Cost to Serve

Virtual Power Plant & Smart Home

- Reduce Utility Cost to Serve
- Compensate for Grid Services (Exports)
- Offer Lower Power Prices to All Customers (Hedging)

Residential Plug-In EV Charging

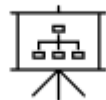
- Increase Utility Demand - Supply Balancing Flexibility
- Energy Bill Reduction
- Reduce Reliance on Fossil Fuel
- Revenue Growth for Utility
- Incent EV Adoption

Renewable Microgrid

- Reduce Utility Cost to Serve
- Absorb Excess Solar
- Outage Prep
- Community Resiliency Hubs

CUSTOMER DEVICES: DEMAND RESPONSE

- Compensate customers for “micro” and “macro” behavioral response from appliance level to whole-home – without compromising customer experience
- Value Proposition
 - Avert rolling blackouts during grid emergencies
 - Respond to high prices, put downward pressure on grid prices
 - Use to relieve local congestion in most constrained hours of the day to defer costly utility infrastructure upgrades
- Utility can partner with a Demand Response Provider or Aggregator to “Bid” the available capacity reduction into the wholesale market to be paid in advance for the expected curtailment



CUSTOMER DEVICES: DEMAND RESPONSE

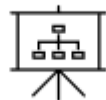
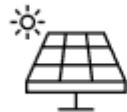
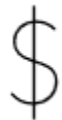
OHMCONNECT & EAST BAY COMMUNITY ENERGY (CALIFORNIA)

- EBCE will contract with OhmConnect as it does with power plants in the electricity market; to procure 25 MWs of load reduction from OhmConnect
- OhmConnect providing load reduction so EBCE can hedge its energy purchases during hot summer afternoons and evenings when the CAISO grid is the most stressed
- Typical annual payments for EBCE customers range **from \$30 to \$100 per year**, depending on home size and location

OHMCONNECT GOALS – CALIFORNIA

- 100 MW Load Reduction Capacity Statewide 2021; 550 MWs in 3 Years

* \$80 MN allocated to firming up customer participation capabilities at appliance level: free smart thermostats, free smart plugs



SOLAR + STORAGE: RESIDENTIAL



Store Solar Energy for Self-Consumption - Offset Utility Bills



Continue Using Solar with Storage in an Outage – Offset Risk of Power Loss



Respond to Critical Peak Pricing – Add Payments for Reducing Grid Load in Peak Conditions (4 Coincident Peak)



Export Energy and Ancillary Services to the Grid -- Offset Utility Costs for Serving Load, Respond to Grid Events, Generate Cash Payments on top of Bill Savings

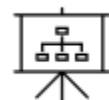
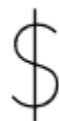
SOLAR + STORAGE: RESIDENTIAL

SACRAMENTO MUNICIPAL UTILITY DISTRICT

Sacramento Municipal Utility District has developed a Net Energy Metering Successor Tariff to accelerate market transformation from Solar Only to Solar-Storage

Utility rate design elements:

- Excess power injected at any time of day receives a DER Energy Credit 7.4c/kWh – represents value of GHG Emissions Savings, Natural Gas Savings, Capacity Savings (Transmission, Distribution, Generation)
- Battery Storage Incentives stack on the DER Energy Credit - the more value the battery provides the higher
 - \$500 base incentive
 - \$1500 if enrolled in critical peak pricing rate, with exports during CPP credited at full retail rates
 - \$2500 if enrolled in Virtual Power Plant)



VIRTUAL POWER PLANT GREEN MOUNTAIN POWER (VERMONT)

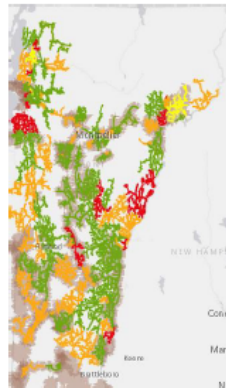
Green Mountain Power

TWO STORAGE TARIFFS FILED IN 2019

Bring Your Own Device (BYOD)

Upfront incentive from GMP for sharing
stored energy during peaks

(\$850/kW, \$950/kW in constrained areas)



GENERAC
PWRCELL

TESLA

sonnen

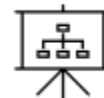
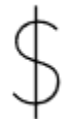
solaredge

Energy Storage System Lease

\$55 per month for 10 years

2 Powerwalls per install:
27kWh/10kW per system

Customers can work with any
participating Tesla-Certified installer

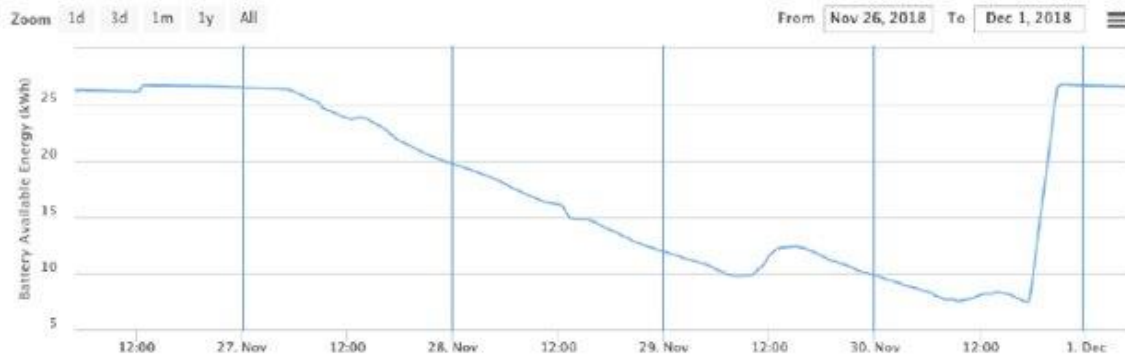


VIRTUAL POWER PLANT

PEAK SHAVING & OUTAGE MANAGEMENT

Green Mountain Power

CUSTOMER STORIES



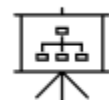
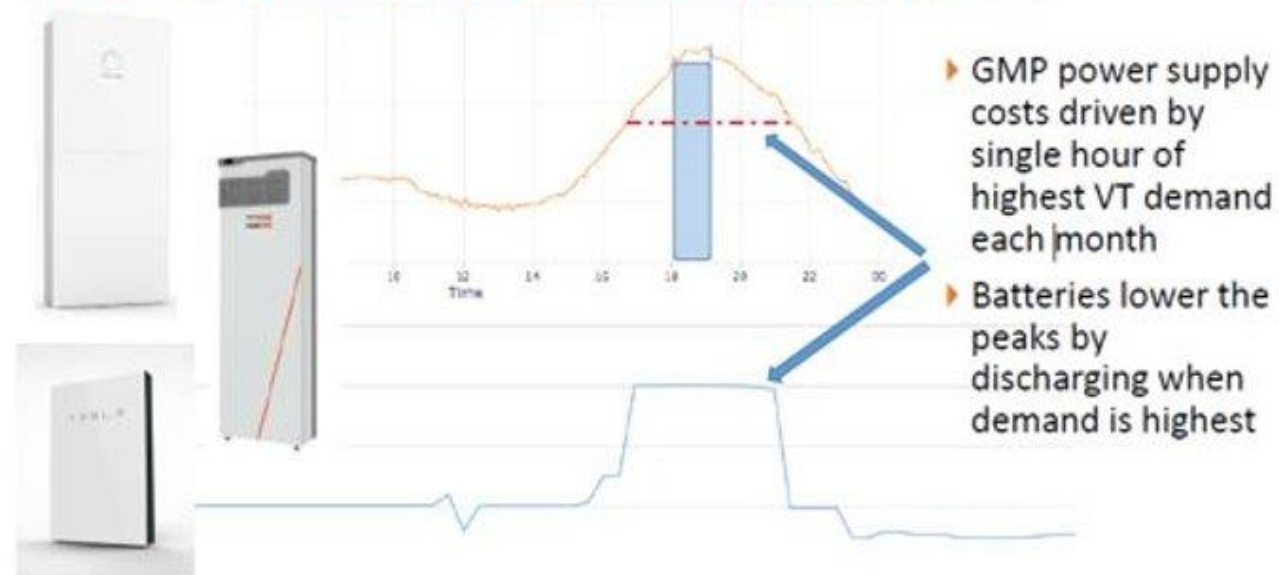
"The Powerwalls pumped our water, ran our lights, appliances, TV, and computers, and even powered our electric snowblower just as seamlessly as if we were connected to the grid"

- Gerry Hawkes, GMP Customer who rode through a 4-day outage

Green Mountain Power

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PEAK SHAVING 101: GENERATE SAVINGS FOR ALL CUSTOMERS

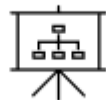


VIRTUAL POWER PLANT

SOUTH AUSTRALIA HOUSING TRUST INITIATIVE

- South Australia Housing trust installed 1100++ solar-storage residential systems on Housing Trust Tenant Properties across the region
 - Housing Trust Tenants do not own the assets – no up-front costs
- Housing Trust Tenants sign up for a tailored Virtual Power Plant retail Energy Offer (Energy Locals is Retailer)
- Even those Tenants without solar+ storage can access the same VPP Retail Energy Offer (~290 customers)

Housing Trust Customers in the VPP Access the Lowest Available Residential Rate in South Australia – 20% Lower than the statewide Default Market Offer



SMART HOMES AT EASTON PARK

DRIVEN BY UTILITY TECHNOLOGY APPROVALS

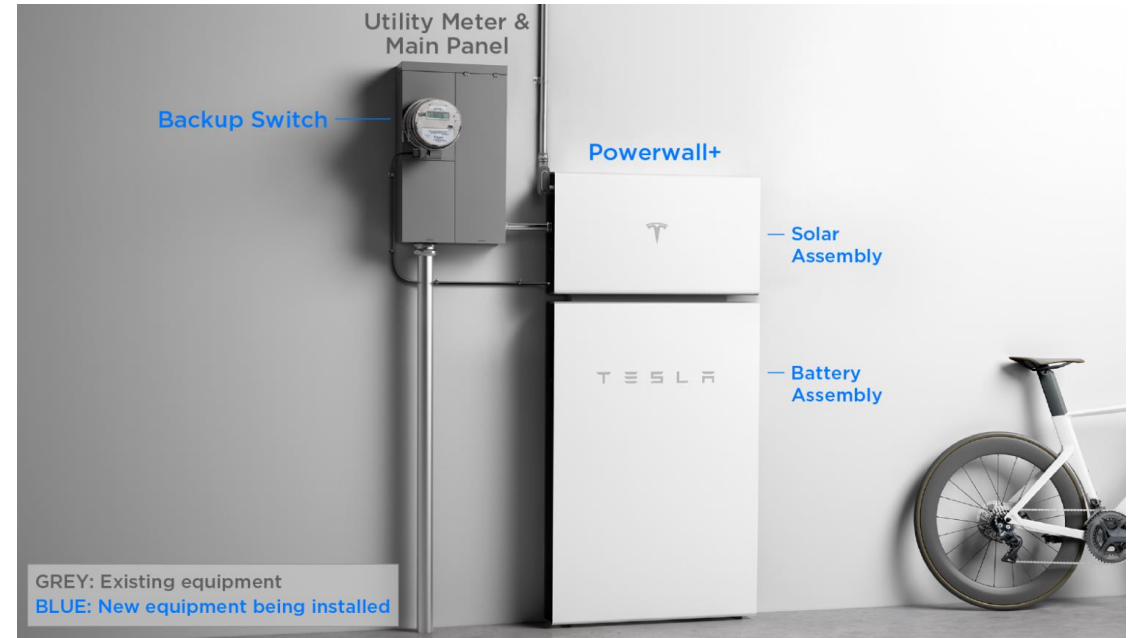


SMART HOMES AT EASTON PARK

DRIVEN BY UTILITY TECHNOLOGY APPROVALS



Old Way

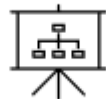


New Way

SMART HOMES AT EASTON PARK

PROJECT MILESTONES & ENABLERS

- 06/09/2021
 - First *Powerwall* + Install in Utility service territory
- 09/30/2021
 - TSLA *Backup Switch* Approval + Install Guidelines Issued by Utility
 - TSLA immediately begins providing \$500 Point-of-Sale Discount for all PV+ Powerwall Purchases in Utility Service Area
- 10/14/2021
 - First 9 Solar Roofs Installed in Easton Park new homes
- 10/18/2021
 - First TSLA Backup Switch & Powerwall + Installs in Easton Park



SMART HOMES IN AUSTIN ENERGY

Technology

Customer Value

Utility Programs

Can Install



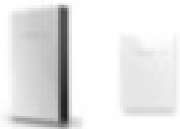
Solar Roof



Retrofit Solar

Resi Self-
Generation
Compensation

Value of Solar Credit (Austin Energy)
Net Energy Meter Credit (Other-US)



Powerwall 2.0 + Backup Gateway

Resi Self-
Consumption
Compensation

TBD in Austin Energy:
Storage Time of Use
Rate/Critical Peak Rate

Residential Grid
Services
Compensation

TBD in Austin Energy – Grid
Services Program

Cannot Install



Powerwall +



Backup Switch

Customer
Experience
Customer Savings
Simplicity in
Operations

TBD in Austin Energy –
Interconnection & Metering
Approvals for both
Technologies

OPINION

Now is the time for regulatory sandboxes in energy and utilities

Published Oct. 22, 2021

By Brien J. Sheahan



Brien Tucker/Utility Dive

The following is a contributed article by Brien J. Sheahan, former Chairman and CEO of the Illinois Commerce Commission, and former chairman of the National Association of Regulatory Utility Commissioners' Presidential Task Force on Innovation.

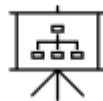
"Energy-specific sandboxes must be carefully and thoughtfully designed, and ... there are good arguments for ... target[ing] the energy industry, particularly the power sector. The energy system is transforming toward a largely distributed and renewables-based future that will require an updated regulatory framework. Trialing some targeted policy changes now, at limited scale, will help ensure that the rules governing the system keep pace with the energy transformation."

[Guidehouse](#)

R E S I D E N T I A L E V P L U G - I N C H A R G I N G

The residential EV rate(s) should

- align with the marginal costs across generation, transmission, and distribution sectors as much as possible
- reflect policy goals as accurately and transparently as possible
- encourage outcomes by influencing end-users' decision making and incentivizing customers to consume at optimal time periods
- convey price signals to end-users in a simple and easy-to-follow manner
- be based on economic sustainability, rate stability and gradualism
- promote energy access and affordability
- apply to whole houses instead of being exclusively for EVs through a separately metered EV charging requirement
*(if customer also has solar/storage on site)



RESIDENTIAL PLUG-IN EV RATE DESIGN GEORGIA POWER AND COBB EMC

Georgia Power Plug-In Vehicle Rate



Cobb EMC NITEFLEX



RENEWABLE MICROGRIDS

COMMUNITY-OWNED UTILITY OWNERSHIP

Battery-Powered Microgrid Models	Modes of Operation
Backup Batteries (Stationary or Mobile)	Batteries power loads directly; No other generation operating in parallel
Off-Grid Microgrid	Battery + Other Generators (Diesel, Solar etc.); no grid power connection; all operate in parallel
Grid-Tied Microgrid	Battery + Solar + optional Generator[s] + Grid (Battery & Solar operate together when on-grid); All operate in parallel when off-grid

Microgrid Benefits	Duration of Need at Single Site
Energy market risk reduction	Years
Distribution Deferral	Years
C&I temporary interconnection requirement	Years
Planned distribution outages	Hours to months
Natural disaster outages; Mobile Solutions	Hours to months
Daily energy shifting between sites	One day

FUTURE AREAS OF INQUIRY FOR CUSTOMERS

- What changes are required to send a price signal to customers for adoption of more demand response and storage?
- Can Austin aggregate customers and resources to build its own Virtual Power Plant?
- Without changing the current ERCOT rules, what recommendations can be made to the City to allow customers to access and benefit from demand-side technology?
- How can demand-side electrification benefit Austin's fiscal goals?
- How do Austin area utilities' resiliency/electrification plans enhance and serve broader City objectives for climate mitigation, public health and safety?
- What enhancements can be made to the **Austin Energy Resource, Generation and Climate Protection Plan to 2030** to incorporate diversified, technology-oriented demand-side programs that compensate Austin Energy customers for all potential contributions to resiliency?

APPENDIX

DEMAND SIDE ENERGY RESILIENCY – AUSTIN’S GOALS

Health, Safety, Welfare Objectives – Austin Climate Equity Plan

Austin Energy Resource, Generation and Climate Protection Plan

Austin Energy Roadmap

Statewide Grid Resiliency/Reform (Senate Bill 2, 3)

Storm Response Findings

Public Surveys

#CommunityPowered Utility – Resiliency Programs Easier to Implement without ERCOT Reforms

SOLAR + STORAGE: RESIDENTIAL SACRAMENTO MUNICIPAL UTILITY DISTRICT

Solar and Storage Rate proposal

All existing solar customers will continue to get the current NEM 1.0 rate and its benefits through 2030.

Rate proposal	Rate effective date	Customer groups impacted
Solar and Storage Rate	January 1, 2022	All Solar and Storage customers approved for interconnection on or after 1/1/2022

- Will accelerate storage adoption and transform the market from solar only to solar and storage.
- Will benefit all our customers and help SMUD achieve the 2030 zero carbon goal at a lower cost by partnering with our customers.
- Excess power can be sold back to SMUD for 7.4¢/kWh no matter the time-of-day or season.
- SMUD will reevaluate this value every 4 years (2026 & 2030) and the value will not be revised more than +/- 30%.
- Staff will implement an interconnection fee of \$475 for a majority of new residential solar applications effective January 1, 2022.

September 16, 2021

4

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Excess power sold back to SMUD for 7.4 ¢/kWh

What makes up the 7.4¢/kWh?

- Recognizes value customers' energy provides to SMUD by reducing the need to generate power from a power plant.

- Avoids the following power generation related costs:



- Carbon / greenhouse gases
- Natural gas
- Capacity (transmission, distribution & generation)



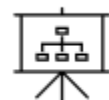
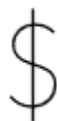
SMUD is recognizing rooftop customers' excess energy provides a **unique indirect benefit of avoiding disturbing** land for a utility size solar plant.

For more details, please see the Changes to Net Energy Metering section in the GM Report.

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5

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SOLAR + STORAGE: RESIDENTIAL VALUE ALL BENEFITS & DIVERSIFY PROGRAMS

\$25M storage incentive program

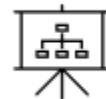
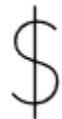
Type	Battery Storage	Battery Storage + Residential Critical Peak Pricing	Battery Storage + Virtual Power Plant Partner
Incentive	Up to \$500	Up to \$1,500	Up to \$2,500
Benefits	<ul style="list-style-type: none"> Customer uses stored energy when power is most expensive Reduces SMUD's peak load Battery provides backup power during an outage 	<ul style="list-style-type: none"> Battery storage benefits Helps SMUD during critical times when energy demand is highest or the grid is stressed 	<ul style="list-style-type: none"> Battery storage benefits SMUD pays an ongoing payment for participating in the program VPP partner shares stored energy with other customers when called upon

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Optional residential Critical Peak Pricing (CPP) rate

Who can participate?	 Customers with smart thermostats  Customers with solar and storage  Customers with storage only  Customers with solar only
What?	<ul style="list-style-type: none"> In times of extreme grid stress, SMUD declares a Critical Peak Pricing "event." SMUD asks customers to conserve energy and use batteries (where applicable). Opted-in customers pay more during "events" in exchange for a discount on summer Off-Peak and Mid-Peak hours.
When?	 <ul style="list-style-type: none"> June, July, August, September 1 to 4 hours per event with advance notice No more than 50 hours per summer
Why?	<ul style="list-style-type: none"> Conserves energy & reduces stress on grid during peak events, helping make energy available for others. Reduces need for energy from less environmentally friendly power plants. Opted-in customers receive discount rate during summer Off-Peak and Mid-Peak hours.

September 16, 2021 6 Board of Directors Meeting 



Renewable Microgrids

An aerial photograph of a solar farm installed on a tropical coastline. The solar panels are arranged in neat, parallel rows on a cleared area of brown earth. To the left, the ocean waves are crashing against a rocky shore. The background is filled with dense green tropical vegetation, including palm trees. In the upper right corner, there is a small building with a white roof, likely a control or maintenance structure for the solar farm.

RENEWABLE MICROGRIDS
CLEAN & RELIABLE ENERGY FUTURE

Examples

- Santa Barbara Unified School District – Solar Microgrids
- Redwood Coast Energy Authority (Municipal) Airport Microgrid

VIRTUAL POWER PLANT

RESIDENTIAL STORAGE EXPORTS TO GRID

GREEN MOUNTAIN POWER



100% Performance Score in Regulation Service to ISONE
Enrollment Goal of 1800 Homes ~ 3,000 Residential Batteries

