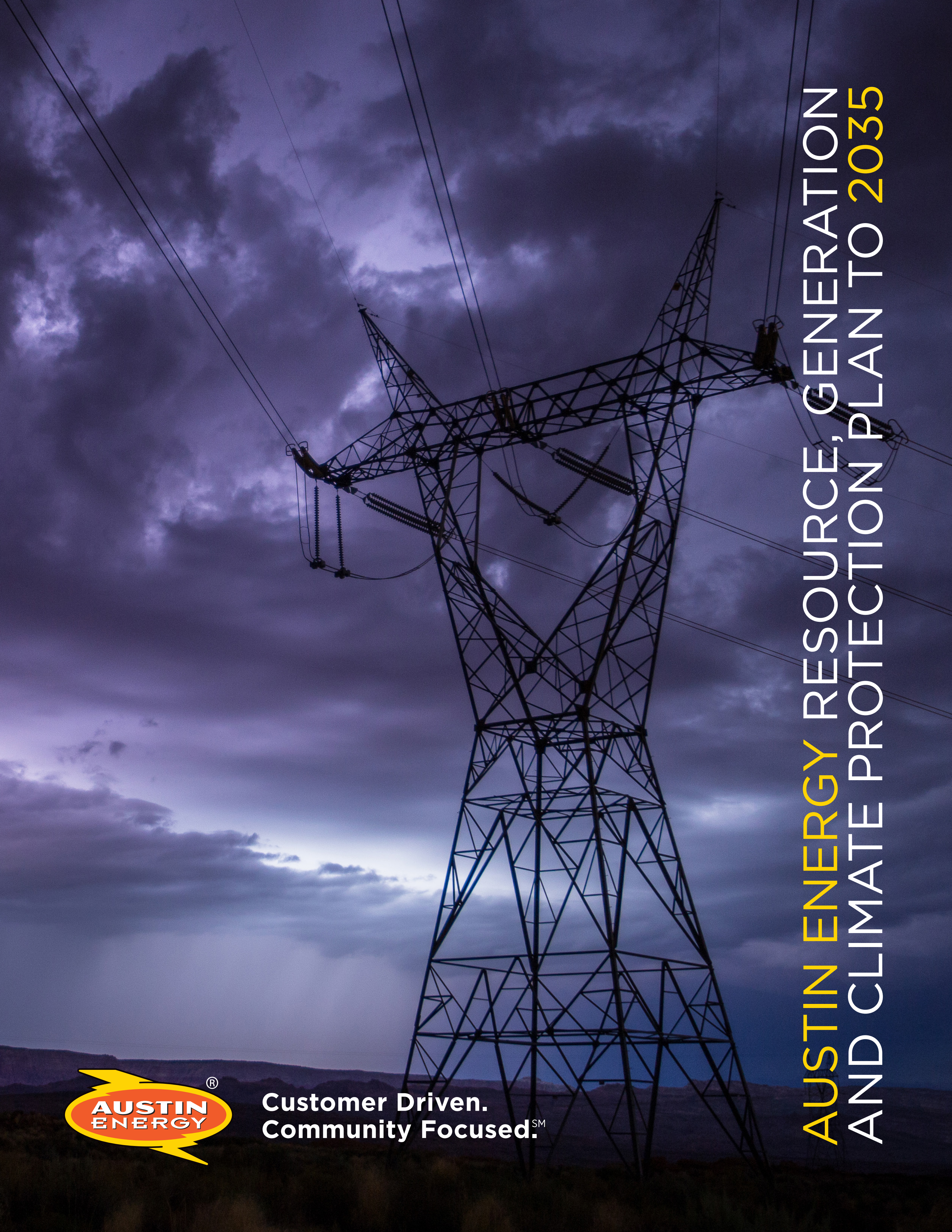
# Powering Austin's Clean Energy Future

# Appendix

AUSTIN ENERGY RESOURCE, GENERATION AND CLIMATE PROTECTION PLAN TO 2035



# AUSTIN ENERGY RESOURCE, GENERATION AND CLIMATE PROTECTION PLAN TO 2035

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# TERMS AND DEFINITIONS

- **Carbon Free —** For electricity, carbon free means that power comes from sources that do not create any carbon emissions when producing energy. Examples of carbon-free power sources are wind, solar, geothermal, hydrogen and nuclear.
- **Carbon Neutral —** For electricity, carbon neutral means any carbon emissions that come from power production are offset or balanced by capturing and removing (sequestering) the same amount of carbon from the atmosphere.
- **Decommission —** When a power plant reaches the end of its operational life, it is shut down, or decommissioned. As part of decommissioning, operating permits end and, depending on future plans for the location, buildings and equipment are removed to support the clean-up and new use of the location.
- **Demand Response —** Demand Response is a way for electric customers — based on conditions on the ERCOT system and through their local utility — to shift and reduce their energy use during specific times to help balance supply and demand on an electric system. By reducing and shifting electric demand away from peak energy use times, customers can help keep overall electricity costs lower for the entire community. As part of Austin Energy's efforts to meet the community's priorities, we have made significant investments in technologies and innovations around Demand Response. Some examples of Austin Energy's Demand Response options include the Power Partner thermostat program, the Power Saver pilot program and the Commercial Demand Response program.
- **Dispatchable Energy —** Dispatchable energy means power that can be turned on and off when needed. This type of power can be adjusted to fit supply and demand needs as they change throughout any particular day. Examples of dispatchable sources of energy are natural gas, batteries and biomass.
- **Intermittent Energy —** Intermittent energy is power that is only available under specific conditions and cannot be turned on outside of those situations. This type of power cannot be adjusted to fit supply and demand needs as they change throughout any particular day. Examples of intermittent energy sources are wind and solar.
- **Distribution —** The distribution system carries power short distances to homes and businesses. It connects to the high-voltage transmission system at substations where the energy voltage is lowered so distribution lines can carry that power to customers. It's a local thing. When you see wooden poles, power lines and green transformer boxes around town or neighborhoods, you are looking at pieces of the distribution system. The typical distribution voltage for Austin Energy is 12.5 kilovolts (kV). Eventually, the power reaches the majority of customers at 240 and 120 volts (V).
- **Electric Reliability Council of Texas (ERCOT) —** The Electric Reliability Council of Texas balances the flow of electric power to more than 27 million Texas customers — or about 90% of the state's electric use. ERCOT is commonly referred to as the Texas or statewide grid. We also refer to ERCOT as the electric marketplace where organizations buy and sell power. By law, Austin Energy is a part of ERCOT and participates in the electric market. That means all the power we generate is sold into the market and statewide grid, and we buy all the power used by our customers from the same market and grid.
- **Electric Utility Commission (EUC) —** The EUC is composed of eleven members appointed by the Austin City Council. Each member serves a four-year term. This commission advises the City Council on policies and procedures related to Austin Energy, including customer services, capital investments, new generation facilities, fuel type selection, fuel costs and charges and more.



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- **Electrification —** Electrification is the transition from fossil fuel technologies to appropriate electric-powered technologies. Examples include gas vehicles to electric vehicles and gas stoves to electric stoves.
- **Energy-Only Market —** The ERCOT energy market is designed as an energy-only market, where power generators are only paid for the energy they provide, with very few exceptions. This is in contrast to a capacity market where generators are paid for the generating capacity they have as well as the power they generate.
- **Generation —** Generation refers to the power plants that make electricity. In the same way that some cars use different fuels to take you down the road, like gasoline, diesel and electricity, different plants use different fuels or sources to make power. Some sources and fuels include natural gas, solar, wind, nuclear, coal, biomass, hydrogen, geothermal and flowing water.
- **Gigawatt (GW) —** A gigawatt is a unit of measurement for electricity. One gigawatt is 1,000 megawatts. For gigawatts, we often use this scale of measurement when we talk about total numbers for entire systems, like the total amount of electricity in ERCOT.
- **Greenhouse Gas —** Greenhouse gases trap heat close to the Earth's surface. These gases include carbon dioxide, methane, ozone, nitrous oxide, and chlorofluorocarbons. Power plants can produce greenhouse gases — especially those that burn fossil fuels.
- **Load —** Load is energy use. It's the amount of power required at any given time to meet all needs on the electric system. When residents use electricity to turn on their lights or run their appliances and when businesses run equipment, that's creating load. When we talk about the supply and demand of the electric grid, load is the demand side of the equation.
- **Load Growth —** Load growth is the increase in the amount of power needed to meet a growing need on an electric system. Load growth can come from a variety of sources, including more customers, electrification and new businesses that heavily rely on power, like data centers.
- **Load Shed —** Load shed is a controlled, temporary interruption of electric service that is used as a last resort to balance supply and demand on an electric system. Essentially, the need for load shed is what causes controlled outages. This happens when there is insufficient supply to meet demand, and ERCOT orders load shed as a last resort to avoid a full grid collapse.
- **Load Zone —** A geographic area of power use that is used to see where electricity is needed and to set prices for that area based on the availability of power and its ability to get there. Different load zones can have different prices. Austin Energy's load zone is basically the same as its service territory.
- **Market Event Liquidity —** This is the money Austin Energy needs to have on hand so it can cover the market participant costs of producing and consuming power in the ERCOT market. This could include payments to ERCOT, fuel suppliers and other organizations we've worked with on power trades. By law, Austin Energy sells all the power we produce into the ERCOT market, and we also buy all the power our customers use out of the market. When Austin Energy buys power for a particular day, we have to pay that cost within seven days, and when ERCOT requires market participants to have funds available in support of the statewide system, we have to make that money available and send it to ERCOT the next day. These costs can change suddenly, and Austin Energy has to be ready with these funds.
- **Megawatt (MW) —** A megawatt is a unit of measurement for electricity. One megawatt is 1,000 kilowatts. We often use megawatts when we talk about topics at the utility scale. Things like power plants, our generation portfolio and our demand are often measured in megawatts. According to ERCOT, a megawatt can power about 200 homes.

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- **Municipally Owned Utility (MOU) —** As an electric utility, Austin Energy is what's known as a municipally owned utility. That means we are owned by the City of Austin, serve as a department of the City and are governed by the Austin City Council. In ERCOT, as a municipally owned utility, we have made the choice to stay out of retail electric competition. Austin Energy's service area was set by the Public Utility Commission of Texas, and those in our service area can only be served by us. The other side of that is Austin Energy can only offer retail electric service to those within our service area. As a municipally owned utility, Austin Energy also has the option to be vertically integrated — meaning we can generate power, transport power and sell power to customers.
- **Peak Load —** Peak load is the amount of electric use at a specific time when electric use is at its highest — significantly higher than the average load level. This peak time is often when the cost of electricity is at its highest. Reducing peak load helps lower costs and ease strain on the electric system by decreasing the amount of power the equipment has to handle.
- **Power Supply Adjustment (PSA) —** The PSA is a dollar-for-dollar pass through rate that allows Austin Energy to recover:
  - » The cost of fuel for our power plants.
  - » The cost of power purchase agreements for renewables or other sources.
  - » The cost of electricity purchased from the ERCOT grid.
  - » Any net charges experienced as Austin Energy sells power to the ERCOT grid.

  Austin Energy adjusts the Power Supply Adjustment rate to reflect the current price of fuel, projected Austin Energy power purchases, and any existing over/under recovery of those expenses. The utility can make small adjustments to this charge throughout the year, as conditions require.
- **Price Separation —** In the energy market, price separation is when the price of power goes up in an area because power can't economically flow to that area. This is often caused by transmission congestion.
- **Public Utility Commission of Texas (PUCT) —** The PUCT is the state agency responsible for the economic regulation of Texas' electric, telecommunication, and water and wastewater utilities. The PUCT oversees the state's competitive utility markets, including oversight of the Electric Reliability Council of Texas, which runs the electric grid for 90% of the state's electric use.
- **Reliability Must Run (RMR) —** Reliability Must Run is a requirement from ERCOT that would keep a generating unit operating past its planned retirement date. After a thorough analysis and exhausting other options, ERCOT would use the RMR designation to keep that generating unit running to address reliability concerns on the statewide grid that could occur if that generation wasn't available. RMR units are only paid for their basic costs to operate and do not receive market prices for their generation.
- **Resource Generation Plan —** A resource generation plan is a long-term guide for a utility to meet future energy requirements. It analyzes risks, costs, technologies and opportunities around future power supply and demand possibilities to come up with options on how to meet those energy needs within a utility's priorities. Austin Energy's Resource, Generation and Climate Protection Plan to 2035 is looking to plot a course to Austin's new energy future while aligning with community values of affordability, equity, reliability and environmental sustainability.
- **Reliability Unit Commitment (RUC) —** The Reliability Unit Commitment is an ERCOT process in which the grid operator requires a generating unit to come online for the purpose of reliability, not market economics. The generating unit is compensated at its production cost and not the market settlement price during this period. A RUC instruction is used when there is a reliability concern in a local area or on the larger statewide grid.

- **Rolling Blackouts —** We call these controlled outages. Controlled outages are meant to be temporary interruptions of electrical service directed by ERCOT when electricity-generating resources cannot meet the electricity demand in the ERCOT region. Each electric utility must reduce demand by cutting power to customers in an amount directed by ERCOT. For Austin Energy's controlled outages, they typically last up to 40 minutes before rotating to another location. Depending on the situation, these outages may turn into extended outages that cannot be rotated.
- **Substation —** A substation is like a hub for electricity. Power flows into a substation so it can be changed into a different voltage before it continues its path to customers. Substation equipment includes power lines, transformers and circuit breakers. There are both transmission substations and distribution substations, depending on the voltage it is meant to handle.
- **Tail Risk —** Tail risk looks at situations that are not likely to happen very often but cause significant impacts if they do. These impacts could affect costs, reliability or environmental performance. Situation examples include price spikes for fuels like natural gas, extreme winter storms, long-term droughts and unforeseen effects of new technology developments. In resource planning, utilities analyze tail risks to assess how portfolios would perform under these extreme conditions.
- **Transformers —** Transformers are pieces of equipment that literally transform electricity from one voltage to another. You can find large transformers as parts of substations, but you can also see smaller versions attached to poles or located on concrete pads near homes and businesses. Changing voltage is important for transporting power from power plants all the way to customers.
- **Transmission —** There are power sources all over Texas, and that power has to reach people. The transmission system handles high-voltage electricity and carries it over long distances. The high voltage is needed for efficiency, and that power flows into a substation to reduce the voltage level so it can continue its way to customers. This system often includes large equipment — tall metal towers and hundreds of miles of power lines. Transmission voltages for Austin Energy include 345 kV, 138 kV and 69 kV.
- **Transmission Congestion —** Transmission congestion is a choke point or bottleneck for power that limits the amount of electricity that can flow through power lines from power plants to the customers who need it. Congestion leads to higher prices for power and possibly power shortages. If enough power cannot be brought in to meet power needs, and there is not enough generation locally, that would cause local outages.
- **Vertically Integrated —** A vertically integrated utility has the ability to generate power, transport power and sell power to customers. In the competitive areas of ERCOT, individual organizations can only provide one of these services. They can't provide multiple services. Because Austin Energy is a municipally owned utility, we are still allowed to be vertically integrated, so we:
  - Own our own power generation and contract for additional energy sources.
  - Own and operate transmission and distribution equipment that transports power from generation sources to homes and businesses.
  - Sell electricity to customers.
- **Voltage —** Voltage is like water pressure for electricity. It helps push electricity through power lines and other electric equipment. The higher the voltage, the further electricity can travel, and then the voltage is lowered so people can use it. Voltage is measured in volts (V) or kilovolts (kV).

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AUSTIN ENERGY RESOURCE, GENERATION
AND CLIMATE PROTECTION PLAN TO 2035

# RESOURCE, GENERATION AND CLIMATE PROTECTION PLAN TO 2035

## OUR COMMITMENT

Through the 2035 Plan, Austin Energy is building a reliable, affordable, and sustainable energy future for our community. By addressing immediate risks and remaining adaptable to future changes, Austin Energy will continue to serve as a resilient and community-focused public power provider.

## THE RISKS

Austin Energy is facing a changing energy landscape. The best way to plan for the future is to identify the changes we're seeing and address the risks ahead.

- **Demand growth —** more people/businesses need more electricity.
- **Local congestion —** need to reduce local congestion and significant price swings to support reliability and protect customers from increased power costs.
- **Replacing older power plants —** loss of local generation means Austin Energy must import power from resources far from our service area, increasing financial volatility and reliability risks.
- **Extreme weather —** impacts infrastructure, operations and financial stability.
- **Dynamic ERCOT market —** leads to unpredictable costs and changing regulatory requirements.

## COMMUNITY COLLABORATION AND VALUES

Austin Energy collaborated with a broad cross-section of local organizations and diverse voices through workshops, stakeholder meetings, and a survey. We also partnered with energy experts to study dozens of approaches to meeting Austin's future energy needs. These are the community's key values:

- **Reliability —** providing consistent and predictable electric service that will power our community as it continues to grow.
- **Affordability —** assessing the impacts and promoting fairness of costs for customers while continuing to provide the public-power benefits that enhance our community's quality of life.
- **Environmental Sustainability —** maintaining flexibility in support of clean and innovative technologies and programs while taking a holistic assessment of the community and environmental impacts.
- **Energy Equity —** evaluating and expanding access to Austin Energy services so they can reach those who need them most while reducing any negative impact of our operations on the community.

## THE TOOLKIT

- **Prioritize Customer Energy Solutions** by reducing the need for generation and leveraging customer-side solutions.
- **Leverage Local Solutions** to ensure Austin's reliability and affordability by maintaining sufficient resources locally.
- **Achieve Decarbonization** by recognizing the impacts of climate change and being a leader in the clean energy transition.
- **Further our Culture of Innovation** by serving as a leading utility in innovative programs and solutions.

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# RESOURCE, GENERATION AND CLIMATE PROTECTION PLAN TO 2035

Austin Energy's Resource, Generation and Climate Protection Plan to 2035 provides a flexible strategy to meet our collective values of reliability, affordability, environmental sustainability and equity while addressing immediate challenges and opportunities.

## KEY ISSUES

Austin Energy developed the 2035 Plan to address challenges and changes the utility is seeing in the energy landscape, including:

- **Increased electricity demand** resulting from electric vehicle adoption, home electrification, data centers, and new development.
- Higher electricity prices in the Austin area because of **increasing transmission congestion**.
- **Projected reliability risks** from insufficient local generation could cause local power outages and create issues with maintaining system voltage.
- Physical and financial **risks from extreme weather events.**

## Building a Bridge to Our Clean Energy Future

Based on intensive stakeholder engagement, modeling, and research, the 2035 Plan puts forward a suite of solutions and technologies to drive these outcomes:

- **100% Carbon Free Generation by 2035**
- **Industry-leading customer energy solutions**
- **Promotes reliability, affordability and sustainability**
- **Protects our most vulnerable**
- **Resilient to extreme weather**
- **Flexible and innovative**
- **Built to adapt to changing conditions**
- **Community-informed plan**

**publicinput.com/generation**



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# What's In Our Plan?

## Prioritize Customer Energy Solutions

**Lead with Demand Response —** Planning to Reach 270 MW and Strive for 470 MW Summer Reductions by 2035

**Promote Local Solar Solutions —** Planning to Reach 205 MW by 2027 and 405 MW by 2035

**Lead with Energy Efficiency —** Planning to Save 975 MW by 2027

**Incentivize Customer-Sited Batteries**

## Achieve Decarbonization

**Continue Goal of 100% Carbon-Free Generation as a Percentage of Load by 2035**

**Improve Local Air Quality through Carbon Intensity Guardrails and Reducing Emissions**

**Add More Clean and Renewable Energy**

**Continue efforts to move away from coal power generation at Fayette Power Project**

## Leverage Local Solutions

**Consider Additional, More Efficient, Natural Gas Peaker Units**

**Incorporate Utility-Scale Batteries —** Installing 125 MW by the End of 2027, if Feasible

**Increase Transmission Import Capacity**

## Further Our Culture of Innovation

**Explore Advanced Nuclear Technologies**

**Research and Development Partnerships**

**Virtual Power Plant**

**Pilot Geothermal Generation, starting with a 5 MW project in East Texas**

**New Solar Opportunities**





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RESOURCE, GENERATION AND CLIMATE PROTECTION PLAN TO 2035

# FREQUENTLY ASKED QUESTIONS

## What is a resource generation plan?

A resource generation plan is a comprehensive strategy developed by an electric utility to determine how it will meet current and future energy needs. This plan outlines the mix of energy resources that the utility will use to generate and deliver electricity to its customers.

## Why is a resource generation plan important?

A resource generation plan is important because it serves as a roadmap for ensuring a reliable, affordable and environmentally sustainable energy future. It analyzes risks, costs, technologies and opportunities around future power supply and demand possibilities so a utility can meet energy needs and priorities.

## What will Austin Energy's resource plan mean for its customers?

- Cleanest energy portfolio in Texas
- Industry-leading customer energy solutions
- Promotes reliability, affordability and sustainability
- Protects our most vulnerable
- Resilient to extreme weather
- Flexible and innovative
- Built to adapt to changing conditions
- Community-informed plan

## Why can't Austin Energy rely on existing local generation?

The reliability and affordability risks we're facing are happening now. Until we get additional generation, we remain at an elevated risk. Additional generation, including natural gas peakers, will allow us to address local reliability issues and help manage price volatility for our customers.

## Are you changing the carbon free by 2035 goal?

The goal hasn't changed — it's always been 100% carbon free generation as a percentage of load. This approach ensures sufficient carbon-free generation to meet demand, avoiding reliance on ERCOT's less clean and costly energy. The percentage of the load means we need to have sufficient carbon-free generation to offset our load. This helps mitigate affordability and environmental risk. Otherwise, we could reach the goal of 100% by having nothing but carbon-free resources but not enough to serve our load. Then we'd be purchasing power from the ERCOT market, and that isn't a very clean fuel mix but could also come at a very high cost. Owning generation acts as a hedge against ERCOT market prices and extreme weather risk. Owning generation also means we have more control over the emissions on the path to carbon free.

## Why doesn't Austin Energy increase its efforts toward demand-side management?

We've maximized potential for energy efficiency, demand response, and local solar, but barriers like costs, workforce availability, and supply chain challenges limit further expansion without significant investment.



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## How urgent is the current risk of local reliability issues on high-demand days?

The risk is immediate. Voltage is the "pressure" that pushes electricity through the system. It needs to remain stable for the grid to function properly. Without local generation, voltage could cause localized outages on very hot and very cold days. Localized outages mean power outages would be occurring only in the Austin area.

## I've heard a lot of discussion around peakers. What are they and how do they align with Austin Energy's goals?

Think of peakers as jet engines. Peakers are small, flexible natural gas units designed to run only during peak demand or emergencies, about 12% of the time, or six weeks out of the year. Additionally, Austin Energy could impose self-regulated limits for when they run. Peakers ensure local reliability, help manage price volatility, and provide critical black start capability to restart Austin's grid during outages. Owning the peakers allows us to control emissions and operational decisions, unlike relying on third parties or ERCOT's less clean energy mix. While adding peakers involves some emissions, they would replace less efficient units, and their limited use aligns with Austin Energy's broader goals of increasing renewable energy, demand-side management, and reducing overall carbon emissions. Peakers can also be sold if no longer needed.

## How is this an improvement from the current plan if it proposes adding new sources of emissions?

With robust energy efficiency and demand-response programs, plus local solar and batteries, Austin Energy will do even more to help customers use less electricity. The plan needs additional local solar solutions to avoid local outages and maintain affordability. In addition to local transmission, solar and batteries, the plan proposes adding limited natural gas peaker units to help reliability and affordability while pushing the transition to a cleaner energy future. Over time, Austin Energy would reduce overall emissions by using new peakers to replace older, less efficient units, and using them sparingly. Without local generation, Austin Energy would have to purchase power from ERCOT whose portfolio has higher emissions..

## What is blackstart and how does it relate to the resource generation plan?

Blackstart refers to the process of restarting a power grid from a complete shutdown. In a grid failure, most power plants cannot restart on their own because they require electricity to power their auxiliary systems (e.g., pumps, controls). Blackstart-capable units, like peakers, are specialized resources designed to jumpstart the grid in these situations. Without these units, Austin would have to wait for another utility to bring power to us, instead of being an active part of the solution from the start. As the capital of Texas, it's our responsibility to be prepared.

## What happens if another Winter Storm Uri occurs and Austin Energy doesn't have enough dispatchable generation?

In an extreme weather event like Winter Storm Uri, if we didn't have enough generation to provide energy over multiple days, we could face significant financial risks. ERCOT could require near-immediate payment of hundreds of millions of dollars, and if we didn't have the ability to pay those costs, it could put the City in significant financial hardship.

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# Load Zone Price Separation

## Austin Energy and the ERCOT Market

The Electric Reliability Council of Texas (ERCOT) operates the statewide electric grid, balancing the flow of electric power to more than 27 million Texas customers — or about 90% of the state's electric use. While ERCOT directs the flow of power all across the state, it's also managing the electric marketplace where generators and utilities buy and sell power. The ERCOT market has a detailed design, with thousands of price point nodes that help determine the cost of providing power.

As an entity that is legally required to participate in the ERCOT market, Austin Energy buys all the electricity to serve customers in its service area from the ERCOT market. Austin Energy also sells the power it produces from its various power plants and solar and wind farms across the state into that market. Because of the design of the ERCOT market, those prices change every five minutes. Austin Energy works 24/7 to maximize the benefits of its generation while managing the energy demand it serves.

## Load Zone Price Separation

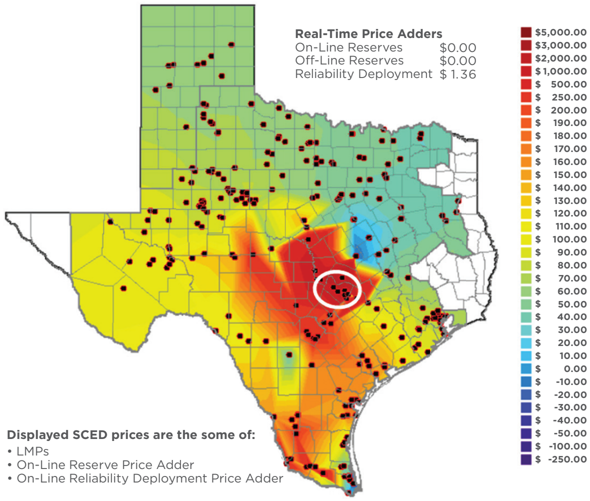
Load zone price separation occurs when the price to buy power for Austin Energy's service area, or load zone, greatly increases while the price for selling power elsewhere in Texas stays lower. The Austin Energy load zone is vulnerable to higher prices due to the limited amount of power we can import and the limited amount of local generation. When there is high demand in the Austin area, transmission lines bringing power in can reach their limit of what they can carry. The ERCOT market recognizes this issue and tries to fix the problem by raising the price of electricity — with the idea that a higher price will incentivize more generation to come online. Other things like local power plant outages, local transmission outages, or even generation and transmission events outside of Austin Energy's service area can trigger load zone price separation as well.

Depending on the number of events and their severity, Austin Energy can end up paying hundreds of millions of dollars more per year to buy power for the Austin area than it earns in selling power to the ERCOT market. Further, if transmission becomes so congested that Austin Energy cannot physically provide enough power to meet local demand, ERCOT may have no other alternative but to order controlled outages in the Austin Energy service area. As such, load zone price separation presents financial and reliability risk to Austin Energy customers.

## Load Zone Price Separation in Pictures

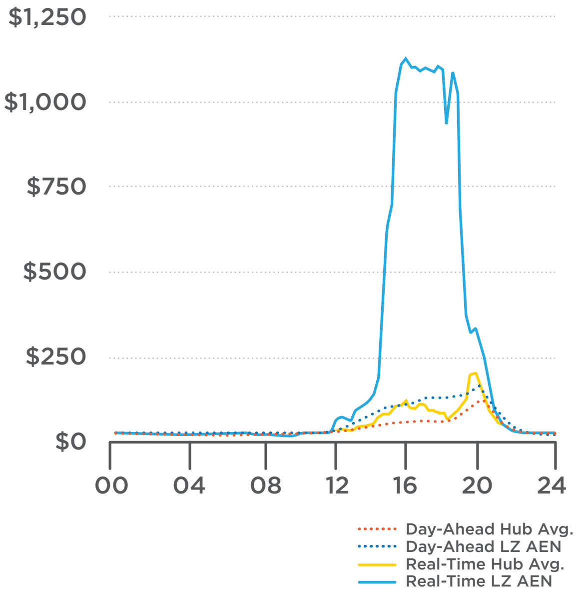
This map from ERCOT's website shows real-time electricity prices at different nodes across the market on the afternoon of August 21, 2024. The bright red spot over Travis County shows an example of load zone price separation as the local prices were much higher than much of the rest of the state.

**ERCOT Real-Time Pricing Heat Map**
5:35 p.m. — Aug 21, 2024



The graph below, also from ERCOT's website, shows the real-time electricity prices over the course of the day on August 21, 2024. The blue line is the price of purchasing power to serve the Austin Energy service territory. The orange line is the average price paid to generators across ERCOT to produce power. This graph shows load zone price separation for several hours, when the blue line is approximately $1,000 per megawatt-hour (MWh) higher than the orange line. Simply stated, Austin Energy was paying ~$1,100 per MWh to serve its customers locally, but it was receiving, on average, ~$100 per MWh to generate electricity across the state to sell into the ERCOT market.

**ERCOT System-Wide Prices**
Aug. 21, 2024




## Reducing Load Zone Price Separation Risk

As a vertically-integrated utility, Austin Energy plays a role in all aspects of electricity: supply, demand, and the transmission and distribution that connects the two. This means that Austin Energy has several options to help reduce the risk of load zone price separation:

1. **Demand:** Reduce local demand as much as possible through energy efficiency, demand response and customer-sited solar. Austin Energy is a leader in demand-side management programs and looks to maximize this option whenever possible. Demand-side management alone, however, may not be sufficient to meet the growing load.
2. **Transmission:** Continue upgrading local transmission equipment to increase the amount of power the system can bring into the Austin area. Austin Energy has a rolling 5-year plan for capital projects related to transmission, which are prioritized based on reliability and growth needs. Note, however, Austin Energy does not have control over transmission outside its service area, so there is a limit to how much it can use this option to solve the problem. Additionally, constructing transmission can be a lengthy process due to state regulatory approval timelines.
3. **Supply:** Maintain sufficient generation capacity inside the Austin Energy load zone to meet local peak demand that cannot otherwise be served by bringing power into the Austin area. This includes adding additional local generation to keep pace with load growth. Local generation, depending on the type and operating parameters, can produce local emissions or have reliability impacts, so there are tradeoffs with this option as well.

Austin Energy believes in an "all of the above" approach, where we work to mitigate the financial and reliability risks of load zone price separation by taking action in all three ways. Given the growth in local demand and customer sensitivity to increasing utility bills, one of the main objectives of the Resource Generation Plan to 2035 is to reduce load zone price separation using a combination of these options.



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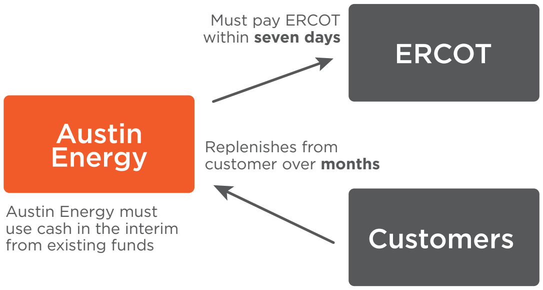
# Liquidity Risks

Liquidity refers to the cash on hand that organizations need to pay their obligations. As an electric utility and a part of the Electric Reliability Council of Texas (ERCOT) market, Austin Energy is required to have sufficient cash on hand for its market operations. Two major liquidity needs are requirements for payments and for collateral.

## ERCOT Payments and Liquidity

State law and ERCOT rules require Austin Energy to sell the power it generates into the market and buy all of the power it needs to serve its customers from the market. When Austin Energy makes that purchase, payment is due to ERCOT within seven days. However, due to billing cycles, it is often months before Austin Energy receives payments from its customers for that same power. This time gap can create a liquidity stress and a cash shortfall for Austin Energy. The utility's cash on hand is reduced because Austin Energy has made the required payment to ERCOT but has not yet recovered those funds from customers. On a day-to-day basis, this is usually a manageable issue. It becomes a concern, however, when power prices are suddenly very high, such as during an extreme weather event or season, or a transmission restriction. In cases when there is a large imbalance between costs and revenues in the market, it may take many months to recover any large ERCOT payment. Austin Energy has to bridge the gap with existing cash on hand, as it did from 2022 through 2024, when it funded $102M of market costs by December of 2022 that were only fully recovered from customers in June 2024.

**Liquidity Needs — Payment Flow**




## ERCOT Collateral Requirements and Liquidity

In addition to cash transfers for payments, ERCOT also requires liquidity from Austin Energy for collateral. Collateral is cash sent preemptively to ERCOT to compensate other market participants in the unlikely event that Austin Energy does not pay its ERCOT bills. All market participants place such collateral with ERCOT, and this mechanism reduces risk for all market participants, though it can tie up a lot of cash.

ERCOT's required collateral amounts change every day. ERCOT calculates Austin Energy's collateral requirement using formulas that include the difference between Austin Energy's load and its generation, as well as traded market prices for electricity. The formulas are complex, and in volatile times, the results can change by tens of millions of dollars each day. When this occurs — as it did in the summers of 2022 and 2023 — Austin Energy must transfer those tens of millions of dollars to ERCOT within two days of the extreme market conditions.

## Risks and Liquidity

The consequences of insufficient liquidity can be serious. If Austin Energy were to miss a payment or a collateral transfer to ERCOT, Austin Energy would be in default on its market participation agreement with ERCOT. This default could mean that financial agreements with all of Austin Energy's suppliers and lenders might be jeopardized, Austin Energy's bond ratings might be lowered, and the City's ability to own and operate a municipally owned utility may be impacted. Bankruptcy courts might need to intervene so that Austin Energy could continue to purchase fuel for plants and pay other bills to continue operations.

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## Real-World Examples

An extreme example of an ERCOT liquidity need occurred during Winter Storm Uri in February of 2021. Brazos Electric Cooperative was unable to make required payments to ERCOT. Due to the market conditions and the composition of its generation portfolio at that time, Brazos incurred $1.8 billion in ERCOT costs in just a few days. Given time, Brazos could potentially have raised rates for its customers and recovered this amount, but it did not have the liquidity, as cash on hand, to meet the need. Brazos declared bankruptcy and was restructured by its stakeholders, and it no longer generates power in the ERCOT market.

Winter Storm Uri could also have damaged Austin Energy's liquidity, if not for certain generation facilities that were online at that time. During the six days from February 14 to February 19, Austin Energy's load costs soared to $1.7 billion, roughly equivalent to four years of total load cost under normal conditions. Fortunately for the utility's customers, Austin Energy's generation revenue offset this cost almost exactly, and left roughly $100 million of net revenue left over. But one generator which is no longer online, Decker Steam Unit 2, supplied $195 million of that offset, and the Fayette Power Project supplied $494 million. If the utility had not had the Decker Steam and Fayette units, it might have resulted in net costs of $589 million, and the utility might also have owed collateral to ERCOT in a volatile range from $500 million up to $1.3 billion. The requirement to pay these bills in a short amount of time emphasizes the immediate need for cash on hand.

Even outside of extreme weather conditions Austin Energy can be impacted by market conditions. In August of 2023, Austin Energy experienced significant market costs and had to transfer $100 million to ERCOT that it had not yet recovered from customers and $120 million to ERCOT to meet collateral requirements. These conditions reduced the utility's cash balances by $220 million overall and exacerbated other cash shortfalls versus the utility's policy targets.

## Managing the Risk Through Resource Planning

Liquidity risk can be managed, and one important opportunity to do so is to match Austin Energy's generation to its load as closely as possible, in quantity, time, location, and response to weather conditions. Gaps between Austin Energy's generation and its load can expose the utility to large payments and large collateral calls, while matching generation to load can add stability to the utility's ERCOT payments and can lower Austin Energy's collateral needs. In its resource planning analysis, Austin Energy is estimating the liquidity risk associated with each of the portfolios that are under review for the 2035 Resource Generation Plan. This overview is intended to provide context to the liquidity risk metric that will be shown, and to convey the importance of assessing Austin Energy's liquidity risk when making resource decisions.

## Notes:



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# Dispatchable Energy Resources

Throughout any given day, customer electricity usage is always changing. This happens as lights turn on and off, washing machines run through a wash cycle, air conditioners kick on or off and from many other everyday life occurrences. One of the roles of the Electric Reliability Council of Texas (ERCOT) is to match energy to those fluctuations. Electric utilities provide the energy resources to do so. Energy resources that are available to ramp up or down are called dispatchable. Dispatchable energy resources are controllable and can adapt in response to changes in electricity demand. With an evolving electric industry — older, traditional power plants retiring and the rapid addition of renewable resources on the ERCOT grid — dispatchable energy resources are an important consideration.

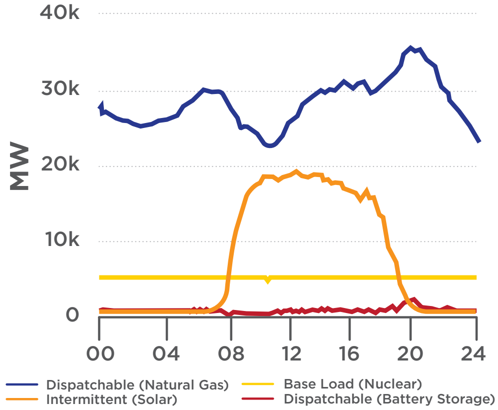
In general, power generation is commonly grouped into three categories: base load power, intermittent power, and dispatchable power. Each of these categories has a part to play in helping to keep the utility grid operating reliably and efficiently, and a key distinction between the three types of generation is their ability to be called upon when needed.

## Base Load Power

Base load power plants — such as nuclear plants — provide a continuous and stable output of electricity. They are generally more efficient when they run 24/7 and are typically run as constant, scheduled output. They are often not capable of significantly ramping up or down based on changing electricity demand. Most base load power plants are large, rated at hundreds of megawatts of capacity. This type of generation is considered the backbone of the power supply. When there is sufficient base load power, utilities can have higher confidence that their basic customer demand can be met.

## Intermittent Power

Intermittent power plants — such as wind and solar photovoltaic (PV) farms — are more variable in nature than base load power. Intermittent power sources are dependent on weather, so there is less control over when they produce power or how much they produce. Though this type of power has more variability, it is not necessarily dispatchable. For example, even though Texas solar regularly ramps up alongside the increased customer demand for air conditioning in the summer, solar generation naturally ramps down early into the long summer evenings, when customers are still using a significant amount of power. While the electricity solar generates can often be timely and beneficial, it is not considered a dispatchable resource because it cannot be controlled. This is also true for wind power.




Source: Grid and Market Conditions (ercot.com)

The graph above shows various types of resources supplying the ERCOT market on Sept. 17, 2024. It shows an example of each category of resource described here including baseload (nuclear), intermittent (solar PV) and dispatchable (natural gas and battery storage). For simplicity, other resources, including coal and lignite, wind, hydro and others, are not shown.

## Dispatchable Power

Dispatchable power plants — such as natural gas peakers and natural gas combined cycle plants — are able to be turned on or off and ramp up or down as needed in response to electricity demand.

Peakers are designed to be infrequently used generation resources that can be dispatched for short durations when the power is needed. Most peaker plants run for 1,500 or fewer hours a year. For reference, there are 8,760 hours in a calendar year. These plants often consist of multiple individual units that are usually around 50 MW each. It is useful to think of a peaker plant like a jet engine that can be turned on and off as needed. The process is very quick, making them highly dispatchable.

Combined cycle power plants are an example of a resource that can fit into more than one category. True to its name, a combined cycle plant is a combination of two types of resources: a peaker plant and another type, known as a steam turbine. Any heat source and water can be used to create steam to drive the steam turbine, and in a combined cycle power plant, the steam is produced from the excess heat of the peaker plant. In this way, a combined cycle power plant recycles that heat and is more efficient than a peaker plant alone. That is, it generates more power for the same amount of fuel than a peaker plant. In exchange for this efficiency, these power plants are often not fully dispatchable. A certain amount of their output is constant and scheduled while the rest can ramp up and down in response to electricity demand.

## What about Demand Response and Battery Storage?

On the other side of the power equation, demand can also be considered a somewhat dispatchable resource. That's where demand response comes in. Demand response programs call on customers to reduce their energy usage for short durations during peak times. Customers who choose to participate can lower the need for peaking generation. This works by shifting customer energy use to before or after the peak period.

Large-scale batteries and aggregate residential batteries can also be used to shift load by charging or discharging for a specific duration — often 1-, 2-, or 4-hours, depending on how much energy capacity the battery has. How battery storage systems charge or discharge is highly controllable, with very quick response times. It is useful to think about the ability of an electric vehicle to accelerate "from 0 to 60" in seconds. That speed and flexibility is also available in battery storage systems. The limited duration, however, can be a negative when dispatchable energy resources are needed for long duration events.

## The Benefits of Dispatchable Energy Resources

When dispatchable energy resources are sited locally — within the Austin Energy service area — they can offer direct support to Austin Energy customers. Local dispatchable energy resources can strengthen reliability by reducing the amount of power we need to bring in to serve customers at peak use times. By providing power close to where it is needed, they are available to quickly respond to changes in customer electricity usage without the risk of congestion or high pricing that comes with power that has to travel long distances across transmission lines. Local dispatchable energy resources that are able to provide power for long periods of time also provide financial protection against load zone price separation and liquidity risks.

Dispatchable energy resources can also provide ancillary services that make our grid more reliable and affordable to operate. Ancillary services describe the capability of an energy resource to provide electricity in a way that maintains a stable, reliable and efficient power grid. Examples of ancillary services required by ERCOT are:

- Quick start — able to start up and produce power within a very short period of time
- Frequency response — able to ramp up and down in response to instructions sent every four seconds to help keep supply and demand in constant balance.

Some dispatchable energy resources are also able to provide black start services, which is the ability for a power plant to start up and begin to restore power to an electric grid that is completely without power. Below is a table of Austin Energy resources and their characteristics:

| Austin Energy Resource Type | Local | Power Type | Available for Ancillary Services |
|---|---|---|---|
| Peaker Plant | Yes | Dispatchable | Yes |
| Battery Energy Storage System | Yes | Dispatchable | No |
| Demand Response | Yes | Dispatchable | No |
| Combined Cycle Power Plant | Yes | Part Dispatchable Part Baseload | Yes |
| Biomass Power Plant | No | Part Dispatchable Part Baseload | Yes (some) |
| Coal Power Plant | No* | Part Dispatchable Part Baseload | Yes |
| Nuclear Power Plant | No* | Baseload | No |
| Solar PV Plant | Yes and No | Intermittent | No |
| Wind Plant | No | Intermittent | No |

*While not physically located within the Austin Energy service territory, the nuclear and coal power plants partially owned by Austin Energy function as if they were local from a financial perspective. Historical ERCOT rules provide "pre-assigned congestion revenue rights" to these resources which essentially causes them to be priced in the ERCOT market as if they were within the service territory and not subject to congestion pricing.



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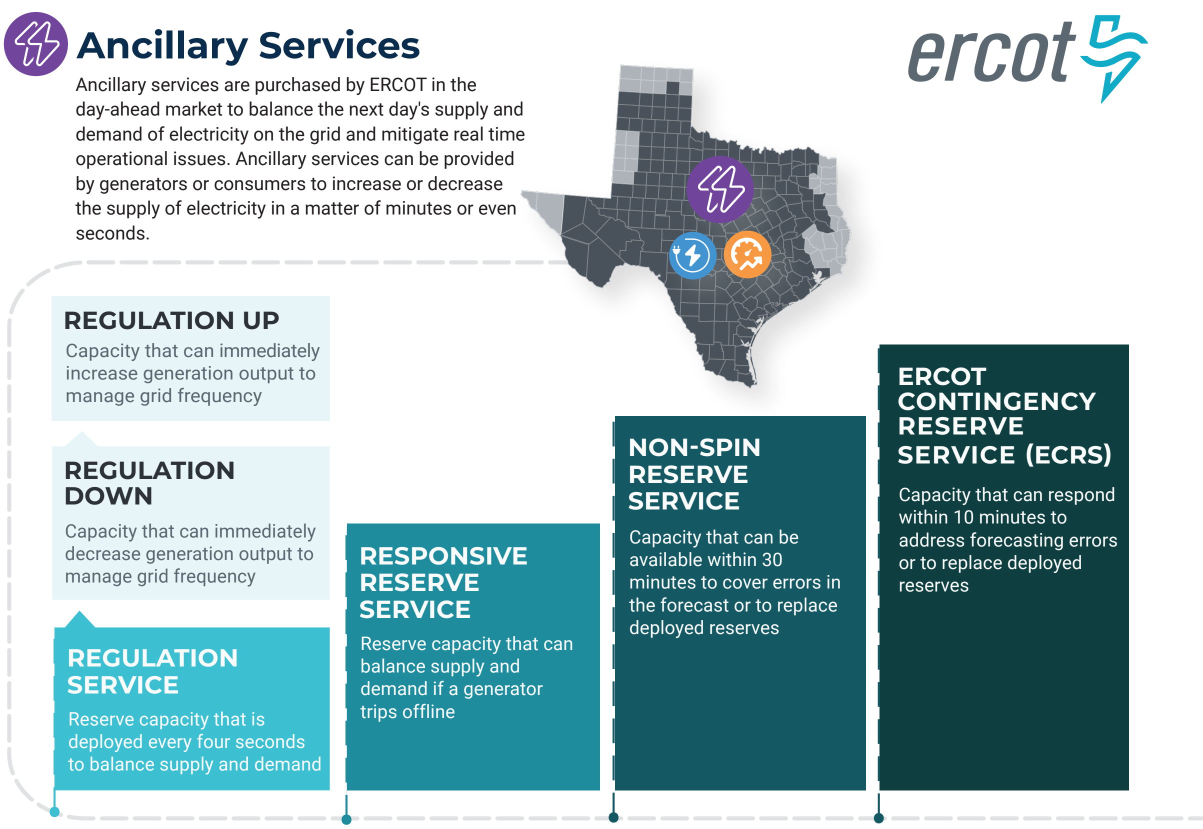
# Battery Energy Storage Systems

Battery Energy Storage Systems (BESS, also known as batteries or battery storage) store electricity generated at one time so that it can be used at a later time, when that power is more valuable or could be used for reliability. Until recently, most battery storage in the electric industry was used as backup power for critical infrastructure — often called Universal Power Supply Battery Backup — as protection during power outages or equipment failure. As bulk electric systems rely more on intermittent resources for power, utility-scale battery storage can provide many services to support reliability. They can also shift when energy is available to meet demand. Because of those services, the capacity of utility-scale battery storage has been growing quickly in many areas of the U.S., including the ERCOT market in Texas, which boasts more renewable generation capacity than any other state.

## How Batteries Can Be Used in the ERCOT Market

In ERCOT, battery storage charges and stores energy during periods of oversupply when prices are lower and discharges later when prices are higher. This “buy low, sell high” strategy is often referred to as energy arbitrage. Battery storage can charge and discharge very quickly, allowing them to provide certain reliability products in the ERCOT market called Ancillary Services. ERCOT’s infographic below explains Ancillary Services, and the table describes which battery storage capabilities make them suitable to provide Ancillary Services.



| Ancillary Service Product | Battery Storage Capabilities |
|---|---|
| Regulation Up and Regulation Down | Battery storage can provide this product through short duration charges and discharges. Regulation Service is short duration but requires flexibility in power output. |
| Responsive Reserve Services | The electronics in a battery storage system provide the ability to respond quickly and provide Responsive Reserve Services for durations that match their energy capacity. |
| Non-Spinning Reserves | Even if they are offline for a long period, batteries do not need to "warm up" like some more traditional generators do. They can meet the requirement to provide power within 30 minutes. However, ERCOT rules limit Non-Spinning Reserves offered from a battery to the capacity they are capable of sustaining for four consecutive hours. |
| ERCOT Contingency Reserve Service (ECRS) | Batteries can also provide power within 10 minutes. ERCOT rules limit ECRS offered from a battery to the capacity they are capable of sustaining for two consecutive hours. |

## Benefits in Pairing Batteries with Renewables

As renewable resource capacity grows in particular regions across ERCOT, curtailments of these resources are increasing in frequency and amount during periods of higher supply and lower demand. Curtailment means reducing the output of a generation source, often through ERCOT price signals — very low or negative prices that do not offset the cost to run the generator causing the owner to turn off the generation source. Battery storage is one option available to renewable asset owners looking to store energy that would otherwise be curtailed or "wasted."

## Growing Uncertainty for Batteries in ERCOT

There has been significant growth in utility-scale battery storage in ERCOT over the past three years, with many more projects in line to potentially connect to the grid. Most of the capacity is near areas with congested renewable resources, but the trend of building battery storage near areas of high demand is rising. These battery storage projects are in various stages of financing and development, and they are most likely to be constructed only when the developer signs a power purchase agreement (PPA) for a guaranteed revenue stream or if they believe they can make sufficient revenue in the ERCOT market.

Historically, many of these projects earned that revenue by a combination of energy arbitrage and Ancillary Services sales. However, recent rule changes require the battery storage operator to constantly provide ERCOT the state of charge — whether the battery is fully charged, fully discharged, or somewhere in between — so ERCOT can monitor and assess the battery's capability to provide Ancillary Services. This provides for more reliability, but it also limits revenue opportunities for batteries. Battery storage economics are further reduced by declining Ancillary Service prices due to growing supply. The diminishing economics will likely lead to delays or cancellations of many of the battery projects in the ERCOT interconnection queue.

## Austin Energy's Battery Experience

Austin Energy has been involved in several battery storage projects, providing us a wide range of experiences and opportunities. We closely monitor and evaluate economic opportunities for battery storage in our power portfolio to benefit customers. Here's a summary of our battery storage experience to date:

- From 2016 to 2020, Austin Energy completed a distribution level solar-plus-battery project through a Department of Energy grant. The purpose of the project was to pilot ways to achieve "Sustainable and Holistic Integration of Energy Storage and Solar PV (SHINES)" that could lower the cost of electricity. In this project, Austin Energy studied how to maximize the value of battery storage by deploying it for market (economic) and reliability benefit. The project used varied solar and battery storage installations including several at residential, commercial, and utility-scale locations. While Austin Energy identified many use-cases for potential value, the project results demonstrated that actual benefit does not yet outweigh cost. This is due to several reasons including ERCOT market rules, the complexity of system integrations, changing technologies, and standards that are struggling to keep pace.

  The SHINES project resulted in two distribution-level battery storage systems, which are still in place today. Each one is approximately 1.5 MW with a two-hour duration. These systems provide Austin Energy personnel hands-on experience in owning and operating battery storage. While gaining this experience, there have been notable ongoing challenges, including fire safety, software integration, vendor relationships and insurance premiums.
- Austin Energy has a PPA with a solar farm that often experiences curtailment. We evaluated signing an additional PPA to operate utility-scale battery storage co-located with that solar farm but elected not to because the outcome would have been a net cost, rather than a benefit, to customers. Instead, Austin Energy negotiated an arrangement where it sells curtailed energy to the battery storage, adding value



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for our customers. This is an innovative solution that finds benefits in battery storage even though Austin Energy does not own or have a PPA tied to that system.

- Austin Energy has analyzed utility-scale battery storage proposals through Requests for Proposals (RFPs) since 2016, including a 2022 RFP that looked for battery options at the Decker Creek Power Plant site. That project idea was put on hold to get better guidance around safety concerns, Austin Energy's next Resource Generation Plan and rising project costs like labor, tariffs, engineering, procurement and construction.
- Austin Energy has conducted multiple interconnection studies for developers who wish to connect renewable-plus-battery projects to our transmission lines. We participate fully in the ERCOT interconnection process and do our part to enable the construction of these projects. One example is the Big Star project in Bastrop County, Texas, which includes 200 MW of solar and 80 MW of battery storage with 1.5 hour duration.
- Austin Energy has additional experience with commercial-scale and residential-scale battery storage not addressed here. For the purposes of the Resource Generation Plan process, these behind-the-meter systems are considered in the Demand Response category.

## Current Battery Opportunities

As we look at batteries as an energy option, it is important to identify how we would use them to determine the best technology, type and duration. Long-term investment decisions should be made after considering the lifetime potential of the project and the state of evolving market rules. We should also consider recent tariff increases, fire safety, insurance concerns and overall life-cycle impacts — like mineral mining and end-of-life recycling uncertainties — when assessing the timing and placement of utility-scale battery storage in our portfolio.

While Austin Energy does not have the same economic incentives as renewable project owners experiencing high levels of curtailment and congestion, we continue to explore opportunities to incorporate utility-scale battery storage into our power portfolio. The two biggest drawbacks are cost and limited duration. However, we continue to assess whether we can use batteries to reduce renewable intermittency or to mitigate shorter duration load zone price separation events.


Austin Energy's Kingsbery Energy Storage System is located in a substation and interconnected next to the La Loma Community Solar array.

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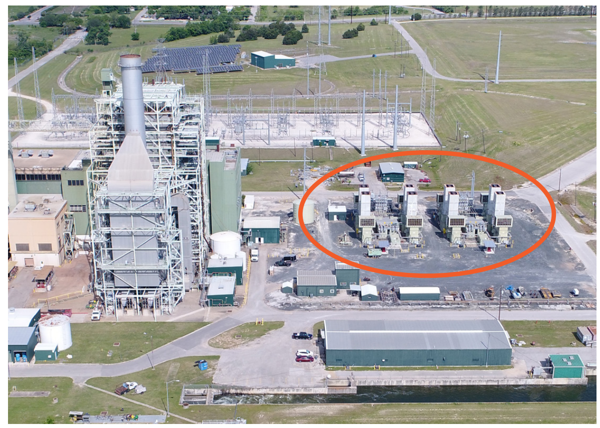
# THE ROLE OF BATTERY STORAGE AND NATURAL GAS PEAKERS

Battery storage and natural gas peakers help keep electricity more reliable and affordable. Battery storage stores energy during low-demand times - when prices are low - and uses it during high-demand times - when energy is more expensive. Natural gas peakers can also quickly supply power during sudden spikes in demand that last longer than batteries' duration, protecting the utility and its customers from reliability gaps and high electric prices.

**Utility-scale Battery Storage Farm**

- Can reduce reliance on fossil fuels.
- Limited duration — only able to store 2-4 hours of energy.
- Starts very quickly to balance short fluctuations in energy supply and demand.



**Natural Gas Peaker Units**

- Newer units produce less emissions.
- Starts up in minutes to meet demand.
- Ensures power when other generation resources aren't sufficient.
- Operates only when needed — limiting emissions and costs.

## Better Together

- **Batteries used first to minimize emissions.**
- **Batteries support short-duration needs.**

- **Peakers support long-duration needs.**
- **Use peakers as a last resort.**

* Acquiring batteries and natural gas peakers requires the vote of Austin City Council.

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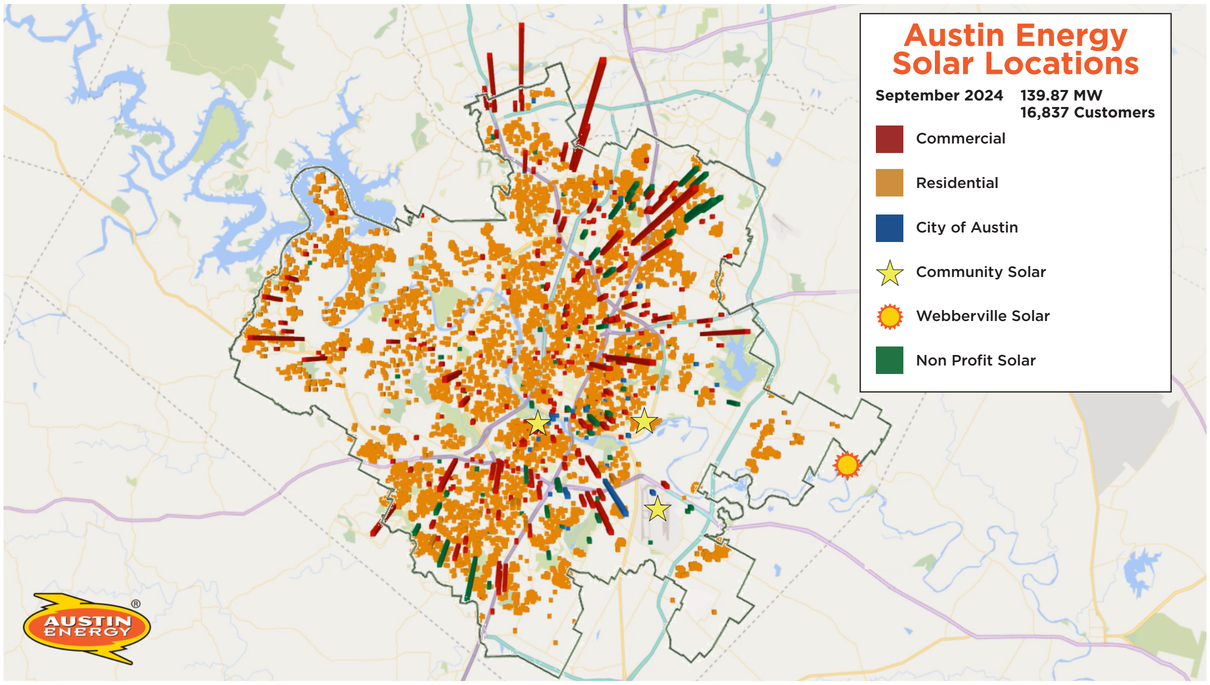
# Local Solar

With the help of our customers, Austin Energy has been an industry leader in solar energy for decades with programs and incentives that play an important role in today's energy landscape.

## Local Solar in Austin Energy's Service Area

There are significant benefits to focusing solar efforts within Austin Energy's service area. Local solar generates power at the point of energy demand. That is, solar energy from someone's rooftop can meet the energy need of that home or business right where it's produced. When power is made locally, it doesn't need to be transmitted long distances across the Electric Reliability Council of Texas (ERCOT) grid. Additional benefits include:

- Customers reduce their energy bills and increase their energy resilience, especially if they have a battery.
- The Austin community receives cleaner air due to emission-free solar energy that displaces electricity from other generation sources and develops a thriving modern local solar industry that stimulates the economy.
- Austin Energy receives local generation that reduces its exposure to volatile energy pricing on the ERCOT market, while also helping meet its environmental goals.




The graphic above depicts the location and type of solar installed within Austin Energy's service area.

Austin Energy's commitment to solar is nothing new:

### Austin Energy Solar Goals Over the Years

| Year | Document | Solar Goals |
|---|---|---|
| 2007 | Resolution No. 20070215-023 | 100 MW of solar power by 2020 |
| 2010 | Austin Energy Resource, Generation, and Climate Protection Plan to 2020 | 200 MW of solar power by 2020 |
| 2013 | Resolution No. 20131024-053 | 200 MW of solar power by 2020, of which 100 MW must be local solar, and 50 MW must be customer-owned solar |
| 2014 | Resolution No. 20140828-157 | 200 MW of local solar by 2020, with at least 100 MW being behind-the-meter customer-controlled solar |
| 2017 | Resolution No. 20170817-061 | 950 MW of solar capacity by 2025, 200 MW of local solar by 2025. 110 MW local solar by 2020, including 70 MW of customer-sited solar |
| 2020 | Austin Energy Resource, Generation, and Climate Protection Plan to 2030 | 375 MW local solar by 2030, of which 200 MW must be customer-sited (in-front-of-meter or behind-the-meter) |

Historically, "Local Solar" was defined as Travis County and its bordering counties. Austin Energy and stakeholders have recently gained a common understanding of the benefits of solar in the Austin Energy load zone, and as such, we have realigned our solar goals and definitions to maximize these local solar benefits. Therefore, local solar is now defined by Austin Energy and its stakeholders as solar within the Austin Energy load zone.

Austin Energy's long history of supporting local solar is something the whole community can be proud of, and we will continue to develop and invest in this technology as we provide customers with power and programs.

## Austin Energy Solar Programs — Evolving to Unlock Solar Access

Austin Energy started its solar support with the Austin Energy Solar Incentive Program. This program has helped increase local solar adoption since it began in 2004. Originally, the Solar Incentive Program was created to increase solar demand by reducing the cost to install a system, which helped create solar jobs as the industry was developing. The Solar Incentive Program also provided an opportunity to establish local industry best practices, educate customers and contractors and develop Austin Energy's experience with this kind of technology. Over the years, the Solar Incentive Program has grown to include innovative solutions such as Value of Solar, Community Solar, Shared Solar and more. The table below describes what each program provides to the community. The Solar Incentive Program has resulted in more than 16,500 solar installations in the Austin Energy service area since its inception.

As part of the next Resource, Generation and Climate Protection Plan, Austin Energy is proactively planning its strategies to expand local solar access and support local solar moving forward. Austin Energy knows barriers still exist for many customers, making it difficult or impossible for them to take part in the clean energy transition.

**Barriers to solar include:**

- Lack of ownership of the home or building
- Reduced access to capital
- Low credit ratings
- Lack of education about solar and offerings

**Customers with challenges to solar access include:**

- Renters
- Low-to-moderate income (LMI) customers
- Commercial customers
- Medically and financially vulnerable customers

To expand solar access to all customers, Austin Energy has the following initiatives available now or under development:

| Program | Customers Addressed | Brief Description |
|---|---|---|
| Community Solar | LMI and Market Rate Residential with barriers to going solar | Subscription to local solar, 50% of capacity is reserved for LMI customers |
| Solar for All | LMI single family and multifamily residential | Courtesy of an EPA grant award, qualifying customers participate at no cost to host solar and batteries for Community Solar. Host customers increase resiliency and gain ownership of the solar and battery at program's conclusion, while LMI participants receive 20% bill savings. Targeting about 3,000 households for participation. |
| Standard Offer | Commercial properties with barriers to going solar | Commercial customers host 3rd-party-owned Community Solar arrays and receive compensation — adding residential after sufficient program experience exists |
| Resilience Hubs | City-owned buildings, communities during emergencies | These buildings host Community Solar and batteries that enable them to stay energized and improve the community's resiliency during emergencies |
| Shared Solar | Multifamily customers with barriers to going solar | Allows multifamily residents to receive bill credits from solar using a single interconnection, rather than needing to interconnect at each unit |
| Non-Profits and Small Businesses | Non-Profit and Small Businesses with barriers to going solar | Qualifying customers receive their incentive upfront rather than over time, helping them overcome lack of access to capital |

Austin Energy leads the way in renewable energy technologies by expanding access to local solar to hard-to-reach customers. Together with the community, we are committed to growing local solar capabilities and installations to serve Austin.

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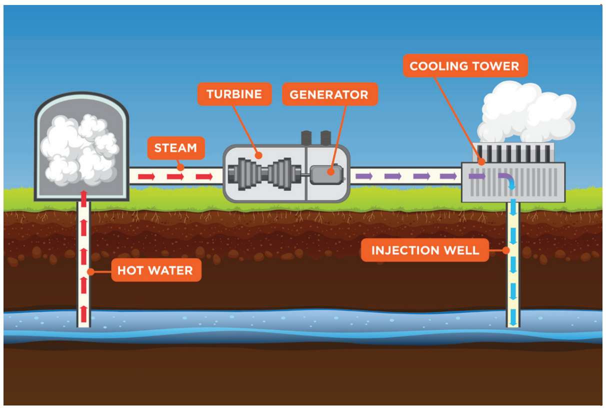
# Geothermal Generation and Geothermal Heat Pumps

In the context of Austin Energy's resource planning effort, geothermal technologies fall into two main categories — geothermal generation and geothermal heat pumps. Though they share some similarities, they fall on opposite ends of the resource planning spectrum. Geothermal generation is on the power production side of the equation, while geothermal heat pumps (like you may have heard of as part of the Whisper Valley development) may affect energy efficiency on the consumer side. At a high level, here's what those different technologies look like.

## Geothermal Generation

Geothermal power plants generate electricity by heating specific fluids deep in the earth's interior to create steam and then directing that steam through a turbine. To reach the temperatures required for heating those fluids, geothermal power plants generally require deep wells. These wells typically run 1 to 2 miles deep into the ground but can go even deeper when needed. Underground, the fluid has to circulate through hot rock to heat up. That permeability can be naturally occurring or manmade. Once the steam is made, a geothermal power plant functions much in the same way as a traditional power plant.




### Geothermal Generation Potential in and around Austin

Subsurface ground temperatures in Austin and Travis County are some of the lowest in the state, meaning Austin is not a good near-term candidate for typical geothermal power production. Using typical geothermal technology in the Austin area, wells would have to be about 4 miles deep to reach the low end of necessary temperatures. Drilling to that depth or deeper would increase costs for a geothermal generation project.

### Geothermal Generation for Austin Energy

Recent federal subsidies combined with newer technology and innovation for geothermal closed-loop systems present potential opportunities and improved economics for geothermal power plants in Texas. Austin Energy is currently working with a geothermal developer to explore and possibly pilot a small utility-scale geothermal plant using Enhanced Geothermal System Technology in an area of the state that best supports the resource. This will help Austin Energy test and better understand the feasibility and challenges of larger utility-scale geothermal opportunities in Texas.

### Geothermal Generation Technologies and Methods

As Austin Energy is looking at geothermal generation opportunities, the utility is considering different technologies and methods that could make this power source more viable. Two of those advancements include:

- **Enhanced Geothermal System (EGS) —** In an EGS, fluid is injected deep underground under carefully controlled conditions to create new fractures and cause pre-existing fractures to re-open, creating permeability where it does not exist naturally. Department of Energy is funding demonstration projects.
- **Binary-Cycle Power Plant —** This type of plant can use lower temperature geothermal resources. Geothermal fluids pass through a heat exchanger with a secondary, or "binary," fluid. This binary fluid has a much lower boiling point than water, and the modest heat from the geothermal fluid causes it to flash to vapor, which then drives the turbines, spins the generators, and creates electricity. Per the Energy Information Administration most geothermal power plants built today use this technology. As of 2020 there were 93 binary cycle generators in the U.S., with the majority located in Nevada because the volcanic nature of the geology is favorable for the technology.

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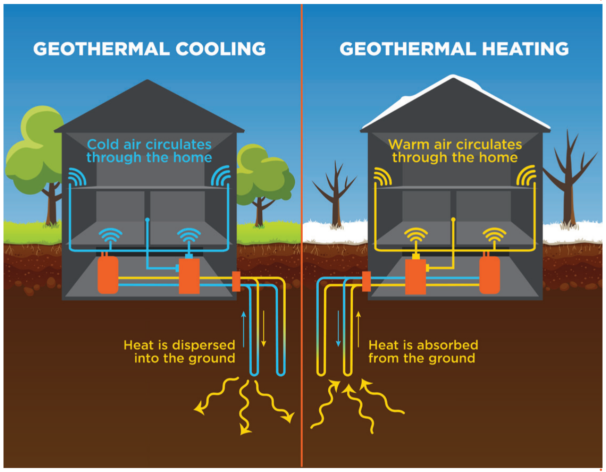
# Geothermal Heat Pumps

Geothermal heat pumps, also known as ground source heat pumps, take advantage of the ground's ability to efficiently store and discharge heat. Geothermal heat pumps use traditional heat pumps — like those used in homes today — that have been modified to transfer heat between the house and the ground as needed to heat and cool the home rather than transferring heat between the home and the air. The idea is that this can help provide more efficient heating and cooling.

Most of these heat pump systems work by circulating water — or a blended water-glycol solution — through a closed loop buried in the ground. Heat is transferred from the home to the ground in the summer to cool the home. In the winter heat is moved from the ground to the home, heating it. This can increase the efficiency of the heating and cooling systems. These heat pump systems work particularly well in areas with a balanced climate of hot and cold weather days.




## Geothermal Heat Pumps in Austin

In Austin, there are many more days that require the air conditioner to run than days that need the heater, heating the ground overall. This results in a less efficient geothermal heat pump system. A solution to this problem is to add an auxiliary cooling system to remove this heat from the ground and discharge that heat into the air. While this solution can work, it results in a more costly and less efficient overall solution.

Austin Energy has conducted limited evaluations of ground source systems in Austin. Austin Energy has seen one system demonstrate the technical potential of the technology to cool houses when applied at the scale of a housing subdivision, but has not been able to verify efficiency savings or the cost of the system compared to traditional technologies at that scale. The one single-home system looked at did not work well and was more costly that a traditional HVAC system for a single family home.

Notes:



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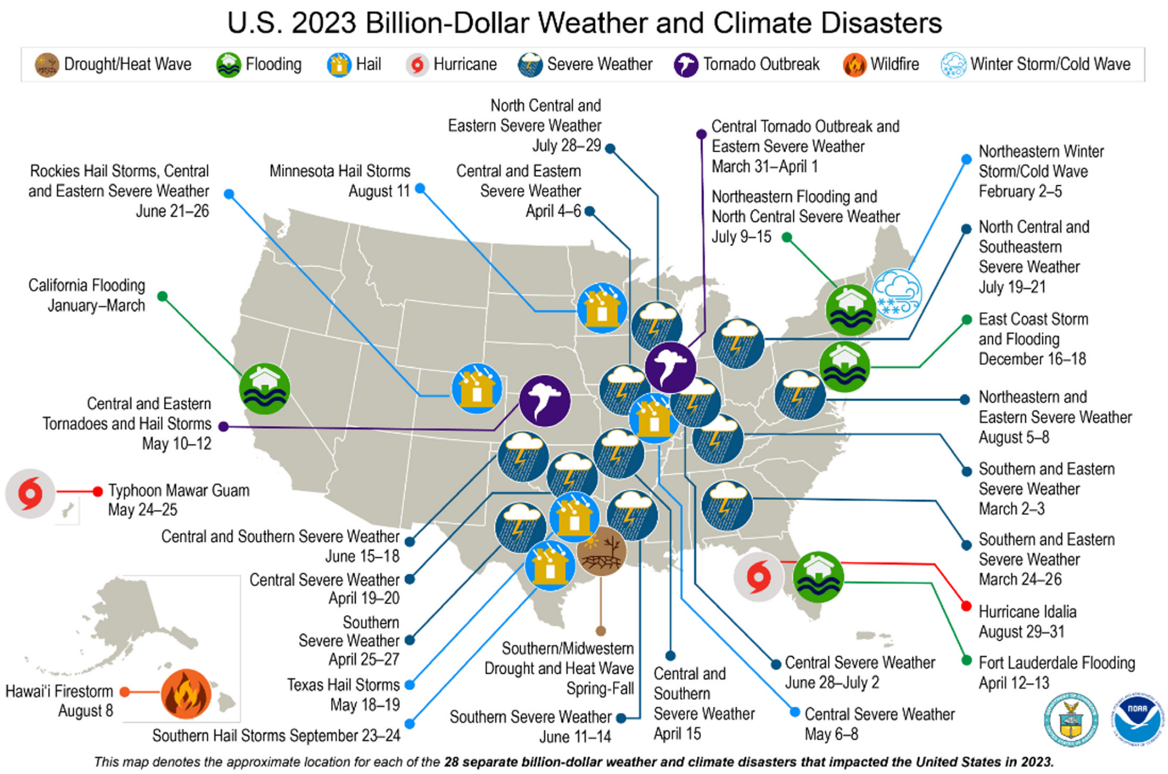
CORP 24 3662 ResGen_GeoThermal 082024 v1 r6

# Decarbonization

Decarbonization is the process of eliminating carbon dioxide ($CO_2$) and other greenhouse gas (GHG) emissions from the global economy as quickly as possible to minimize the impacts from climate change. It aligns with the Austin community value of environmental sustainability.

## Impacts of Climate Change

Extreme weather events intensified by climate change continue to increase in both frequency and severity across the United States. Texas is particularly vulnerable to high-impact, extreme weather events. According to the National Oceanic and Atmosphere Administration's climate.gov website, our state has had some of the greatest total financial impacts since 1980 from billion-dollar extreme weather events. In 2023 alone, Texas experienced at least four separate billion-dollar weather and climate disasters.




Source: climate.gov

## Challenges to Decarbonizing the Electric Industry

The electric industry is changing rapidly, and decarbonization also has to navigate these changes. Overall, electricity generation accounts for approximately 25% of total GHG emissions in the United States. These emissions peaked around 2007 and continue to trend downward.

The retirement of older coal and natural gas fired power plants has supported this trend, and non-emitting renewable energy sources like wind, solar and geothermal have replaced that power supply. These types of resources continue to grow rapidly, especially in Texas.

There are some challenges that come with this transition. One is managing the intermittent

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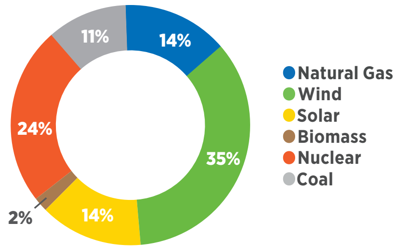
power production from energy sources that are dependent on the weather, such as wind and solar. Another is the time and cost required to build new transmission infrastructure to transport the energy from these new power sources, which are often built in locations where the renewable resource is most plentiful, to the locations where the power needed, often in major cities across the state. On the other end of the energy equation, decarbonization of the electric industry also must adjust to the current period of unprecedented demand growth, driven by data centers, electric vehicles and electric appliances replacing gas versions. This shift adds to the challenge of generating enough electricity when and where it is needed.

## Austin Energy's Path to Decarbonization

In 2020, Austin Energy committed to transition from coal and gas fired power plants toward 100% carbon-free electricity generation by 2035. In progress toward that goal, Austin Energy is a national leader in clean energy, with 75% of its electricity coming from carbon-free sources in FY23.

**Percent of Energy Generated from Austin Energy Assets (MWh)** FY23




However, Austin Energy's decarbonization efforts are facing the same challenges mentioned above. Additionally, changes and uncertainty in the ERCOT market following the 2021 winter storm have impacted our ability to meet the commitment to be carbon free by 2035. Removing all remaining traditional generation sources and replacing them with only some combination of local solar, demand response, energy efficiency and battery energy storage could come with significant risk. Setting the right technology mix to align with the community priorities of environmental sustainability (decarbonization), reliability and affordability is one of Austin Energy's primary objectives when planning for the future. Part of that is seeing what a pathway to 100% carbon free would look like.

## Net Zero or Carbon Neutral as a Bridge Solution

Another option in continuing Austin Energy's progress and leadership in clean energy is aiming for net zero or carbon-neutral emissions. This option could provide flexibility for Austin Energy to continue making progress in reducing $CO_2$ emissions while lowering costs and outage risks. When Dr. Michael Webber, with the University of Texas at Austin, presented to the Austin Energy Utility Oversight Committee meeting in July, he stated "A variety of researchers — Princeton, UT Austin, Energy Information Administration, International Energy Agency, etc. — have conducted studies on how to decarbonize the economy at the global, national and state level. These studies have a variety of similar and overlapping conclusions. The general consensus is net-zero is cheaper, faster and more equitable than carbon-free." Austin Energy is looking to further explore this option as the path to carbon-free becomes increasingly challenging.



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# Black Start

## What is Black Start for the Statewide Grid and why it is an Important Consideration for Austin

Black start is the process for restoring the electric grid after a full or partial blackout. It is a worst-case scenario event — low probability but very high impact — that grid operators must plan for just in case.

The black start process relies on generating units that are capable of starting up with no external power source, which is a special characteristic available only in some units. Black start units are typically natural gas or hydroelectric generators that have a separate start-up source other than the electric grid. North American Electric Reliability Corporation (NERC) reliability standards govern black start requirements for transmission operators and regional reliability organizations. ERCOT protocols implement these standards locally.

Black start is a tightly coordinated process with several steps:

- **Initiation —** Following a blackout, operators begin to implement pre-existing Black Start Plans, which are coordinated amongst ERCOT and all transmission operator utilities. They stabilize any parts of the grid that are still operational, assess the situation and start up available black start certified units.
- **Cranking Path —** Black start units generate initial power, which energizes a cranking path — a transmission line connecting the black start unit to another generator. When this happens in multiple locations across the state, each isolated area is called an island.
- **Sequential Restoration —** The power from each island is used to start additional generators. This creates a domino effect that gradually brings more of the grid back online. As this occurs, distribution operators bring on just enough demand to balance the power output, though very few customers are restored at this stage at the distribution level. Once possible, the islands "connect" forming larger areas of the energized grid. The true goal of this stage is to rebuild the "backbone" of the transmission grid and create a stable base from which all customers can be re-connected at the distribution level.
- **Full Restoration —** The process continues until the entire grid is re-energized, customers are re-connected and normal operations are restored. This requires careful balancing of voltage and frequency, two of the characteristics of a healthy electric grid — think of them like blood pressure and heart rate to the human body. The exact time a full black start restoration would take in ERCOT isn't known for certain — because it has never happened — but experts estimate it could take weeks to months.

## Black Start and ERCOT

- After the 2003 Northeast Blackout — which affected parts of the Eastern Interconnection, the system was able to re-energize quickly by importing power from neighboring systems without executing black start plans. ERCOT's relative lack of transmission connections to neighboring systems makes having a robust system of black start generators much more important. Concerns about black start in ERCOT have grown since the system came close to a complete blackout during Winter Storm Uri in 2021.
- ERCOT relies primarily on natural gas for black start capabilities. Hydroelectric is another option, but ERCOT has very little power of this type in the system. Regulators are exploring allowing batteries to act as black start resources, but that idea is in its very early stages and would require significant technical and operational changes.
- In addition to relevant NERC standards, black start resources must meet ERCOT's requirements, including the ability to start within a short time and having access to a minimum of 72 hours of fuel. ERCOT selects black start units through a

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competitive process in which bidders submit an "availability bid" measured in hourly standby costs of $ per hour. ERCOT then evaluates these bids and selected units are paid as bid for a certain period of contracted time.

## Black Start and Austin Energy

- Two of Austin Energy's four gas turbines (peaker units) at the Decker Creek power station currently participate in ERCOT's black start program, with Unit GT1 serving as the primary black start unit and Unit GT3 serving as the backup unit.
- While Austin Energy is compensated for providing black start services, being a part of this process means we play a critical role in getting power back to Texas after a blackout. As a public-power utility, Austin Energy works 24/7 to provide our community with power and services. It's important for us to be there for them in a black start scenario, when it's needed most.

ERCOT inspects Austin Energy peaker units at Decker Creek Power Station.

You can also find information on Black Start in this KUT article —

## Notes:



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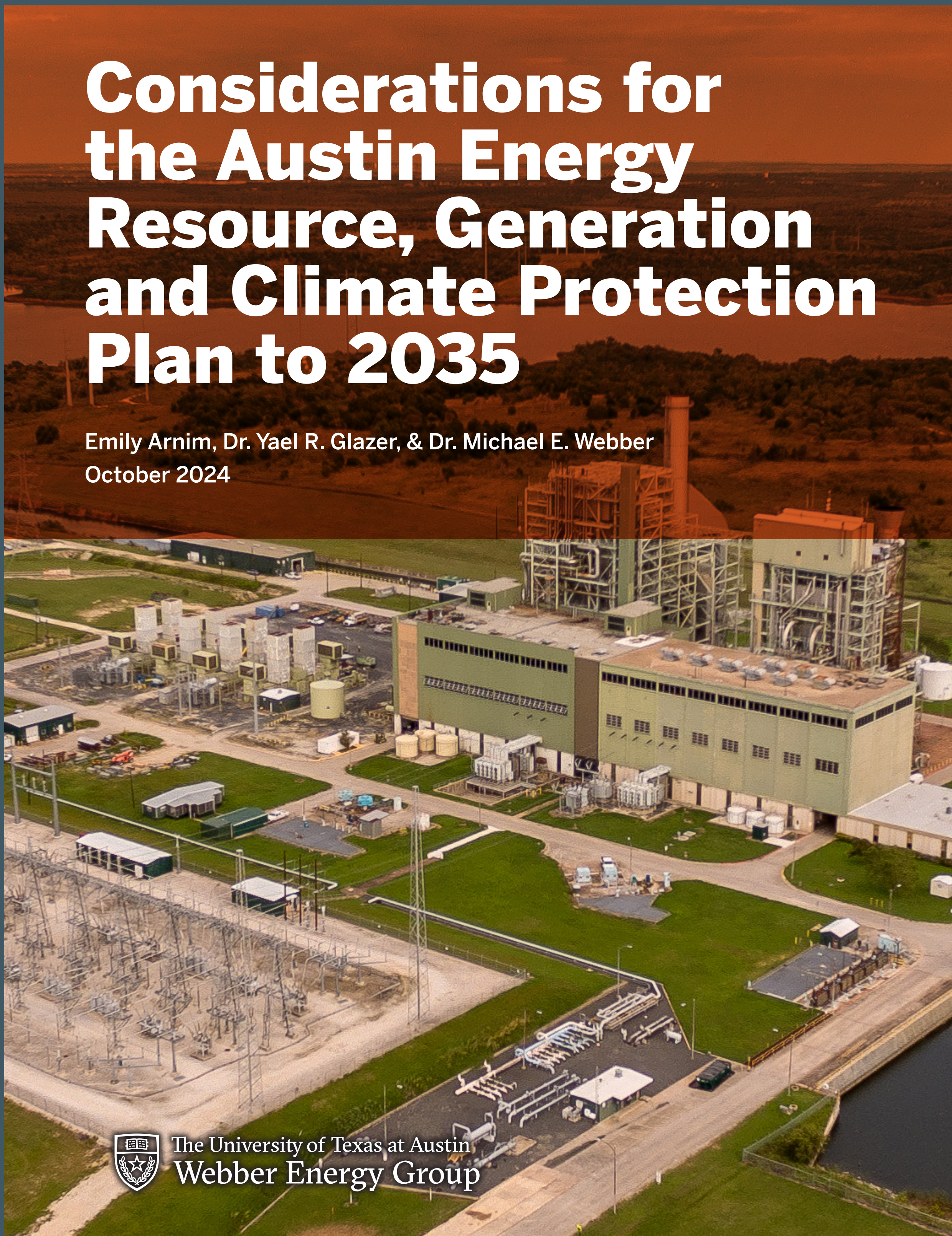
# AUSTIN ENERGY RESOURCE, GENERATION AND CLIMATE PROTECTION PLAN TO 2035

# CONSIDERATIONS FOR THE AUSTIN ENERGY RESOURCE, GENERATION AND CLIMATE PROTECTION PLAN TO 2035 — WEBBER ENERGY GROUP



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# Executive Summary

This report examines how Austin Energy (AE) can manage increasing electricity demand through 2040 while ensuring clean, reliable, and affordable power. With AE peak demand projected to reach up to 7,800 MW by 2040 under a high load growth scenario—from about 3,000 MW in 2023—the utility faces the multi-pronged challenge of expanding and decarbonizing its energy supply while operating in a warming world.

AE must address the expiration of renewable power purchase agreements (PPAs) and rising power demand driven by four main factors: population and economic growth; electrification of home heating and cooking; large load growth (e.g., data center growth); and electric vehicle (EV) adoption.

Our analysis identifies unmanaged EV charging as the most significant driver of peak demand growth. If EV charging remains unmanaged, it could account for nearly half of the total peak load. Smart-charging technologies will be a crucial component of AE's resource plan, with the potential to shave 3,600 MW off of peak demand. Data centers could also emerge as drivers of peak demand growth, though their individual power requirements are uncertain. Data center expansion will therefore necessitate careful monitoring and adaptable strategies from AE.

To effectively meet future demand, AE must evaluate options through the lens of trade-offs, considering a diverse range of supply and demand solutions that ensure resource adequacy and reliability while minimizing pollution and mitigating exposure to price volatility and transmission congestion fees.

Key strategies might include: enhancing energy efficiency; expanding renewable energy sources; deploying distributed solutions such as solar, energy storage, and demand response; and installing dispatchable power sources in the AE service area—with a preference for carbon-free options. In addition, short-term solutions might need to be incorporated as part of the plan to ensure resource adequacy despite import capacity limitations and the retirement of local generation.

Additionally, addressing equity and environmental concerns, such as reducing fenceline pollution and outages that disproportionately affect marginalized communities, will also play a vital role in optimizing overall system performance and achieving AE's sustainability goals. With technologies available today and on the near-term horizon, a balanced mix of carbon-neutral and carbon-free solutions often proves cheaper, faster, and more equitable to implement than solely zero-carbon options.

Policymakers reviewing AE's resource generation plan should recognize the need to balance affordability, reliability, and environmental goals. Effective policies will avoid prescriptive mandates and instead set outcome-based standards, allowing AE flexibility to meet targets while accommodating the potential to integrate innovative solutions in the future. This approach enables AE to pursue emissions reductions and reliability improvements while managing costs, creating an adaptable path forward that minimizes unintended consequences—like cost spikes or reliability concerns—that rigid mandates might cause. Standards-based policies thus support AE's ability to innovate in its resource planning, meeting community and environmental goals amid shifting energy demands and technologies.

# 1. Introduction and Scope

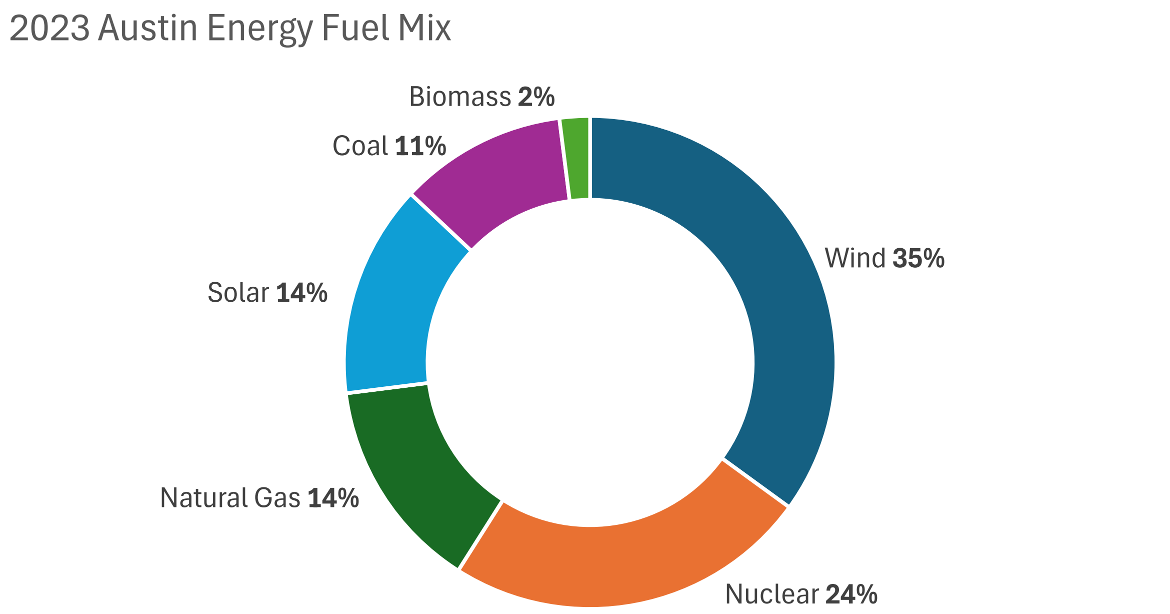
Austin Energy (AE), like many utilities across the country, faces the multi-pronged challenge of providing reliable and affordable energy to meet growing demand while also decarbonizing and operating its resources in a warming world.

AE has built its strategy around four key pillars: sustainability, safety, affordability, and reliability.[1] Today, nearly 75% of energy generation from AE assets is carbon-free (see Figure 1),[2] significantly higher than the U.S. average of 40%.[3] As the population and economic activity of the greater Austin area continue to grow, electricity consumption and peak demand is likely to rise accordingly. In fact, AE continues to set new peak demand records almost annually, with the latest record set in 2023 reaching 3,064 MW (see Figure 2).[4] Maintaining a high level of carbon-free generation in the face of this growth will require thoughtful consideration of various options.

This report aims to provide multiple demand growth scenarios through 2040 in the AE service area and identify several viable generation and efficiency strategies that AE can implement to meet demand.

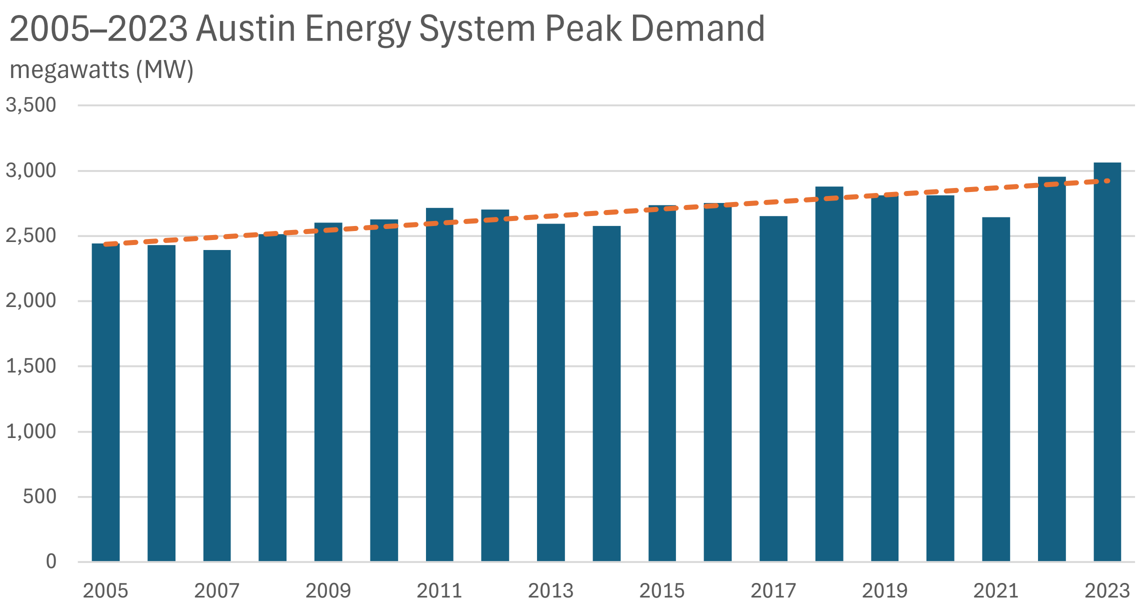
AE is a publicly-owned municipal utility serving approximately 540,000 customers—more than one million people—between Travis and Williamson counties and is a critical part of the local community. In 2023, with an approved budget of $1.72B and 1,897 full-time employees, AE earned $1.5B in revenue and generated over 14 TWh of electricity for ERCOT.[5] In the process, AE provided $115M in funds to the city.[6]

1 https://austinenergy.com/about/company-profile/benefits-of-public-power
2 https://austinenergy.com/-/media/project/websites/austinenergy/about/2023_annual_report.pdf
3 https://www.weforum.org/agenda/2023/03/us-electricity-energy-carbon-renewables/
4 https://austinenergy.com/-/media/project/websites/austinenergy/about/2023_annual_report.pdf
5 https://austinenergy.com/-/media/project/websites/austinenergy/about/2023_annual_report.pdf
6 https://austinenergy.com/about/company-profile/numbers




Source: Austin Energy FY2023 Annual Report

**Figure 1: Electricity in Austin Energy's service area in 2023 came from a range of primary resources, including wind, solar, nuclear, natural gas, coal and biomass.**

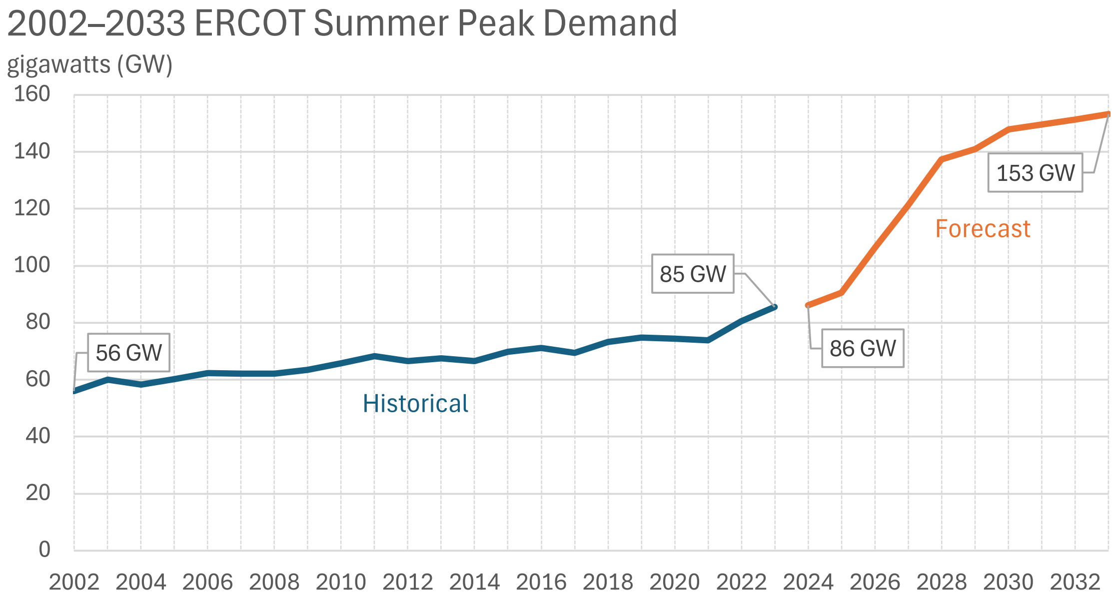



Source: The City of Austin

**Figure 2: System peak demand in the Austin Energy service area has increased 25% from 2005 to 2023.**

## 1.1 Larger Trends in the Energy Transition

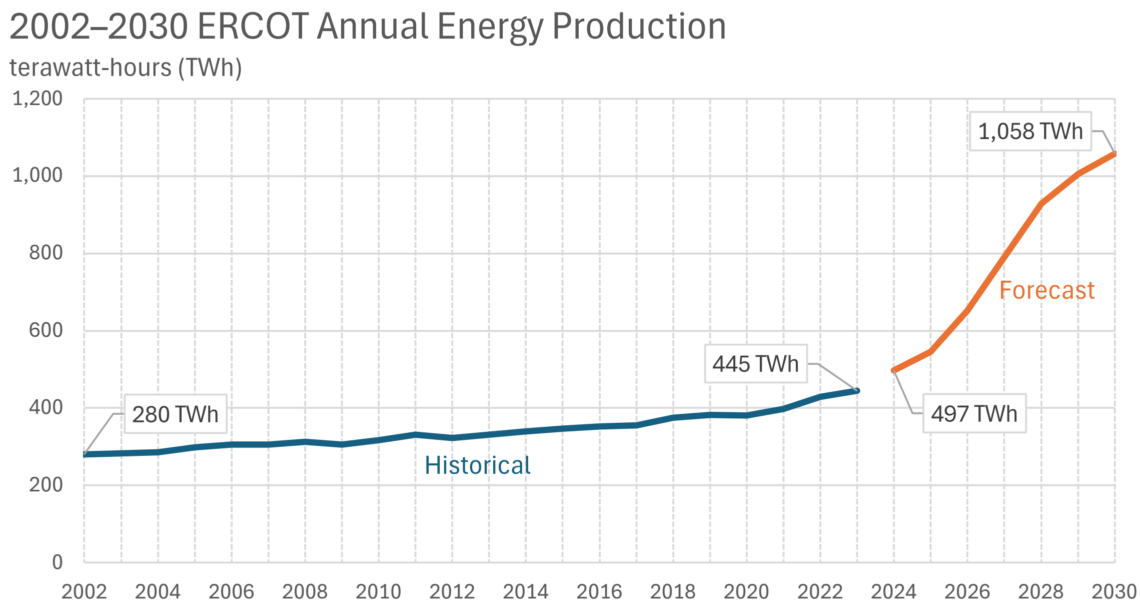
Industry groups, political leaders, and environmental groups agree: power demand is rapidly increasing. As a consequence, load growth is not unique to AE or the greater Austin area. ERCOT is predicting, and already seeing, significant growth in demand (GW), consumption (GWh), and transmission congestion.[7] By 2033, ERCOT predicts peak demand will reach over 153 GW, up from 85.5 GW in 2023 (see Figure 3). Similarly, electricity consumption is projected to reach 1,058 TWh by 2030, growing nearly 140% in the next seven years (see Figure 4).[8]




Source: ERCOT

**Figure 3: ERCOT Summer Peak Demand Forecast shows significant expected growth in the next decade.**

7 https://www.ercot.com/gridinfo/load/forecast
8 https://www.ercot.com/gridinfo/load/forecast




Source: ERCOT

**Figure 4: ERCOT Annual Energy Forecast shows significant expected growth in the next decade.**

Load growth is expected to increase rapidly for a few key reasons, including:

- Electrification of transportation, industrial loads, and home heating and cooking;
- Population and economic growth; and
- Changing climate/weather patterns, including heat domes and polar vortices, which lead to increased power usage for climate control in the built environment.

Below, we break these larger trends into four categories for analysis in the AE service area: Population growth, electrification of home heating and cooking, large load growth (e.g., data center growth), and electric vehicle (EV) adoption.

Compounding these challenges is the fact that ERCOT's transmission capacity has become increasingly scarce as more generation comes online in locations far from load centers.[9] This additional strain on the grid from load growth and increasing pressure on transmission capacity underscores the importance of balancing remote renewable energy expansion with grid infrastructure limitations. As such, options within the Austin Energy service area are worthy of special consideration.

9 https://www.ercot.com/files/docs/2023/12/22/2023-Report-on-Existing-and-Potential-Electric-System-Constraints-and-Needs.pdf

### 1.1.1 Decarbonization Tradeoffs

Decarbonization aims to reduce or eliminate carbon dioxide ($CO_2$) emissions, but the approach taken involves tradeoffs between cost, speed, and equity. There are two primary decarbonization strategies:

- **Carbon-Free (Zero-Carbon) Solutions**: These technologies, such as wind, solar, geothermal and nuclear power, produce no emissions at the point of generation. They provide clean energy, but often require significant investment in transmission infrastructure or construction costs and take time to scale.
- **Carbon-Neutral (Net-Zero) Solutions**: These approaches focus on removing $CO_2$ rather than eliminating them entirely at the point of generation. Strategies such as reforestation and technologies like carbon capture, utilization, and storage (CCUS) or direct air capture (DAC) remove $CO_2$ either at the source of production or from the atmosphere.

Tradeoffs between net-zero and carbon-free strategies revolve around environmental and economic performance, equity implications, and speed of implementation. With technologies available today and in the near-term horizon, a mix of carbon-neutral and carbon-free solutions tends to be cheaper, faster, and more equitable to implement than solely zero-carbon options.[10]

Importantly, decarbonization efforts are compatible with economic growth. A variety of organizations, including the U.S. Department of Energy,[11] the International Energy Agency,[12] Princeton University,[13] and the University of Texas at Austin,[14] have conducted studies on how to decarbonize the economy at the state, national, and global levels. These studies have a variety of similar and overlapping conclusions, including potential trade offs between strategies, but all find that a decarbonized economy can and does prosper.

### 1.1.2 Priority Order for Decarbonization

Decarbonizing the grid requires strategic decision-making and can be summarized by the guiding principle, "Do your best, clean up the rest." This approach outlines a logical order for tackling emissions in the most cost-effective and impactful way.

At the forefront is energy efficiency: ensuring resources are maximized and waste is minimized. The second priority is electrification, which replaces direct-use fossil fuels with cleaner, electric-powered alternatives. For energy services for which electrification isn't feasible, clean molecules—such as clean hydrogen, hydrogen carriers or sustainable fuels—can be used. Finally, carbon management addresses residual emissions, ensuring that any remaining carbon footprint is mitigated.

10 https://cockrell.utexas.edu/images/pdfs/UT_Texas_Net_Zero_by_2050_April2022_Full_Report.pdf
11 https://www.energy.gov/industrial-technologies/doe-industrial-decarbonization-roadmap
12 https://www.iea.org/reports/net-zero-by-2050
13 https://netzeroamerica.princeton.edu
14 https://cockrell.utexas.edu/images/pdfs/UT_Texas_Net_Zero_by_2050_April2022_Full_Report.pdf

### Efficiency

Programs that promote greater energy efficiency from our buildings, appliances, devices and lighting reduce the need for more electricity and have the added benefit of keeping homes at a safer and more comfortable temperature for longer durations if there is a power outage during a weather event.

### Electrification

Electric light-duty vehicles, home heating, and cooking have environmental and human health benefits and get cleaner with time as the grid decarbonizes. However, electrifying these activities might require expanding the grid to accommodate greater peak power demands (GW) and annual consumption (GWh).

### Clean Molecules

Clean molecules—biomethane, hydrogen, hydrogen carriers, and so forth—may be used for the parts of the economy that are hardest to electrify (e.g., shipping, aviation, industry, space heating in older buildings, etc.) and for power generation when other options aren't available.

### Carbon Management

Carbon management includes options such as point-source capture, reforestation, direct air capture, and marine carbon dioxide removal to prevent the release of greenhouse gases to the atmosphere and remove ambient $CO_2$.

## 1.2 The Challenges Facing Austin Energy

Amid the nationwide challenge of simultaneously expanding and decarbonizing the grid, AE faces three specific challenges in developing a renewable resource generation plan in the coming years:

- Aligning generation with peak demand or times of greatest power scarcity, especially as the economy continues to electrify;
- Addressing the expiration of solar and wind power purchase agreements (PPAs) over the next 15 years; and
- Delivering renewable power—which is often generated far from load centers—to Austin given the challenges of transmission congestion.

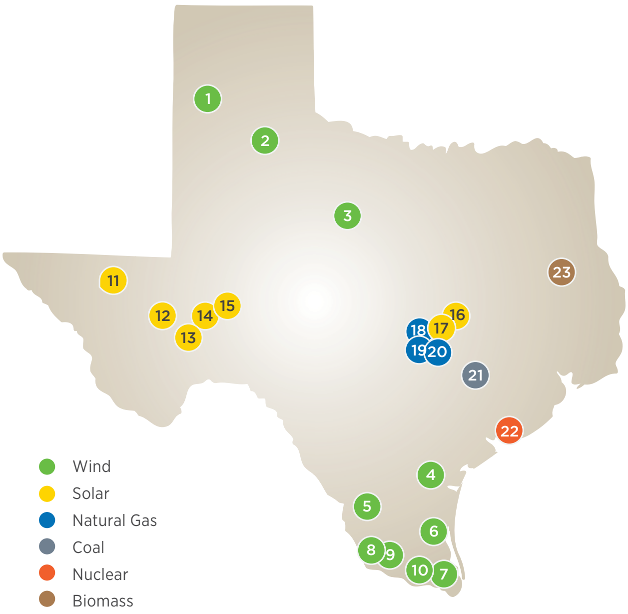
### 1.2.1 Austin Energy's supply forecast

Today, AE has a total adjusted generation capacity[15] of 2,560 MW, with coal, natural gas, and nuclear energy providing more than 60% of power. Of that, 873 MW, or 34% of capacity, is supplied by renewable resources, including wind and solar (see Figure 5).

15 Adjusted for capacity factors for each type of energy generation using ERCOT's July 2024 Unit Capacity data

## Austin Energy Generation Details and Locations

| | Name | Type | Installed Capacity (MW) |
|---|---|---|---|
| 1 | Jumbo Road | Wind | 299.7 |
| 2 | Whirlwind Energy Center | Wind | 59.8 |
| 3 | Hackberry Wind Project | Wind | 165.6 |
| 4 | Karankawa | Wind | 206.6 |
| 5 | Whitetail | Wind | 92.3 |
| 6 | Gulf Wind | Wind | 170.0 |
| 7 | Los Vientos 2 | Wind | 201.6 |
| 8 | Los Vientos 3 | Wind | 200.0 |
| 9 | Los Vientos 4 | Wind | 200.0 |
| 10 | Raymond | Wind | 200.0 |
| 11 | Aragorn | Solar | 180.0 |
| 12 | Roserock | Solar | 157.5 |
| 13 | Waymark | Solar | 178.5 |
| 14 | East Pecos | Solar | 118.5 |
| 15 | Upton | Solar | 157.5 |
| 16 | East Blackland | Solar | 144.0 |
| 17 | Webberville Solar Project | Solar | 30.0 |
| 18 | Decker Creek Power Station | Natural Gas | 200.0 |
| 19 | Mueller Energy Center | Natural Gas | 5.0 |
| 20 | Sand Hill Energy Center | Natural Gas | 595.0 |
| 21 | Fayette Power Project | Coal | 600.0 |
| 22 | South Texas | Nuclear | 430.0 |
| 23 | Nacogdoches | Biomass | 105.0 |




Source: Austin Energy FY2023 Annual Report

**Figure 5: Austin Energy nameplate capacity ratings and locations. On-peak adjusted capacity is slightly lower to reflect real-world weather conditions.**

All but three of AE's renewable resources have PPAs that will expire on or before 2040.

Even now, AE does not produce enough power to meet demand, and therefore must rely on the ERCOT power market. As PPA expiration dates approach and as demand grows, AE will need to weigh whether to build new, dispatchable generation in its load center or rely increasingly on the ERCOT market for power.

To better understand AE's supply forecast, we first look at the expiration date of current PPAs, which begin as early as 2027 and continue through 2043. Available generating capacity will decrease further when Fayette Power Project (FPP) closes. While the date for FPP closure is not yet known, we illustrate two scenarios: One showing AE's generating capacity assuming FPP closes in 2032, per EPA rules, and another showing generating capacity assuming FPP closes in 2029 (see Figure 6). The rolloff of PPAs is also graphically shown in each of the peak demand scenarios (see Figure 10). For the purpose of the load forecast graphs, we assume FPP closes in 2030.

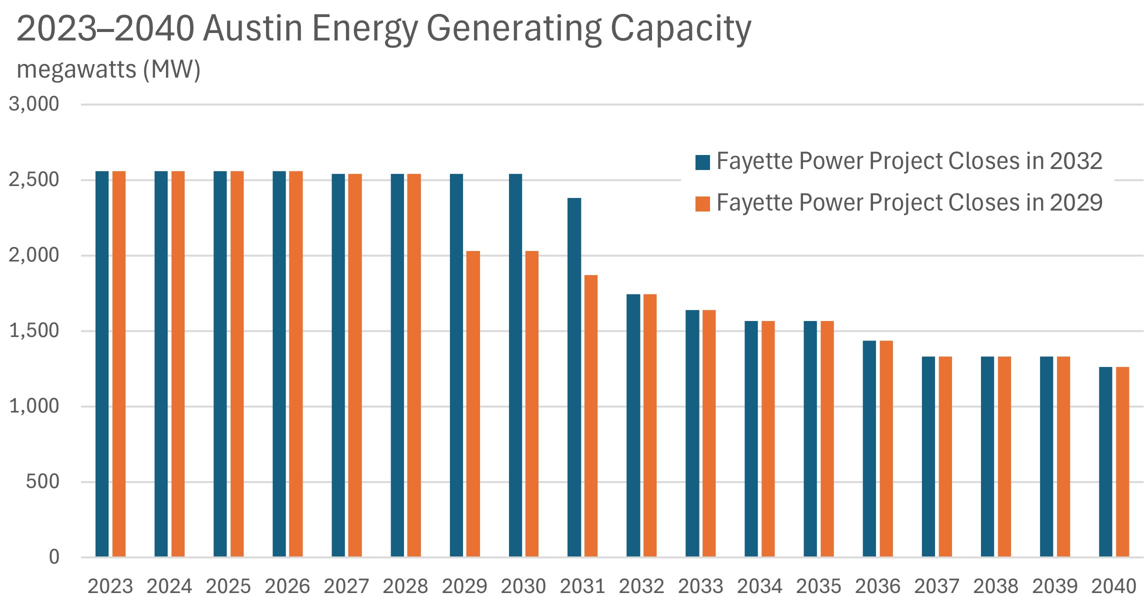



**Figure 6: Austin Energy's generating capacity based on PPA contract expiration demonstrates the impact future closures will have on supply. This figure shows PPA rolloff for all AE generators with the exception of Decker, Mueller, Sand Hill, South TX, and Nacogdoches.**

# 2. Data and Methods

To understand load growth in AE, we forecasted peak demand and energy consumption in the AE service area. In our forecast, we considered four main drivers of load growth:

- Population and economic growth
- EV adoption
- Electrification of home heating and cooking
- Growth of data centers and other large loads

In the next few subsections, we describe how growth for each of these four drivers was calculated and analyzed.

## 2.1 Population Growth

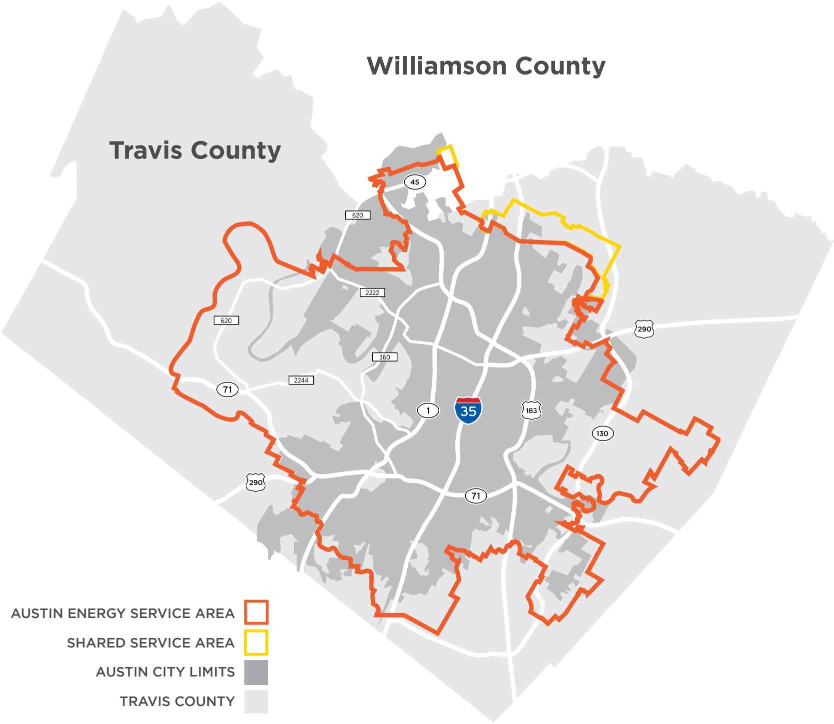
Considering an aggressive population growth scenario, we found that population growth alone could cause peak demand to reach nearly 3,500 MW in 2040, exceeding AE's current record of just over 3,000 MW.

### 2.1.1 Population Growth Calculations

Population growth projections were sourced from the 2022 Texas Population Projections Program from the Texas Demographics Center.[16] The Texas Demographics Center offers two population growth scenarios: One assumes future migration rates will be similar to those between 2010 and 2020 and another assumes migration rates half of those between 2010 and 2020. Because we are calculating peak demand—and "worst-case scenarios"—we utilize the first, more aggressive population growth scenario.

Historical Travis County population data was sourced from Nielsberg Research.[17] Though the AE service area includes parts of both Travis and Williamson Counties (see Figure 7), we focused exclusively on Travis County and AE customer data (from 2020,[18] 2021,[19] 2022,[20] and 2023[21]) for projecting population growth due to data limitations.

16 https://demographics.texas.gov/Projections/2022/
17 https://www.neilsberg.com/insights/travis-county-tx-population-by-year/
18 https://austinenergy.com/-/media/project/websites/austinenergy/about/fy_2020_annual_report.pdf
19 https://austinenergy.com/-/media/project/websites/austinenergy/about/2021_annual_report.pdf
20 https://austinenergy.com/-/media/project/websites/austinenergy/about/2022_annual_report.pdf
21 https://austinenergy.com/-/media/project/websites/austinenergy/about/2023_annual_report.pdf




Source: Austin Energy

**Figure 7: About half of the Austin Energy service area encompasses the City of Austin, and the other half encompasses the area surrounding the Austin city limits.**

### 2.1.2 Peak Demand from Population Growth

Peak power demand data were available for 2000, 2005, 2010, and 2018 through 2023 from AE. These data were cross-referenced with peak demand data posted by the City of Austin for 2006 through 2019 (see Figure 2).[22] To extrapolate peak demand for the years without posted data, we conducted an exponential regression analysis (See Figure 8). We employed an exponential, rather than linear, regression analysis because we seek to assess peak demand based on the aggressive population growth scenario discussed above. Under this assumption, we found that population growth alone could cause peak demand to reach nearly 3,500 MW in 2040.

22 https://data.austintexas.gov/Utilities-and-City-Services/Austin-Energy-System-Peak-Demand/a6pm-qynf/data

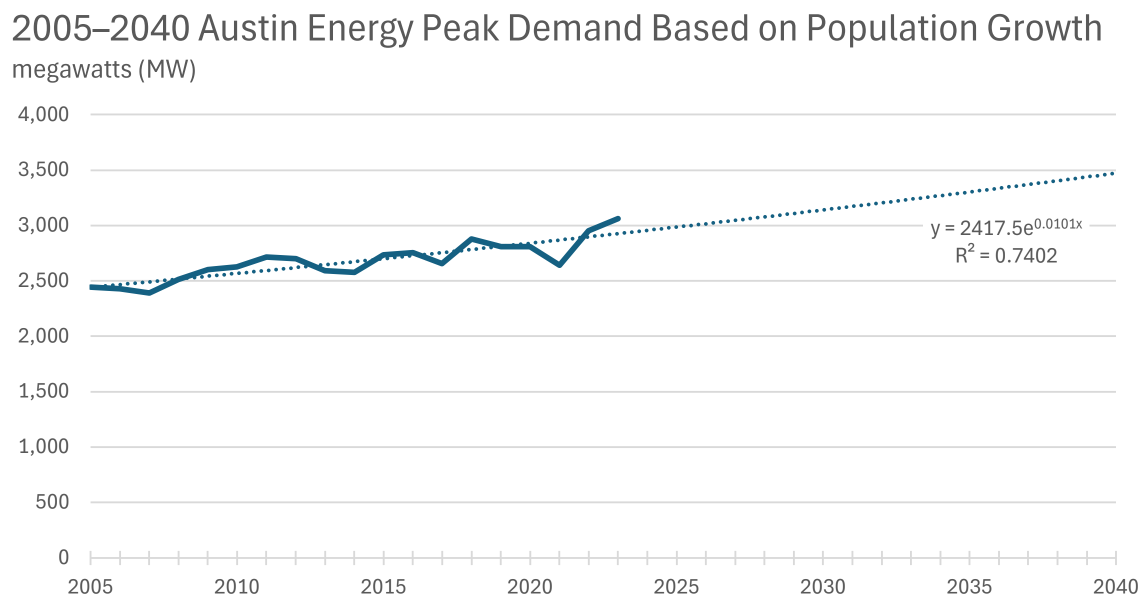



**Figure 8: An exponential regression analysis suggests that Austin Energy's peak demand due to population growth is projected to grow significantly.**

## 2.2 Data Centers

Based on current ERCOT projections and existing or planned data centers for the AE service area, we assume that 500 MW (0.5 GW) could be added to peak load by 2040.

As of today, 124 MW of data centers are reportedly running or planned for the AE service area.[23] However, as noted in Table 1, demand information is not available for 27 data centers (~50%) that will be, or already are, located in the AE service area. The lack of information regarding data center power requirements leaves uncertainty as to their future power and energy needs.

23 https://www.datacenters.com/locations/united-states/texas/austin

**Table 1: Austin Energy service area data centers require approximately 126 MW of power**

Note: Power demand is unknown for data centers that do not have a demand value listed (represented by '-').

| Data Center Name | Demand (MW) |
|---|---|
| DataBank | 0.4 |
| Thin-nology Helios Way Data Center | 2 |
| Element Critical Austin One Data Center | 5 |
| American Tower Edge Data Center Austin | 0.096 |
| Enzu AUS4 Austin Data Center | – |
| Lumen Austin 2 Data Center | – |
| LightEdge Austin I Data Center | 2.5 |
| Lumen Austin 3 Data Center | – |
| Enzu AUS1 Austin Data Center | – |
| Data Foundry Austin 1 Data Center | – |
| Enzu AUS2 Austin Data Center | – |
| MOD Mission Critical AU1 - Data Foundry Data Center PoP | – |
| Switch Data Centers - Austin 1 Data Center | – |
| Enzu AUS3 Austin Data Center | – |
| MOD Mission Critical AU2 - DRT Austin Data Center PoP | – |
| Digital Realty Austin AUS11 Data Center | 16 |
| CyrusOne AUS3 Austin Data Center | 24 |
| Otava Austin Data Center | 2.25 |
| Data Canopy Austin 2 | 9 |
| CyrusOne AUS2 Data Center | 9 |
| LightEdge Austin II Data Center | 2.5 |
| Lumen Austin 1 Data Center | – |
| Data Foundry Austin 2 Data Center | 36 |
| Data Foundry Texas 1 Data Center | 24 |
| Data Foundry The Data Ranch | – |
| Switch Data Centers Texas 2 Data Center | – |
| Switch Data Centers Texas 1 Data Center | – |
| **TOTAL Demand** | **124** |

Source: Austin Data Centers Locations

We estimate that data centers could require an additional 500 MW in the AE service area by 2040. This figure is derived from ERCOT's projection that roughly 40 GW of additional load will be added by data centers by 2030, up from about 1 GW in 2024.[24] High load growth scenarios predicted by ERCOT suggest that by 2039, demand from large loads could reach 104 GW, with non-industrial large loads accounting for approximately 80% of that demand, or roughly 80 GW.[25]

Because Austin Energy has a 4% share of the ERCOT market, we determined that Austin could see up to 3 GW of growth from data centers.[26] However, this high-level estimate was reduced to 0.5 GW because of the expectation that land and cost constraints would limit how much demand is sited in the AE service area. As a result, we estimate AE will need to prepare for an additional 500 MW for data centers by 2040.

Because data center growth is a relatively new phenomenon, rate of growth and data center locations are hard to predict. It is possible that data center growth within the AE service area will be higher than our prediction, given that companies may want to locate their data systems near their physical offices and workforce or due to faster utility hook-up times or to benefit from AE's relative cleanliness and reliability. It is also possible that data centers will move just outside of the AE service area to take advantage of different electricity rate structures. A data center's individual size and power requirements are also difficult to predict, but are anticipated to grow.

## 2.3 Home Electrification

Home electrification, though ultimately a small portion of electricity demand in the coming years, will account for roughly 30 MW of added peak demand in the AE service area by 2040, according to our analysis. However, some variation is expected, since human behavior and weather patterns can vary.

Polar vortices and cold snaps in the Austin area mean that home heating could account for unusually large portions of peak demand for hours or days at a time in the winter months. Higher temperatures could mean increased demand for air conditioning during the summers. Electric and induction stove top demand, though less volatile than demand for home heating and cooling, often correlates with peak demand times, as customers tend to cook meals when demand is highest (early evenings in the summer or early mornings in the winter).

### 2.3.1 Electrification of Heating

Around 56% of Travis County homes currently use electricity for heating.[27] We assume 1% growth per year, based on historical trends of building electrification.[28] For the purpose of this analysis, we also assume that growth remains linear, and that by 2040, 72% of buildings will have electrified heating. To determine how much energy is required to satisfy peak demand assuming electric heat pump use, we utilized 2023 research performed by Matthew Skiles, Joshua Rhodes, and Michael Webber (see Figure 9).[29]

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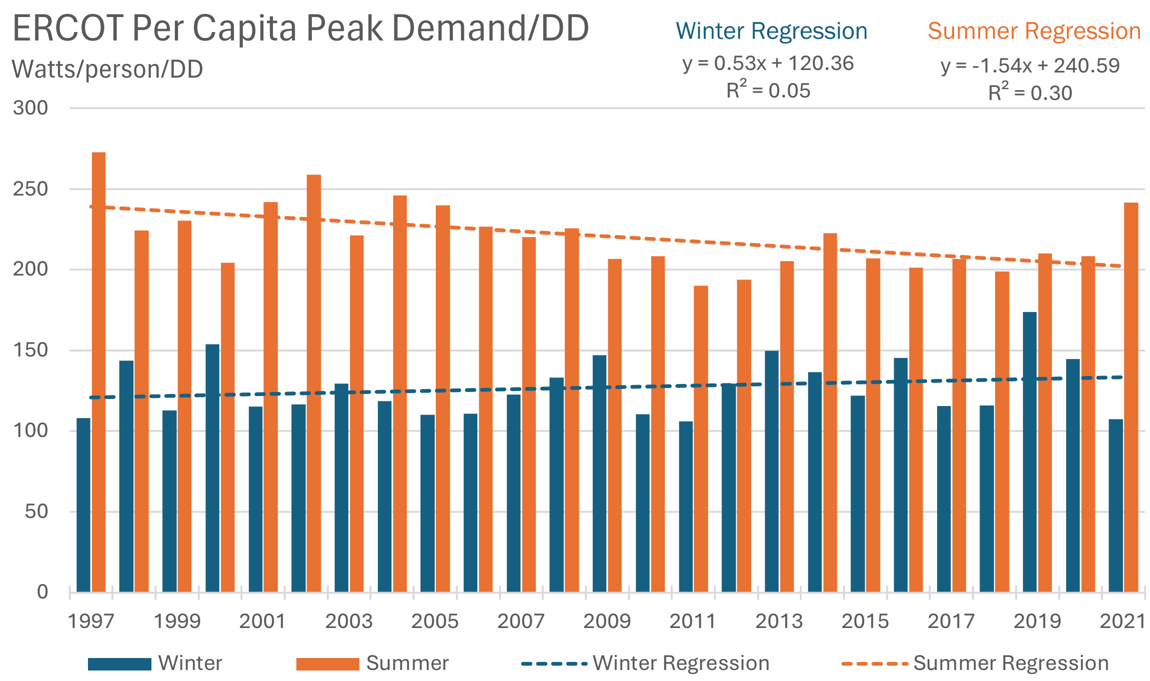
24 https://www.ercot.com/gridinfo/load/forecast
25 https://www.ercot.com/files/docs/2024/06/07/2024%20Long-Term%20System%20Assessment%20(LTSA)%20High%20Load%20Growth%20Scenario_June11_2024.pdf
26 https://austinenergy.com/rates/residential-rates
27 https://www.census.gov/acs/www/about/why-we-ask-each-question/heating/
28 https://www.washingtonpost.com/climate-environment/interactive/2023/home-electrification-heat-pumps-gas-furnace/
29 https://doi.org/10.1016/j.tej.2023.107254




Source: [Perspectives on peak demand: How is ERCOT peak electric load evolving in the context of changing weather and heating electrification?]

**Figure 9: Per capita peak demand per degree day (DD) is increasing over time for winter peak demand days.**

Our calculations found that based on the growth of heating degree days (HDD) in ERCOT, per capita peak demand for heating could move from 0.136 kW/person/HDD in 2024 to 0.148 kW/person/HDD in 2040. Based on our population growth projections, total peak demand for electrified heating in the AE service area could reach 195 MW by 2040.

For the purpose of displaying these results graphically in Figure 10, we found the difference in demand for each year between 2024 and 2040 to show actual demand growth.

### 2.3.2 Electrification of Cooking

Based on our estimates detailed in this section, electrification of cooking could add 25 MW of additional demand by 2040. For our analysis, we make the following assumptions:

- Electric and induction stovetops and ovens use between 1,000 and 3,000 W, depending on the mode of cooking (e.g., boiling a pot of water versus self-cleaning an oven).[30] For our calculations, we use the average of 2,000 W.
- 71–90% of Texans cook with an electric stove, according to the 2020 Energy Information Administration (EIA) Residential Energy Consumption Survey of 18,500 U.S. households.[31]

30 https://www.directenergy.com/en/learn/home-energy-management/how-much-energy-does-oven-and-electric-stove-use
31 https://www.statista.com/chart/29082/most-common-type-of-stove-in-the-us/

Because there is no information detailing electric versus gas stove use for Travis or Williamson counties, we use the Texas average of 80%.

- Electric stovetops are anticipated to grow in tandem with the development of new buildings, similar to the growth of heating electrification (about 1% per year). This analysis did not include the possibility that gas stovetops would be regularly replaced by electric stovetops in existing homes, though if that happens, perhaps because of incentives or policies requiring the change, then the peak demand growth for electric cooking would be even higher than shown here.
- 79% of households prepare at least one hot meal at home per day, according to a 2020 EIA survey.[32] (It is worth noting that these data could be skewed given that the survey was conducted during the COVID-19 pandemic, when people were more likely to cook at home than eat out. However, for the purpose of this analysis, we assume that 79% is representative of average household behavior.)

The calculations used to determine peak demand growth based on the above assumptions can be found in Appendix A.

## 2.4 Electric Vehicle Adoption

According to our forecasts, the greatest factor (and variability) in potential peak demand growth is from different EV charging patterns. For this reason, we analyzed three EV charging scenarios:

- Load forecast without any smart-charging management, and assuming every single EV plugs in at peak times (100% vehicles charging at once): **3,773 MW of new demand**

  While it is unlikely that every AE resident plugs in their EV at the same time of day, our goal is to model the worst-case scenario. It is also worth noting that humans often can and do act synchronously.[33]
- Load forecast based on ERCOT's assumed hourly EV charging patterns, which suggest that roughly 10% of electricity consumption from EVs will occur at once:[34] **377 MW of new demand**
- Load forecast with smooth, round-the-clock charging management of EVs, which assumes smart-charging technology: **157 MW of new demand**

To calculate these EV charging peak demand scenarios, we first determined the rate of adoption of EVs in Travis County. In 2023, there were 0.76 cars per person in Travis County, according to the Texas Department of Transportation.[35] If we assume this value stays constant, and per population growth projections, there will be approximately 1.3M vehicles registered in Travis County in 2040. Today, of the roughly 1M vehicles registered in Travis County, 42,000 are EVs.[36]

32 https://www.eia.gov/todayinenergy/detail.php?id=53439
33 https://www.scientificamerican.com/article/electric-car-owners-charge-at-once/
34 https://www.ercot.com/files/docs/2018/12/21/2018_LTSA_Report.pdf
35 https://www.dot.state.tx.us/apps-cg/discos/default.htm?dist=AUS&stat=vr
36 https://app.powerbi.com/view?r=eyJrIjoiYTRlY2M2MTctZDYwZC00MDNjLThkZDMtZjY5N2Y1YzlkNzA5IiwidCI-6IjJmNWU3ZWJjLTIyYjAtNGZiZS05MzRjLWFhYmRkYjRlMjliMSIsImMiOjN9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To estimate future EV penetration, we used goals outlined by the Austin Joint Sustainability Committee and ERCOT EV projections: [37,38,39]

- There will be 100,000 EVs in Travis County by the end of 2025;
- 40% of miles driven in the county will be electric by 2030; and
- EV adoption will grow linearly through 2040, at which point EVs account for 50% of registered vehicles in Travis County.

To calculate peak demand using the above goals and projections, we employed the following assumptions:

- The average Travis County citizen drives 14,000 miles per year;[40]
- EV owners will use a typical 5.7 kW Level 2 home charger; and
- The average EV travels 3.6 miles per kWh of electricity.

The calculations used to determine peak demand growth for each of the three EV charging scenarios can be found in Appendix A.

37 https://services.austintexas.gov/edims/document.cfm?id=270550&ref=austindaily.com
38 https://www.ercot.com/files/docs/2022/02/14/2022_LTSA_Update_02152022.pdf
39 https://www.ercot.com/files/docs/2023/08/28/ERCOT-EV-Adoption-Final-Report.pdf
40 https://www.fhwa.dot.gov/policyinformation/statistics/2019/

# 3. Results

Our results reveal that unmanaged EV charging has the largest potential impact on peak demand out of the four load growth drivers we analyzed. In Figure 10, we demonstrate this impact against AE's generation capacity, including PPA rolloffs.[41]

In our first scenario, EV charging accounts for nearly half of total peak load if not managed (See Figure 10).

Reducing the number of EVs charging at once to 10% of total vehicles has a considerable effect on overall peak demand, reducing the total peak demand from 7,800 MW to 4,400 MW (See Figure 10). Under this second scenario, the reduction in demand from EV charging elevates the relative potential impact of data centers on peak demand.

Finally, our third scenario with uniform EV charging demonstrates that smart-charging technology could have an outsized impact on total peak demand. In this scenario, uniform charging shaves an estimated 3,600 MW off of peak demand, lowering the total peak demand to 4,200 MW (See Figure 10).

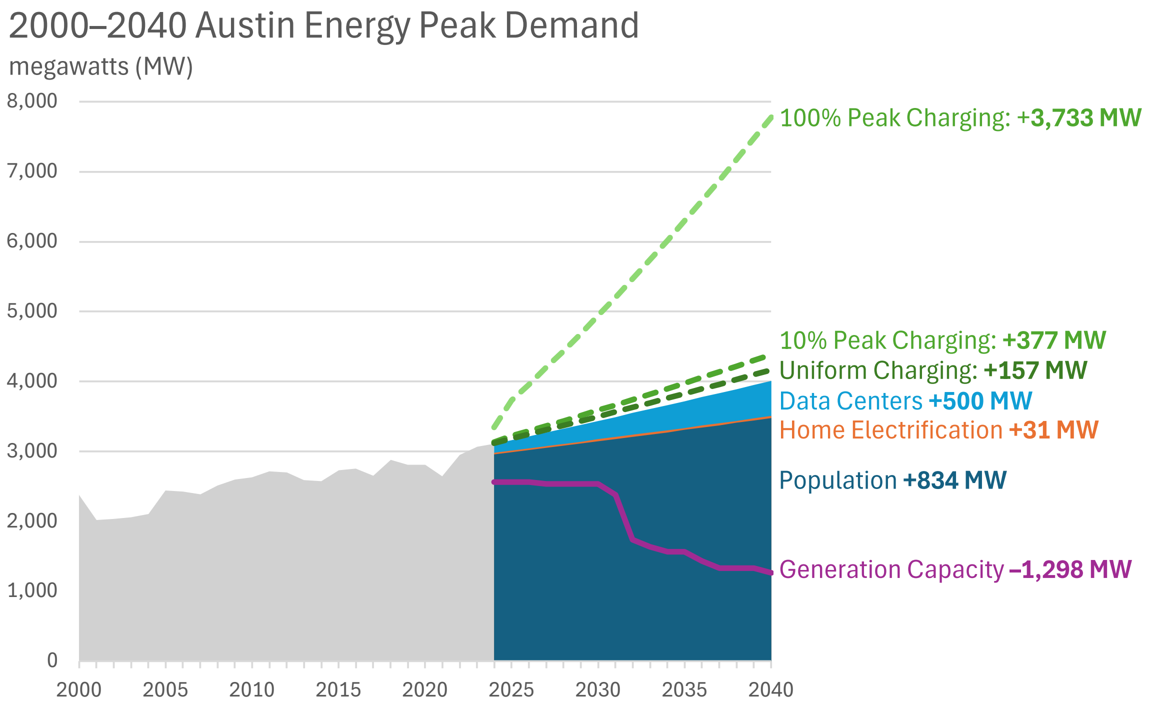


**Figure 10: Projected peak demand for Austin Energy under three EV charging scenarios: Scenario 1 assumes unmanaged charging with 100% of EVs charging during peak times, leading to the highest demand increase; Scenario 2 models 10% of EVs charging at peak times, moderating demand spikes; Scenario 3 envisions a fully managed charging approach, distributing EV charging uniformly throughout the day to flatten peak demand.**

41 In Figure 10, the line entitled, "Population" represents all sources of electricity demand from 2000 through 2023 (e.g., A/C, heating, lighting, EV charging, etc.). Starting in 2024, the data split based on the four sources of load growth outlined in the previous section so that each of their contributions to peak demand can be analyzed.

# 4. Discussion and Key Considerations

## 4.1 Options to Meet AE Resource Adequacy Needs

Understanding and assessing trade-offs are key to evaluating options to meet future demand. AE should consider expediting the deployment of a variety of supply and demand solutions to ensure resource adequacy while minimizing exposure to out-of-service area price volatility and transmission congestion fees. These solutions include a *combination* of non-generators, variable renewable generators, and dispatchable sources.

### 4.1.1 Non-Generators

- **Energy efficiency** helps offset demand growth by reducing overall consumption, easing strain on the grid and delaying the need for costly infrastructure expansion.
- In terms of balancing supply and demand, turning loads off is just as useful as turning on power plants. Customers can participate in **demand response (DR)** by turning off non-essential loads, such as hot water heaters or pool pumps during peak hours. Residential DR may also include turning off essential loads, such as heating and cooling, on a rotating basis.
- **Batteries and other storage systems**, while helpful, are typically constrained by their limited durations of two to four hours. Longer-duration options are emerging and are likely to be available in the late 2020s and early 2030s.

### 4.1.2 Renewables

- **Renew or replace existing, out-of-service area PPAs** for wind and solar. It may also be possible to increase the power output of current wind and solar generation through repowering. However, PPAs with remote power plants do not alleviate transmission congestion concerns.
- To alleviate congestion concerns, **new solar** systems could be built in the AE service area. Commercial locations, such as parking lots or warehouses, are especially attractive because of their low cost.[42] It may also be possible to expand solar outside of the AE service area but to locations nearby in less transmission-congested areas.

### 4.1.3 Dispatchable Sources

- Regardless of whether AE adopts the aforementioned options to meet resource adequacy needs, **dispatchable, carbon-free generation** (with a low capacity factor) is likely still needed to affordably serve customers when wind and/or solar availability is low. Similarly, local, dispatchable generation that has the potential to be carbon-free or carbon-neutral in the near term is a practical solution. Dispatchable generation also provides other reliability services, such as voltage support.
- Near-term options for dispatchable sources include:
  - Gas with carbon removal at Nacogdoches or elsewhere
  - Gas with carbon capture onsite

42 https://emp.lbl.gov/tracking-the-sun

- Gas with flexible fuel (to accommodate blending with hydrogen, etc.)
- Biomethane
- Hydrogen
- Ammonia
- FPP but with wood pellet blending, carbon capture, etc.

- Longer-term options may include:
  - Geothermal
    - Difficult to do in the AE service area
  - Nuclear Fission (technology used at STP Nuclear, of which AE is a partial owner)
    - Slow to build, expensive, and hard to do in the AE service area
    - AE could potentially install small modular reactors (SMR) or traditional Gen III or Gen IV plus-up systems at STP
  - Nuclear Fusion
    - Technically immature and hard to estimate construction times, cost, regulatory context, etc.

## 4.2 Special Considerations for Austin Energy

In meeting future demand, AE has the opportunity to improve overall system performance and maintain low costs for customers. Though there are many possibilities for meeting peak demand, not all are viable for AE. Similarly, there is not one "correct" solution. AE will need to deploy a *variety* of generation options (thermal, commercial solar, etc.) and demand side controls (storage, demand response, efficiency, etc.) to effectively serve customers.

Below, we outline special considerations for AE and address common questions regarding the feasibility of solutions for AE.

### 4.2.1 Opportunities for Efficiency

In an effort to reduce electricity use, AE has prioritized efficiency measures and programs over the last two decades. As such, AE has already capitalized on many of the low-lift efficiency plays such as financial assistance for weatherizing homes and rebates for installing LED light bulbs and energy-efficient appliances.[43] While additional energy efficiency options exist, they will likely be more challenging and costly to implement compared to the measures already in place.

#### Demand Response

AE currently operates a thermostat-based DR program, helping to manage residential load during peak times. As EV adoption increases, more opportunities for DR will emerge, with EVs potentially acting as mobile batteries and offering flexible energy storage and grid support.

43 https://savings.austinenergy.com/residential/offerings

However, EVs will also compete with smaller, stationary batteries installed at the meter, creating a dynamic where multiple resources could vie for grid support roles.

Regardless, it's likely that DR efforts will continue to focus on residential customers, as industrial and commercial users tend to have more predictable, less variable loads, making them easier for utilities to serve without the same level of demand management.

### Geothermal Efficiency Opportunities

Geothermal energy generation is not a practical option for AE due to geological limitations, but geothermal efficiency for heating and cooling via ground source heat pumps and cooling or heating districts is a prospect worth exploring further. In developments like Whisper Valley in East Austin, geothermal systems are being utilized as an efficiency measure rather than a large-scale energy source.[44] These systems tap into the stable temperatures underground to provide more efficient heating and cooling for homes, reducing overall energy consumption and lowering demand at peak times. However, additional research is needed to determine whether geothermal efficiency opportunities are feasible for AE, given varying types of bedrock and soils throughout the Austin area.

## 4.2.2 Benefits of Local Dispatchable Power

Building dispatchable power within the AE service zone not only reduces exposure to significant financial risk from bulk grid price volatility and transmission congestion pricing, but also improves service reliability. Eventually, expanding the transmission grid to accommodate growing demand within ERCOT will be essential. However, because the process of permitting and building new statewide transmission lines is complex, upgrading the transmission system takes longer than building new power plants. As such, near-term, local solutions might be especially desirable for AE.

### Hydrogen and Flexible Fuel Combustion

Depending on how it is produced, stored and transported, hydrogen could provide a cleaner alternative to natural gas, reducing carbon emissions and contributing to AE's sustainability goals. Flexible fuel combustion, allowing the use of various fuel sources, could enhance energy security by reducing dependence on any single energy source.

However, hydrogen infrastructure is expensive to develop, requiring new production systems, pipelines, storage, and fueling systems, which could drive up costs. Flexible fuel systems might also lead to emissions if fossil fuels remain part of the mix, complicating efforts to achieve net-zero targets. Lastly, the technology and infrastructure needed for these options are still in development and might not be ready for widespread deployment in the near term. However, it is worth noting that there is substantial federal government support for hydrogen, so it is possible that its availability will improve dramatically.

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44 https://www.thinkgeoenergy.com/texas-neighborhood-to-be-built-atop-largest-residential-geothermal-grid/

### Rotating Machines

Rotating machines, like turbines at thermal power plants and synchronous condensers, could play a critical role in helping AE meet growing demand while enhancing grid stability. These machines are helpful for voltage and frequency control, which could have been beneficial during events like Winter Storm Uri, potentially mitigating brownouts.

A combination of rotating machines and strategically placed batteries, such as at each substation, could help balance demand and improve grid resilience while reducing 4CP peak demand charges.

### Repowering

While PPAs remain relevant, they have become less attractive due to recent tax transferability rules, which provide greater incentive for direct ownership.[45] Nevertheless, renewing, repowering, or replacing existing wind and solar PPAs might be an effective strategy for AE to quickly address growing demand while meeting sustainability goals. Repowering and renewing PPAs can enhance capacity and efficiency but do not necessarily resolve transmission congestion issues.

## 4.2.3 Management of EV Charging

It has been a known risk that whether EVs strain or enhance grid performance depends on what time of day they are charged.[46] Our analysis demonstrates that implementing a method of smart charging to limit EV charging to no more than 10% of vehicles at once could cut 2040 peak demand projections by more than 3,400 MW.

Therefore, implementing time-of-use rates,[47] smart-charging technology,[48] or other approaches that reduce how many EVs charge at times of scarce supply will be beneficial to maintaining grid stability.

## 4.2.4 Holistic View of Equity

Equity is an important consideration to the AE resource generation plan, particularly when considering the impacts of local generation. While the impact of emissions and fenceline pollution are critical issues, focusing equity discussions solely around these topics overlooks many other equity challenges, including electricity reliability, workforce participation, affordability, and economic growth. For instance, a new power plant near a low-income neighborhood could make it a point to hire locally, offering new employment opportunities to residents. Balancing each of these factors with cost-effectiveness—using least-cost optimization—helps ensure a fair approach.

Future iterations of this work could include a more detailed analysis of net-zero versus zero-carbon equity benefits, the burden of pollution, and opportunities for improved reliability and affordability and economic growth, particularly for low-income Austin residents.

45 https://www.whitehouse.gov/cleanenergy/clean-energy-tax-provisions/
46 https://www.ercot.com/files/docs/2022/08/04/2022_LTSA_Update_08092022.pdf
47 https://doi.org/10.1016/j.egyr.2022.06.048
48 https://afdc.energy.gov/fuels/electricity-infrastructure-development

### 4.2.5 Environmental Considerations

Electrifying transportation and home energy systems by replacing gasoline, diesel, and natural gas with electricity or adding CCUS technologies provides distinct environmental advantages. In particular, gasoline tailpipes are the biggest air quality concern in the AE service area. Given this fact, it is noteworthy that charging an EV with electricity—even if generated from FPP—is actually cleaner than driving a gasoline-powered car, owing to the timing and location of emissions. While internal combustion engines (ICEs) release pollutants from tailpipes at ground level in densely-populated urban areas during the day, EVs charged using power from a coal power plant at night shift emissions to rural areas, where smokestacks release pollutants at higher altitudes, allowing for greater dispersion and avoiding the formation of photochemical smog, which requires sunlight to form.

This transition to electricity-powered systems, even with fossil-fuel-derived electricity, lessens both direct human health impacts and broader environmental concerns. While carbon-neutral generation is the goal, these tradeoffs will be important for AE to consider as the utility prepares for unprecedented demand.

#### Carbon Management

There are several strategic pathways to reduce carbon emissions, each with unique tradeoffs in terms of cost, environmental impact, and reliability. For instance, vegetative carbon management and seabed meadows offer promising nature-based methods for carbon sequestration, but may not be feasible inside the Austin area.

Additionally, carbon offsets offer a flexible tool to address those emissions that are more challenging or expensive to eliminate directly. Offsets could help manage costs while maintaining progress toward carbon reduction goals. Ultimately, a hybrid approach that incorporates both immediate, cost-efficient solutions and long-term investments in carbon removal will help AE meet its decarbonization targets while ensuring reliability and economic sustainability.

## 4.3 Key Considerations for Policymakers

For policymakers, understanding the inevitable trade-offs among affordability, reliability, and environmental goals is essential to crafting effective policy. For instance, policies focused solely on emission reductions could lead AE to invest heavily in renewable generation and storage, which might increase rates for customers or reduce system reliability if adequate backup generation isn't available. Conversely, policies that prioritize low rates above all else could lead to reliance on cheaper, fossil-based generation that contradicts decarbonization targets. Balancing these priorities requires a nuanced approach that allows AE to work toward its ambitious climate goals without compromising rate affordability or grid reliability. Policymakers should prioritize designing policies that encourage diverse pathways for achieving clean and reliable energy, rather than mandating specific fuels or technologies, as flexibility often leads to better outcomes.

Standards-based policies, which set high-level requirements for labor, environmental quality, and reliability, have historically proven effective because they enable market participants to innovate and select the best pathways to compliance. For example, the Clean Air Act

Amendments in the early 1990s successfully addressed acid rain by requiring utilities to limit sulfur emissions without dictating how.[49] Utilities could reduce emissions by choosing among a range of options—such as installing scrubbers, burning cleaner coal, or fuel-switching to natural gas—leading to a 40:1 benefit-cost ratio and faster-than-expected mitigation of acid rain.[50]

Conversely, prescriptive policies, such as the mandates on corn ethanol for reducing U.S. dependence on fossil fuels, have shown how rigid requirements can lead to unintended consequences that may undermine the original policy goals. In the case of the corn ethanol policy, mandates drove resource competition and impinged significantly on land and water resources, with limited environmental benefits. Mandates also failed to anticipate (or incentivize) the rise of electric vehicles, which are environmentally beneficial.[51] Policymakers should therefore consider the benefits of flexibility to enable efficient, innovative responses while minimizing unintended consequences.

For policymakers considering AE's resource generation plan, this means setting clear, outcome-based standards for sustainability, reliability, and affordability that enable AE to make strategic, context-sensitive decisions that balance its unique operational needs with public policy goals. By establishing ambitious yet flexible targets for AE's energy mix, rather than dictating specific technologies or fuel sources, policymakers can support AE in innovating within its resource portfolio to meet community and environmental standards. This approach can mitigate the risk of unintended consequences, such as cost spikes or reliability issues, that may arise from prescriptive mandates and allows AE to adapt its resources in response to evolving energy markets, technological advancements, and the diverse needs of its customer base.

49 https://www.epa.gov/acidrain/acid-rain-program-results
50 https://www.epa.gov/clean-air-act-overview/highlights-clean-air-act-40th-anniversary
51 https://doi.org/10.5547/01956574.34.4.1

# 5. Conclusion

Utilities, including AE, must brace for a period of significant growth in electricity demand. Our analysis shows scenarios in which AE could see peak demand more than double by 2040. Unmanaged EV charging is projected to have the largest impact on growth, driving total peak demand up more than 4,500 MW, to 7,800 MW. Fortunately, EV charging can be managed, reducing EV-related peak demand 3,800 MW to just 150 MW.

Still, in the next 15 years, there is anticipated to be a fundamental mismatch between energy demand in the AE service area and AE-owned or contracted power generation. To ensure resource adequacy and reduce the impact of price volatility and transmission congestion fees, AE should accelerate the deployment of solutions to address both supply and demand. Key to this strategy is evaluating energy options through the lens of trade-offs, balancing various considerations—such as the benefits and drawbacks of local, dispatchable power, the necessity of EV charging management, and the feasibility of new efficiency measures—to optimize overall system performance and cost-effectiveness for customers. This approach involves incorporating a mix of generation and storage resources alongside efficiency improvements. A strategic approach that prioritizes decarbonization and equity will not only strengthen AE's financial health, but also provide customers with greater reliability, affordability, and sustainability.



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# Acknowledgements

This analysis was funded by Austin Energy through a master service agreement with the University of Texas at Austin. Many thanks to members of the Austin Energy Utility Oversight Committee at the City Council and the City of Austin's Electric Utility Commission whose questions helped shape the report. Many thanks to Lynda Rife who organized public comment sessions and workshops that were useful for gathering questions and insights from a wide array of local stakeholders that this report seeks to address. Other contributors include Jeffrey Philllips, who provided the cover photo and graphics and illustration support. Many thanks to Lisa Martin, Kurt Stogdill, Daniel Bishop, Michael Hoffman and others at Austin Energy who provided valuable feedback for this report.





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# Appendix A: Peak Demand Calculations

## Home Electrification

### Home Heating

Research done by Skiles et al. was used to determine peak demand for AE based on customer electric heat pump use. Skiles et al.'s research applies linear fit estimations to seasonal peak demand in ERCOT. We employ their winter regression formula, since we are concerned primarily with heat pump use (See Figure 9). Though Skiles et al.'s data are derived from ERCOT total peak electricity demand from 1997 through 2021, we assume, for the purposes of our research, that ERCOT winter peak demand is a reasonable representation of Austin winter peak demand. To tailor the results to Austin, however, we use Skiles et. al's method of normalizing peak demand data by population.

Per capita demand was calculated as follows:

$$\text{Per Capita Peak Demand (kW/person/HDD)}_{\text{Year}} = (0.77) \times (\text{Year in the Model}) + 115.83$$

Peak demand for the AE service area was calculated as follows:[52]

$$\text{Total AE Peak Demand}_{\text{Year}}\text{(MW)} = (\text{Per capita peak demand})_{\text{Year}} \times (\text{Travis County population})_{\text{Year}} \times (\text{\% of buildings with electric heat pumps})_{\text{Year}}$$

### Home Cooking

Peak demand for electric cooking was calculated as follows:[53]

$$\text{Peak Demand for Electric Cooking}_{\text{Year}}\text{(MW)} = ((\text{\% Households that Prepare} \geq 1 \text{ Hot Meal per Day}) \times (\text{Number of AE Households with Electric Stovetops})_{\text{Year}} \times (2\text{ kW})) / 1{,}000$$

$$\text{Difference in Peak Demand for Electric Cooking}_{\text{Year}}\text{(MW)} = (\text{Peak Demand})_{\text{Year}-1} - (\text{Peak Demand})_{\text{Year}}$$

52 Calculations do not account for heat pump efficiency.
53 Calculations do not account for stovetop efficiency.



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## EV Adoption

To estimate peak demand and electricity consumption, we utilized the following equations:[54]

$$\text{Peak Demand Year (MW)} = ((\text{\# of EVs})_{\text{year}} \times (5.7 \text{ kW}) \times (\text{\% of Vehicles Charging at Once})) / 1{,}000$$

$$\text{Electricity Consumption Year (MWh)} = ((\text{Total Electric Miles Driven})_{\text{Year}} \times (1 / 3.6 \text{ Miles per kW Hour})) / 1{,}000$$

Assuming:

$$\text{Total Electric Miles Driven}_{\text{Year}} \text{ (Miles)} = (\text{Total Miles Driven})_{\text{Year}} \times (\text{\% of Miles Driven That Are Electric})_{\text{Year}}$$

54 Calculations do not account for EV charging efficiency.

# AUSTIN ENERGY RESOURCE, GENERATION AND CLIMATE PROTECTION PLAN TO 2035

## COMMUNITY OUTREACH




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# STAKEHOLDER WORKSHOP SUMMARIES

## AUSTIN ENERGY
## WORKSHOP #1 WORKSHOP FEEDBACK SUMMARY

Austin Energy Headquarters (4815 Mueller Blvd. Austin, TX 78723)
Friday, June 7, 2024 | 11:30 a.m. to 1:30 p.m.

### Workshop Overview

Austin Energy hosted their first in a series of monthly workshops on Friday, June 7, 2024, from 11:30 a.m. to 1:30 p.m. at the Austin Energy Headquarters (4815 Mueller Blvd. Austin, TX 78723). The purpose of Workshop #1 was to gather initial feedback and input from local stakeholders to begin identifying community values, priorities, and metrics for Austin Energy's Generation Resource Plan 2035. Stakeholders representing local organizations who provided a voice to Austin Energy's mission pillars of clean/sustainability, affordability and reliability attended along with members of the public and those who joined online via a Webex link.

Workshop participants were shown a series of introductory presentations reviewing the basics of energy supply and demand, the Texas and Austin-area energy market, Austin Energy's mission pillars and what a resource generation plan is and its purpose as a tool for future utility resource planning. Stakeholders were broken into four breakout groups and engaged in small group discussion with a set of questions. Workshop participants were encouraged to ask questions and provide feedback through the workshop, including during the presentations and small group discussions.

Each breakout group had an assigned facilitator who took notes on a flip chart. The notes on the flip chart were recorded and referenced to provide this summary. The meeting concluded with Austin Energy polling workshop participants on the best day of the week and time folks would like to host future workshops. There were 31 stakeholder participants and 21 members of the public who attended in person.

An engagement summary for this workshop was provided to members of the Electric Utility Commission (EUC) who met on the following Monday, June 10, 2024. Takeaways from the EUC meeting are included in the next section.

### Top Themes and Takeaways

**Additions to the Mission Pillars:** Workshop participants felt good about Austin Energy's mission. Participants mentioned the complexity of the market and the difficulty of balancing the three mission pillars. Workshop participants suggested adding equity and transparency to Austin Energy's mission. Equity was defined as ensuring services to those who need them the most. Transparency, specifically easy accessibility regarding residential customers' fees and rates. Participants noted wanting to see more proactive communication from Austin Energy regarding outages and disaster response. Workshop

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participants urged Austin Energy to prioritize collecting community feedback and to foster more coordination with local organizations and groups.

**Sustainability & Innovation:** Overall, workshop participants would like to see flexibility versus specificity prioritized in the Generation Resource Plan. The mission should be holistic, including restorative energy practices, innovative solutions, and demand management. Workshop participants focused on cradle-to-grave or life cycle assessments regarding sustainability. Some mentioned wanting to explore new nuclear options, geothermal, and green hydrogen. The need to expand on-site/home renewable generation was mentioned as well.

**Customer Rates & Affordability:** Workshop participants continued the equity theme when discussing affordability. Austin Energy must consider the populations that need energy the most, including the medically vulnerable and those who are low-income or on fixed incomes. and addressing the energy burden for affordability. Energy burden was discussed as a measure instead of a percentage increase. There was no specific discussion of affordability with commercial customers. Note: The Resource Generation Plan is separate from the rate case. Austin Energy may want to discuss the differences at a future meeting to manage the expectations of the workshop participants.

**Reliable vs Predictability:** Workshop participants recognized that 100% reliability cannot be attained and that some outages are inevitable. However, they encourage Austin Energy to be predictable – this includes the number of hours of impact when outages occur and to receive notifications ahead of time. There are some groups where 100% reliability is very important, including those that are medically compromised and fragile. The plan may want to include resilience hubs to have water, food, and stored clean energy. One group suggested comparing Austin Energy to ERCOT's numbers or there are other resources to analyze frequency and duration compared to Houston or Dallas.

**Suggestions for Resource Generation Discussions for Future Meetings:**

- Hyperlocal and on-site energy generation,
- Battery storage, energy storage outside of batteries,
- Demand management,
- Locally sourced energy options to reduce cost of transmission,
- Cradle-to-grave or life cycle assessments of resources,
- Reliability and affordability by energy source,
- Update on the Fayette Power Plan.
- New energy generation technologies,
- Nuclear energy
- Geothermal energy
- Green hydrogen
- Transmission lines statewide

### Electric Utility Commission (EUC) Input

- Equity is important — we should identify where equity plays a role in the plan
- Predictability is great, but is it feasible?
- Risk is going to be part of our work. We need to ensure Austin Energy is financially stable – the example of the Brazos Electric Cooperative was mentioned. We don't want to have those same issues.
- Keep Austin Energy public. It is a dividend to the community. It is important that we do not lose it.
- To keep Austin Energy public, we must balance affordability, reliability and sustainability.
- When we measure sustainability, we need to look at externalities including water use, air quality and effects on non-attainment.
- When it comes to transparency, we need to tell people the costs associated with ERCOT and the costs from Austin Energy.Demand management,

## Small Breakout Group Discussion Feedback and Questions

*Group 1 Notes*

### How well is Austin Energy doing in relation to its mission? Is there anything missing?

- Overall, Austin Energy's mission is good. Our group would add "sustainable" since it's not inherent in "clean" or reliable".

### What comes to mind when you think of "clean"?

- Avoiding human impacts. Human health is important. This correlates to carbon emission percentages and particulate matter.
- Concerns were raised about "unclean" energy sources when sustaining services for the medically vulnerable.
- "Cradle to Grave" or Life Cycle Assessment concerns including:
  - What are the lifetime costs of clean energy infrastructure?
  - Energy ROI concerns such as wind turbines
  - Where can credible studies be found?
- There were general questions about solar energy and how residents can obtain personal supplies for home solar panels.

### What comes to mind when you think of "affordable"?

- The group requested that Austin Energy track customers' usage overall versus over 65 customers.
- What median income is considered "affordable"? This is important from district to district and neighborhood to neighborhood.
- Concerns were expressed for customers on fixed incomes. Their usage isn't comparable since their living conditions and buildings could contain old infrastructure, which would make them less efficient and use more energy.
- There's a preference for gradual rate increases compared to sudden or no increases. It's important for customers to be able to plan for these increases.

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### What comes to mind when you think of “reliable”?

- Ice storms and their impact on customers
- There were questions about the impact of the urban canopy:
  - » How often trees are trimmed? What is the maintenance schedule? For wires and poles specifically, we should recognize the impact of climate change and the risks it poses.
- Instead of an aspirational goal of reliability, what about predictability?
- Recognition that 100% reliability cannot be attained:
  - » Some outages are inevitable
  - » The community wants predictability — this includes the number of hours of impact when outages occur and to receive notifications ahead of time. Austin Energy is doing a better job than before.
- The group expressed their desire for 100% reliability for those who are medically compromised and fragile – everyone else can absorb more risk. This would include informing the broader customer base that there is a medical vulnerable list and how to get on it.
- What are Austin Energy numbers compared to ERCOT’s numbers? Is ERCOT’s goal to only have one failure every 10 years?
  - » SAIDI, CAIDI, SAIFI – look at these resources to analyze frequency and duration compared to Houston or Dallas
- Communication is key (text, mass email) – need to do a better job of informing customers
  - » Utilize community groups to market Austin Energy’s affordability programsWhat median income is considered “affordable”? This is important from district to district and neighborhood to neighborhood.
- Concerns were expressed for customers on fixed incomes. Their usage isn’t comparable since their living conditions and buildings could contain old infrastructure, which would make them less efficient and use more energy.
- There’s a preference for gradual rate increases compared to sudden or no increases. It’s important for customers to be able to plan for these increases.

## *Group 2 Notes*

### How well is Austin Energy doing as it relates to their mission? Is there anything missing?

- There historically have been good programs at Austin Energy, but there have been no recent changes. Exploring distributing small batteries could be helpful.
- One participant hasn’t seen recent customer report data and requests this for future workshops. Austin Energy combines residential and commercial customer data – there is a request to have this data separated.
- There’s a need for increased community involvement.
- Specifically on affordability – affordability for who? Homeowners benefit from Austin Energy, but it’s uncertain if renters benefit equally.
- Equity – prioritizing providing services to people who need it
- Ensuring information is available to everyone

- Community resilience – ensuring communication with the City of Austin during outages.
- Ensuring resources for renters during emergencies – this was discussed for the resilience hubs to have water, food, and stored clean energy.
- There's a need to plan to incorporate new technology as it comes.
- Local government coordination.

### What comes to mind when you think of "clean"?

- Converting coal to renewable facilities sources.
- Achieving zero carbon emissions, air pollution, and water pollution.
- Exploring technologies that enhance fossil fuel regeneration.
- Conservation efforts – conserving water, materials, fuel, and land.
- Increasing battery use – participants noted that Austin is three years behind.
- Maintaining affordability, cleanliness, and reliability.
- Restoring previously polluted areas.

### What comes to mind when you think of "affordable"?

- In addition to the 2% over "x" number of years timeline, set annual increase goals.
- Energy burden – addressing the impact of energy costs on consumers.
- Exploring locally sourced energy options.
- Maintaining affordability for employers who are providing services for Austin Energy.

## *Group 3 Notes*

### How well is Austin Energy doing as it relates to their mission? Is there anything missing?

- Austin Energy is doing a good job considering the complexity of the market and the difficulty in balancing the three mission pillars.
- Austin Energy could be more proactive in their outage communication.

### What comes to mind when you think of "clean"?

- More opportunities and incentives need to be put in place for residents to generate local, on-site energy. Right now, there aren't robust incentives to do so.
- Incentivize battery usage.
- Biomass is not actually clean.
- We should consider carbon emissions along with air and water pollution.
  - » This also includes better water consumption monitoring.
- How do nuclear facilities affect nearby water sources?

### What comes to mind when you think of "affordable"?

- Rather than seeing the data aggregated on averages for both residential and commercial, we'd like to see Austin Energy's tiered rates compared with similar programs — this includes comparing our market and commercial rates with others.

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- There's a partnership opportunity to use AISD real estate assets to create hyperlocal sources of energy production, including those facilities having the ability to use the energy they produce rather than it all going to the grid system.
  - Austin energy needs to be creative in providing ways for local demand management.
- With the increase in large tech companies and data centers coming to Austin, this results in an increased demand in energy consumption. Is there a way to offset the cost onto those entities rather than it potentially affecting the rates of residential customers?
  - This could also include developing more ways to offer credits for efficiency.
- Instead of just looking at energy consumption, consider energy burden when determining rates.

### What comes to mind when you think of "reliable"?

- For example, with our current Electric Vehicle (EV) management, we should consider not only peak travel times but determine peak load or charging times.
- When it comes to renewables, we should be conducting full lifetime analysis of that energy generation.
- Participants encouraged Austin Energy to have a more holistic energy strategy.

## *Group 4 Notes*

### How well is Austin Energy doing as it relates to their mission? Is there anything missing?

- Reliability and affordability per energy source, resource availability specifically
- For Austin's new solar program, what are the projected effects on the percentage input changes?
- Coal plant — how does its removal affect the system?
- There is a complexity with relationships with other entities like LCRA:
  - What about percentages/shares owned by Austin Energy/City of Austin — what will be the process of transitioning out of coal plants usage? Decommission or selling outright?
- What's the difference between fees versus rates? There needs to be better visibility and transparency between the two.
- How well is the CAP Program working? The community needs to see the data to see its efficiency. How can it be improved? We need to raise greater awareness and usage for qualifying populations.
- Worker protection protocols.
- Safe delivery of the product/energy.
- Transparency in communication — this should be added to the mission statement in some form.

### What comes to mind when you think of "clean"?

- There needs to be a discussion about nuclear energy, specifically about the technological advances that make it a viable option.
- Has geothermal ever been considered? Is that on the table?
- What about green hydrogen?

### What comes to mind when you think of "affordable"?

- Fees versus rates — is 2% an appropriate goal?
- For affordability, what about the percentage of a customer's income?

**What comes to mind when you think of "reliable"?**

- When the power comes on — group consensus.
- If there's an issue, the solutions need to come quickly.

## General Session Feedback and Questions

**Q: Are municipally owned facilities under the Public Utility Commission (PUC)?**

A: Yes — Austin Energy works with municipal facilities to install transmission lines and determine cost-of-service in those areas. We also have the ability to go to them for rate appeals. Also, if Austin Energy is building transmission lines outside of city limits, we work with municipal entities to do that. This includes any weatherization work as well.

**Q: If people find themselves in an emergency situation related to a power outage, is there a number to call?**

A: Yes — Austin Energy does keep a medically vulnerable registry to proactively reach out to community members. Our goal is to prepare the community to stay in place during disasters and to have emergency preparedness plans.

**Q: On the "Sustainability Goal" slide, what happened from 2022 to 2023 for it to drop from 77% to 70%?**

A: Our load is increasing. The renewable and carbon-free energy we're generating isn't close to us. It's getting more and more difficult to transmit the energy where we need it to be.

**Q: Does the data account for changes in peak seasons or peak hours of the day?**

A: The data presented today represents annual numbers, but with the time of day and seasons it does change. The public can access real-time data on the website.

**Q: Would these charts look different if we weren't on the ERCOT grid?**

A: That would require significant analysis to determine.

**Q: How much wiggle room do we have with the 2% metric since we've been below it for so long?**

A: The 2% affordability goal was set by the Austin City Council. There isn't much room to adjust that metric.

**Q: Are the rates affected by the increase in natural gas prices?**

A: To a degree. The rate shown is an all-in rate.

**Q: For the 2% affordability goal, does that factor in low-income or fixed-income people?**

A: This is looking at our average rate. Austin Energy does have programs in place to ease the cost burden on low-income customers.

**Q: Do the rates run parallel between commercial and residential? Is this the average across the board?**

A: Yes, this is the average including commercial and residential.

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**Q: Can we have a breakdown of the cost drivers? A breakdown of what drives those rates would be helpful.**

A: Yes, that's something we can provide in a future workshop.

**Q: Is the goal itself actually 2% a year or is it 20% over ten years?**

A: The goal is to have rates increase by only 2% a year, if needed. We don't like to have larger increases — rate shock is real. Situations like increased costs in the ERCOT market or inflation can cause the rates to increase.

**Q: Is the affordability metric only for residential or is it system wide?**

A: It's system wide.

# AUSTIN ENERGY
# WORKSHOP #2 WORKSHOP SUMMARY

Austin Energy Headquarters (4815 Mueller Blvd. Austin, TX 78723)
Friday, July 26, 2024 | 11:15 a.m. to 1:30 p.m.

## Workshop Overview

Austin Energy hosted their second in a series of monthly workshops on Friday, July 26, 2024, from 11:15 a.m. to 1:30 p.m. at the Austin Energy Headquarters (4815 Mueller Blvd. Austin, TX 78723). The goals of Workshop #2 were to have the participants have a general understanding of ERCOT and its relationship to Austin Energy and to hear from Dr. Michael Webber with the Webber Energy Group from the Cockrell School of Engineering at UT Austin regarding Texas and Austin-area energy markets and trends, resource options, and potential risks and tradeoffs. Stakeholders representing local organizations who provided a voice to Austin Energy's mission pillars of clean/sustainability, affordability and reliability attended along with members of the public and those who joined online via a Webex link. The workshop was also streamed and recorded live on ATXN.

Workshop participants were given a brief overview of the feedback heard from Workshop #1 and a presentation on how that feedback is being shared with the Electric Utility Commission and incorporated into the Resource Generation Plan 2035. An ERCOT 101 presentation was given to show the relationship between Austin Energy and ERCOT and how Austin Energy is not only responsible for its service area but is also affected by levers in the larger ERCOT/Texas energy market landscape. After the ERCOT 101 presentation, Dr. Michael Webber gave a robust presentation covering topics such as energy transition, electrification, broader ERCOT trends, load growth, resource options, demand management and more.

The remaining time of Workshop #2 was dedicated for a general questions and answers session where workshop participants could engage with Dr. Webber and Austin Energy representatives. Like Workshop #1, workshop participants were divided into four groups. The members of each group had access to these handouts: Webber's presentation slides with room to take notes, a general notetaking document, and a document to capture any questions that weren't addressed in the questions and answers session. Workshop participants were instructed to either leave their handout capturing any unanswered questions on the group tables or to leave them at the sign-in station. The meeting concluded with Austin Energy and Rifeline sharing details of Workshop #3.

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## Top Themes and Takeaways

### *ERCOT 101 Presentation*

- Austin Energy is bound to the ERCOT market and its rules and constructs.
- The ERCOT market, like any market, has both benefits and risks. Decisions made in themarketplace have tradeoffs. For example, a decision made to maximize reliability could reduce affordability or vice versa.
- Decisions we make for the Resource Generation Plan will affect the tools available in the future to minimize risk and maximize benefits in the ERCOT market in terms of affordability, sustainability, reliability and equity.

### *Dr. Webber Presentation*

- Utilities, including Austin Energy, need to prepare for an era of unprecedented electricity consumption.
- The challenge before us is to simultaneously expand and decarbonize the grid while the world is warming.
- Austin Energy is uniquely positioned, as a municipally-owned utility, to address load growth because it can work on both the supply and demand sides of the equation. Since the service territory is its own load zone Austin Energy can avoid congestion costs by building generation close to where customers need it.
- Do your best, clean up the rest through a combination of efficiency, electrification, clean molecules and carbon management.
- Austin Energy has an opportunity to improve the overall financial health of the utility (and therefore provide more benefit to the Austin community and customers).
- The key lens through which energy options should be considered: trade-offs.

## Q&A General Session

Recording Link: https://austintx.new.swagit.com/videos/311156

### *In Person Questions*

**Q:** What do you think Austin Energy should do to build more capacity for renewable energy?

**Response: Timestamp 1:07**

**Q:** Talking about net zero versus carbon free – carbon management is a big topic. How do you talk to people about carbon capture? What do you say to critics of it? People say it’s too expensive.

**Response: Timestamp 1:09**

**Q:** Why were batteries not listed on the slide? Could we use a utility scale battery, charge it at night, and dispatch it during peaks?

**Response: Timestamp 1:16**

**Q:** How does hydrogen fit in in the future?

**Response: Timestamp 1:25**

**Q:** In your opinion, is the cost of producing a power plant that would combust hydrogen in the long term, after combusting natural gas for some time, would that offset the cost and the benefits of solar?

**Response: Timestamp 1:28**

**Q:** How do you feel about Austin Energy installing something small, like a 20 kilowatts battery, at each meter and then using it for demand respond — they keep the money until the system pays for itself — and then after that customers will get the money?

**Response: Timestamp 1:33**

**Q:** How will the burden of pollution be accounted for and factored into the modeling?

**Response: Timestamp 1:35**

**Q:** What is the role of big corporations that contribute more to power usage?

**Response: Timestamp 1:40**

***Online Chat Questions***

**Q:** Do you have a lot of flexible demand response to help with keeping costs down?

**Response: Timestamp 1:12**

**Q:** On electrification, how does Austin Energy forecast how much additional electricity will be needed with EVs and transitioning from gas heaters to electric heat pumps?

**Response: Timestamp 1:15**

**Q:** How much demand response can Austin Energy play with on ‘EV’ and other ‘DERs’? What is Austin Energy doing to prepare for controlling devices?

**Response: Timestamp 1:13**

**Additional Context:** Austin Energy programs like Power Partner[SM] Thermostats and EV are examples of ways Austin Energy controls devices to manage demand.

**Q:** What impact will the ADVANCE ACT have on accelerating adoption of nuclear?

**Response: Timestamp 1:32**

**Q:** Do you know if Austin residents and businesses are purchasing back-up generators?

**Response: Timestamp 1:38**

**Q:** I'd be interested to hear how involved Austin Energy gets into R&D and how they are going to scale up software to control the grid within their territory or program design. Are there other options they can employ before resorting to building new generation or are we already past that? Does the public get to weigh in on load forecasting which is going to drive how much new generation Austin Energy thinks they need?

**Response: Timestamp 1:52**

**Q:** Austin Energy is buying and selling on the market and producing electricity. Has anybody looked at why Austin Energy is in the production business anymore? Buy from the grid and let somebody else build it and manage it and not be in the production business.

**Response: Timestamp 1:54**

### *Unanswered Questions*

The following questions were submitted by participants in writing for response after Workshop #2.

**Q: Could Austin Energy hypothetically build transmission too and get cost recovery for it?**

A: Austin Energy can build transmission and recover costs, though there are specific requirements around that. To build transmission, the utility must have approval from the Electric Reliability Council of Texas (ERCOT), the Austin City Council and, in some cases, the Public Utility Commission of Texas (PUCT). Also, the transmission has to connect to existing Austin Energy equipment on at least one end. The utility cannot build transmission just anywhere. Locally, Austin Energy has several transmission projects underway that meet these requirements.

Cost recovery for transmission is not guaranteed as transmission costs within ERCOT are spread to all ratepayers. To recover costs for transmission build, Austin Energy must submit a transmission cost of service (TCOS) rate request to the PUCT. The PUCT reviews the request to ensure that all costs are reasonable and necessary.

**Q: With green hydrogen, you start with electricity and then lose a lot of energy as you hydrolyze, compress, transport, and finally re-generate electricity. How could hydrogen ever be cost-effective for electricity generation?**

A: There is a lot to consider when looking at green hydrogen, especially if one entity is handling the whole process — from hydrogen production to electricity generation. Another way to look at it, though, is to separate that process and have a different entity produce the green hydrogen. The entity generating electricity does not have to also produce the hydrogen. If hydrogen production is the main purpose of the business, there would be different ways to manage and offset costs. Especially when taking production scale into consideration, we see examples where green hydrogen could be cost-effective for electricity generation.

**Q: Transmission buildout in ERCOT:**

- **When will more transmission be built to reduce congestion and costs to Austin Energy customers?**

A: The Electric Reliability Council of Texas (ERCOT) continuously looks at the electric system and evaluates needed transmission projects. It publishes all planned or approved transmission projects on its Planning webpage under Transmission Project for Information Tracking (TPIT). This tracker includes Austin Energy projects.

Planned projects have to go through an ERCOT approval process (including ERCOT Board approval) before going to the Public Utility Commission of Texas (PUCT) for approval. ERCOT publishes TPIT three times per year: March 1, July 1 and Oct 15.

- **What specific transmission lines need to be upgraded to reduce congestion costs?**

A: In general, upgrading and building transmission lines throughout ERCOT will help reduce congestion costs. ERCOT's 2023 Report on Existing and Potential Electric System Constraints and Needs provides the latest published outlook on congestion costs and related transmission projects. Congestion specific to Austin Energy is caused by two main factors:

» Limitations around how much power can be brought into the Austin service area.

» Limitations implemented to ensure grid stability when voltage support is weak or insufficient.

As Austin Energy continues its transition to cleaner technologies, addressing these transmission conditions is critical. Last year, the energy services consulting group 1898 & Co. completed a third-party transmission study for Austin Energy assessing several improvements to support reliable service with no local gas generation. Austin Energy already has many of those transmission projects underway. However, while transmission can relieve some local congestion, additional changes in the electric landscape — such as growth in demand — make this a dynamic problem. It often requires additional supply and demand-side solutions to protect customers and Austin Energy against future risks. In short, transmission alone does not solve the problem.

- **What is the process where ERCOT assesses the need for transmission upgrades and prioritizes them?**

A: Congestion Rent is a measure used by ERCOT to identify overloaded elements and recommend transmission improvement to relieve congestion. Here's how ERCOT uses it:

» ERCOT tracks the monthly historical Congestion Rent to identify overloaded transmission lines.

» It then proposes a transmission system improvement need in the Regional Transmission Plan.

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- » The transmission operator that owns the infrastructure where the new transmission equipment would go takes on the project and develops a plan to address the required transmission improvements.
- » The transmission operator's plan becomes a project that is then submitted to the Regional Planning Group (RPG) for review.
- » After RPG review, ERCOT performs an independent review of the project and additional scenarios to recommend the project that meets the evaluation criteria at the lowest cost.
- » With ERCOT's approval, the transmission operator further develops the plan and goes to the PUCT for final approval.

2. Transmission operators (like Austin Energy) can also submit projects based on potential future needs to the Regional Planning Group (RPG). Potential future needs can look like additional growth expected in the service area or retirement of generation. After RPG review, ERCOT performs an independent review of the project and additional scenarios to determine if the project should be approved. With ERCOT's approval, the transmission operator further studies the route, involves the community and landowners in the project and goes to the PUCT for final approval. Regardless of the way, it typically takes.

**Q: What are the easiest ways for Austin Energy to locally increase generation to reduce price impacts from congestion?**

A: Austin Energy recently retired about 800 MW of thermal generation in its service area as it continues to efficiently manage its power assets. Those retirements, coupled with limitations around how much power can be brought into the Austin service area, make it difficult for Austin Energy to manage price spikes in the ERCOT market. On one level, a simple solution is increasing local generation through permitting, siting and deploying peaker generation units, which can be built in two to four years. This is a complex issue, though, and any solution needs to align with community values and priorities while protecting against future risk.

**Q: Aside from demand-side management and energy efficiency, what is the quickest, most affordable way for Austin Energy to meet resource adequacy?**

A: Aside from demand-side management and energy efficiency, the quickest and most affordable way for Austin Energy to meet resource adequacy is to have locally sited generation. A full solution, though, has to address broad considerations. That's why the resource generation planning process further studies costs, emissions and outages to fully assess tradeoffs and effects to the community values of affordability, environmental sustainability and reliability.



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**Q: What is the value of switching from a carbon free model to a net zero model?**

A: A carbon-free model does not allow for any thermal, dispatchable generation that emits carbon. A net-zero model allows for carbon emissions as long as they are captured or removed from the atmosphere. Very high wholesale market prices in the ERCOT market tend to occur when there is limited generation and demand for energy is high. The net-zero model allows for thermal, dispatchable generation during these periods, while offsetting those carbon emissions. This can significantly reduce costs to Austin Energy customers. If the thermal generation is owned by Austin Energy, then we have the ability to run that equipment and manage emissions in a meaningful way while promoting reliable service. If thermal generation is owned by others, they are likely to run the resources without regards to the emissions impact.

**Q: Is it an option for Austin Energy to expand its service territory? Are there options in a reasonable radius for medium-large scale solar/wind farms?**

A: Austin Energy's service area was set by the PUCT in 1976. Austin Energy alone does not have the authority to expand it, but it is possible. In very specific circumstances, a case for expansion can be brought to the PUCT through a Certificate of Convenience and Necessity. The other utility serving that area also has to agree. Historically, these adjustments have been minor boundary amendments and not large-scale service area changes.

The Austin area is generally not considered a prime development spot for wind energy. There are large solar farms close to the City of Austin such as East Blackland in Pflugerville or Big Star Solar just east of Austin. There are fewer options for wind near Austin, but we are seeing some wind developments in areas like Llano County.

**Q: Is Austin Energy/City of Austin considering regulation/policy to prevent large electricity consumers, like data centers, from affecting our load?**

A: Austin Energy is required to provide electric service to customers within our service territory regardless of the type of customer. However, there is a robust planning process to ensure readiness for large changes to the grid. When a customer with a high demand wants to connect to the electric system, Austin Energy has an evaluation process to explore needs and requirements. First, Austin Energy would go through a preliminary analysis of the request. If the request passes that initial screening, Austin Energy would do a full interconnection study with the customer to fully determine the impacts and needs of providing power. If everyone agrees with the results of the interconnection study, then the construction process begins.

Generally speaking, large customers tend to invest in energy efficiency measures, which helps to reduce their load. Some large customers participate in demand response.

# AUSTIN ENERGY
# WORKSHOP #3 WORKSHOP SUMMARY

Austin Energy Headquarters (4815 Mueller Blvd. Austin, TX 78723)
Thursday, Aug. 22, 2024 | 11:15 a.m. to 1:30 p.m.

## Key Workshop Takeaways

- Reliability is the community's top priority across the board. In the survey responses, resource allocation tradeoffs exercises, and small group discussions, participants indicated that Reliability is the top community value to consider for the Resource Generation Plan.
- Equity continues to be a major theme and discussion point throughout the workshops. Participants have expressed the importance of keeping equity top of mind when considering the other community values.
- The impacts of outages can be detrimental to vulnerable communities, low-income families, and especially for the medically compromised who rely on power and automation for their homes and life-sustaining devices.
- Austin Energy's environmental sustainability leadership should be applauded. Stakeholders acknowledged Austin Energy's investments in clean energy, energy efficiency, demand response and more, and additional efforts should prioritize reliability and resilience.

## Workshop Overview

Austin Energy hosted their third in a series of workshops on Thursday, Aug. 22, 2024, from 11:15 a.m. to 1:30 p.m. at the Austin Energy Headquarters (4815 Mueller Blvd. Austin, TX 78723). The goals of Workshop #3 were to have participants explore trade-offs between affordability, reliability and environmental sustainability, and to discuss equity as it relates to how those three affect the most vulnerable. We have been talking about trade-offs throughout this series of workshops, and while it would be ideal to have 100% clean, 100% reliable and 100% affordable with truly equitable outcomes, the exercises and surveys featured in this workshop allowed participants to express their risk tolerances with real-world examples. This workshop was recorded and streamed live on ATXN. Due to technical difficulties, a Webex link was not available.

When attendees arrived, they were given their first survey, the Impact Survey, which asked questions regarding the effects of affordability, reliability/resiliency and environmental sustainability to them personally and for those who their organization serves or represents. To see a preview of the results of the Impact Survey, please see Page 2 of this report. Please see *Workshop #3 Results-Survey Responses Excel spreadsheet* for a comprehensive look at all the survey responses. After attendees spent time completing the Impact Survey, Rifeline provided a brief presentation to report out on the takeaways from Workshop #2.

While the surveys provided during Workshop #3 were available through physical paper handouts, a QR code was available for each of the four breakout groups to scan and take the surveys online through a SurveyMonkey link.

The participants were then introduced to the Resource Planning Tradeoffs Exercise, titled A Game of Beans. The goal of the exercise was for participants to provide valuable feedback on how Austin Energy should prioritize tradeoffs among community values. Using finite resources, or beans, participants created allocations for the planning values as an individual, and as a group. This exercise provided insight into how participants viewed the tradeoffs between affordability, reliability/resiliency and environmental sustainability. To review the instructions of the exercise, the individual and small group allocation scores, and the small group report out takeaways, please see Page 3 of this report. Additionally, see *Workshop #3 Results-Survey Responses Excel spreadsheet* for a comprehensive look at the Resource Planning Tradeoffs Exercise scores.

Following the tradeoffs exercise, Ronnie Mendoza, Austin Energy's Manager of Customer Assistance Programs, gave a presentation on the Texas Energy Poverty Research Institute (TEPRI)'s report on energy equity and energy insecurity, which highlights values already echoed by what's being discussed in the workshops. The presentation also reviewed the policy recommendations TEPRI offered in their report. After the presentation, participants were handed a second survey titled, Most Vulnerable Survey. This survey asked participants to describe in more detail who they thought of when they considered those most vulnerable and how equity is applied to the three community values of affordability, reliability/resiliency and environmental sustainability. After completing the Most Vulnerable Survey, each breakout group facilitator guided their group members through those same series of questions. Each small group then reported out to the room on what their respective group discussed. To see a preview of the results of the Most Vulnerable Survey, please see Page 7 of this report. Please see *Workshop #3 Results-Survey Responses Excel spreadsheet* for a comprehensive look at the Most Vulnerable Survey responses.

Participants were handed a final survey titled, Objectives Survey. This survey had a list of three draft objectives under each community value of affordability, reliability/resiliency, and environmental sustainability. Participants were instructed to circle one objective that best aligned with their/their organization's perspective(s) out of each category or were given an option to write their own. All surveys were collected by the Rifeline team. The Objectives Survey responses have been included in the *Workshop #3 Results-Survey Responses Excel spreadsheet*; however, those responses will be further explored in Workshop #4, and therefore will be included in the summary report for Workshop #4. Closing remarks included letting participants know that Workshop #4 is scheduled for Thursday, Oct. 3, 2024. Participants were also informed that one of the agenda items for Workshop #4 will be to discuss the results of the Objectives Survey. There were 24 participants and five members of the public who attended Workshop #3 in person.

Here is the recorded ATXN link for Workshop #3: https://austintx.new.swagit.com/videos/313139

## Impact Survey: Recap of Responses

**Question #1: What is the impact to you if you lost power for the following timeframes?**

**1 hour** — minimal, inconvenience, annoying

**8 hours** — somewhat substantial, financial impacts, can't work, painful, pharmaceuticals at risk

**48 hours** — financial impacts, devastating, relocate, no work

**Question #2: What is the impact to the people or companies served by the organization you represent loses power for the following timeframes?**

**1 hour** — loss of revenue, damage to equipment, inconvenient, could endanger our residence due to depend on equipment

**8 hours** — loss of revenue, possible loss of customers, damage to equipment, disruption to care

**48 hours** — devastating, loss of revenue, damage, life-threatening

**Question #3: What is the impact to you if your monthly electric bill increased by the following amounts?**

**$1-$5 per month:** minimal, inconsequential, depends, if it gets compounded

**$5-$10 per month:** minimal, inconvenient, I would need to re-evaluate consumption

**Question #4: What is the impact to the people or companies served by the organization you represent if their monthly bill increased by the following amounts?**

**$1-$5 per month:** very little, modest, impactful when you look at scale, low-income already burdened

**$5-$10 per month:** impactful, significant, change spending habits

**Question #5: When there is a day with high smog, on a scale of 1 to 5, how impacted are you? (***Circle one and add any comments to describe the impact***)**

**2 — Slightly affected, 1 — Not affected at all,**
**3 — Moderately affected, 5 — Extremely affected**

**Describe Impact:** Limit outdoor activities, asthma can flare, allergies get worse which impacts my ability to work and exercise, can lead to getting a sinus infection, I worry about long-term health impacts.

**Question #6: When there is a day with high smog, on a scale of 1 to 5, how impacted are those served by the organization you represent? (***Circle one and add any comments to describe the impact***)**

**2 — Slightly affected, 3 — Moderately affected, 5 — Extremely affected**

**Describe Impact:** Limit outdoor activities, the medically vulnerable with asthma, Chronic Obstructive Pulmonary Disease (CPOD), allergies, and long-term health problems, may mean higher medical costs.

## Resource Planning Tradeoffs Exercise — A Game of Beans

### *Game Instructions*

Each participant was given an individual gameboard and ten jellybeans. The gameboard shows three bars, or values, labeled: Affordability, Reliability, and Environmental Sustainability. Each of the three rows shows ten boxes, with five already shaded in with an image of a bean. These bars represent a range for an allocation, or score, from 1 to 10. There are already 5 shaded in jellybeans for each value, so participants were instructed to allocate their 10 jellybeans amongst the 15 remaining empty boxes. An allocation of 10 for any of the values represents a Generation Plan that achieves the highest possible performance for that value. For example, an allocation of a 10 for Environmental Sustainability might represent a plan with a 100% sustainable portfolio. However, this would mean the participant has less beans to allocate for the Affordability and Reliability values. Please see Figure 1 below for the Individual Allocation Gameboard:

*Figure 1*

### *Individual Allocation Results*

Participants were instructed to do an initial individual allocation. To calculate the allocation for each value bar, every participant's allocation was added together and then divided by the number of participants who completed a gameboard (23). This calculation revealed the average for each value bar. The score for the **Affordability value bar was 7.91**, with allocations ranging from 7 to 10. The score for the **Reliability value bar was 9.08**, with allocations ranging from 8 to10. The score for the **Environmental Sustainability value bar was 7.95**, with allocations ranging from 6 to 10. Out of the three value bars, **Reliability received the highest score** followed by Environmental Sustainability and Affordability, respectively. The Environmental Sustainability value bar received the widest range of allocations out of the three with a range of 6 to 10. As a reminder, please see Workshop #3 Results-Survey Responses Excel Spreadsheet for a comprehensive look at the individual gameboard results.

### *Breakout Group Allocations*

After participants completed their individual allocation, each small group was instructed to complete a Group Gameboard. To complete this gameboard, every participant in that group shared their individual allocation, and a facilitator added them together. The total sum of each value bar was then divided by the number of participants within that group. Please see Figure 2 below for the Group Gameboard:

*Figure 2*

**Resource Planning Tradeoffs Exercise** (Group)

Affordability

| Individual 1 | Individual 2 | Individual 3 | Individual 4 | Individual 5 | Individual 6 | Individual 7 | Individual 8 | Individual 9 | Individual 10 | Individual 11 | Individual 12 | Total | | Group Allocation | Reallocation |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | ÷ Number of individuals = | | |

Reliability

| Individual 1 | Individual 2 | Individual 3 | Individual 4 | Individual 5 | Individual 6 | Individual 7 | Individual 8 | Individual 9 | Individual 10 | Individual 11 | Individual 12 | Total | | Group Allocation | Reallocation |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | ÷ Number of individuals = | | |

Environmental Sustainability

| Individual 1 | Individual 2 | Individual 3 | Individual 4 | Individual 5 | Individual 6 | Individual 7 | Individual 8 | Individual 9 | Individual 10 | Individual 11 | Individual 12 | Total | | Group Allocation | Reallocation |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | ÷ Number of individuals = | | |

### *Small Group Allocation Results*

Please see Figures 3-6 for each breakout group's allocation results:

*Figure 3 — Red, Group 1*

| | Group 1 — Red | 1 | 2 | 3 | 4 | 5 | Total | Group Allocation | Reallocation |
|---|---|---|---|---|---|---|---|---|---|
| Individual Allocation | Affordability | 10 | 8 | 7 | 9 | 9 | 43 | 8.6 | 8.6 |
| | Reliability | 9 | 8 | 9 | 10 | 9 | 45 | 9 | 9 |
| | Sustainability | 6 | 9 | 9 | 6 | 6 | 36 | 7.2 | 7.2 |

*Figure 4 — Blue, Group 2*

| | Group 2 — Blue | 1 | 2 | 3 | 4 | 5 | 6 | 7 | Total | Group Allocation | Reallocation |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Individual Allocation | Affordability | 9 | 8 | 8 | 8 | 8 | 7 | 7 | 54 | 7.7 | 7.7 |
| | Reliability | 9 | 10 | 9 | 9 | 9 | 9 | 9 | 64 | 9.1 | 9.1 |
| | Sustainability | 7 | 8 | 8 | 8 | 8 | 9 | 9 | 57 | 8.1 | 8.1 |

*Figure 5 — Yellow, Group 3*

| | Group 3 — Yellow | 1 | 2 | 3 | 4 | 5 | Total | Group Allocation | Reallocation |
|---|---|---|---|---|---|---|---|---|---|
| Individual Allocation | Affordability | 10 | 8 | 7 | 9 | 9 | 43 | 8.6 | 8.6 |
| | Reliability | 9 | 8 | 9 | 10 | 9 | 45 | 9 | 9 |
| | Sustainability | 6 | 9 | 9 | 6 | 6 | 36 | 7.2 | 7.2 |

*Figure 5 — Green, Group 4*

| | Group 4 — Green | 1 | 2 | 3 | 4 | 5 | Total | Group Allocation | Reallocation |
|---|---|---|---|---|---|---|---|---|---|
| Individual Allocation | Affordability | 10 | 8 | 7 | 9 | 9 | 43 | 8.6 | 8.6 |
| | Reliability | 9 | 8 | 9 | 10 | 9 | 45 | 9 | 9 |
| | Sustainability | 6 | 9 | 9 | 6 | 6 | 36 | 7.2 | 7.2 |

For every group, **Reliability was their highest allocated value bar**, the range being between 9 and 9.4. **Environmental Sustainability came in second** for three of the groups (Group 2, Group 3, and Group 4) while **Affordability was second for two of the groups** (Group 1 and Group 4). Environmental Sustainability had the widest range of scores from 7.2 to 8.2. After facilitators calculated each breakout group's scores, the facilitators asked participants within each group if they would like to adjust the group scores based on feedback they heard from their fellow group participants. As a result, Group 3 (Yellow) was the only group that adjusted their allocation, shifting points to increase Affordability and lower Environmental Sustainability. Group 3's Affordability score increased from 7.6 to 7.8, while their Environmental Sustainability score decreased from 8.3 to 8.2. This is reflected in the "Reallocation" column in Figure 5.

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### *Individual Reallocation Results*

The final stage of the Resource Planning Tradeoffs Exercise included instructing all participants to go back to their Individual Allocation Gameboards and complete the "My Final Allocation" column on the far right of the page (see Figure 1). The purpose of this column was to see if, based on the conversations participants had within their small groups, anyone wanted to change or adjust their individual allocations. For the Affordability value bar, two participants raised their scores (indicated by green highlight) and two participants lowered their scores (indicated by yellow highlight). For the Reliability value bar, two participants raised their scores to 10. For Environmental Sustainability, four participants lowered their score, and one raised their score. To review the specific scores, please see Workshop #3 Results-Survey Responses Excel Spreadsheet.

## Texas Energy Poverty Research Institute (TEPRI) Report Presentation Takeaways

- TEPRI's report on energy equity and energy insecurity highlighted values which echo those already being discussed in the workshops: energy affordability, energy reliability and resilience, clean energy access (sustainability).
- The following results show the percentage of respondents who ranked each value as their top priority:
  - Priorities for LMI households from highest to lowest—
    - Affordability- 50%
    - Resiliency- 27%
    - Sustainability- 17%
    - Reliability- 8%
- TEPRI offered policy recommendations:
  - Enhance access to energy assistance programs through education and outreach, programs, and financial incentives
  - Address reliability/resilience through infrastructure investments, supporting community resilience hubs, and public awareness
  - Promote clean energy adoption through education and outreach programs

## Most Vulnerable Survey

**Question #1**: When you think of equity and/or those experiencing energy insecurity in Austin Energy's service territory, who or what demographics do you think of specifically? *Please describe.*

- Fixed incomes, elderly, those with medical needs, those with disabilities, those dependent on electric medical equipment

- Low income, $30,000/year or less or $50,000 or less for a family at or below 60% Median Family Income (MFI), residents in the Eastern Crescent, Black and brown communities generally, students housed in higher education facilities, the unhoused, non-English speakers, the working poor, new immigrants, single-family households
- Small businesses
- Tenants without a say in energy efficiency

**Question #2**: When you think of equity, how do you relate it to the community values outlined in Austin Energy's Mission?

**Affordability —**

- Give more discounts to lower-income residents
- Provide equitable access to service that is not a privilege, but rather a right
- Austin Energy's higher-income individuals should help reduce the energy burden for those with low-income
- Income-based tiered rate structure
- Rebates and incentives targeted towards households, renters and multifamily owners

**Reliability/Resiliency —**

- Provide dependable access to resources, year-round, with ever-increasing environmental climate
- Transparency and communication to better protect medically vulnerable and elderly
- All areas and neighborhoods should have the same assurance that their power will remain on, this could be life or death for some
- Focus on those that need it most

**Environmental Sustainability —**

- Equity should be considered not just among Austin residents but with a global perspective, providing access while remaining conscientious of long-term environmental impacts
- Neighborhoods near Austin Energy's assets
- Austin Energy is already doing an excellent job, should be a focus, but not at the expense of affordability and reliability
- Low-income and communities of color bear the impact of pollution
- Fine particulate matter and atmospheric oxidizing capacity pollutants have direct and meaningful health impacts
- It's a balance, help with low-income solar and tenants' access to clean energy

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**Question #3**: If we were looking at equity, which one of Austin Energy's mission pillars should be prioritized the most? (Circle one)

**Reliability/Resiliency — 10 selections**

**Affordability — 5 selections**

**Environmental Sustainability — 3 selections**

**Additional comments:**

- We should prioritize all things that help with equity
- We can have it all, we shouldn't prioritize

**Question #4**: Do you have any other advice regarding equity for Austin Energy?

- Provide equity awareness to the public, improve communication
- Have a separate consideration for equity in each category so it is always front and center
- The "always be prepared" mantra puts an undue burden on individuals
- Invest in battery storage technology like (base power) for low-income residents where Austin Energy controls it just like a thermostat
- The carbon-free approach, while eliminating fence line pollution, jeopardizes affordability and reliability by limiting dispatchable generation assets. Without assets, the utility minimizes black start capability, voltage support, rolling brownout pollution and exposes itself to load-zone price separation
- Higher base rate so rebates for low-income areas become possible
- Metrics/state of Customer Assistance Programs should be made public — measure true success of the program
- Automation of life sustaining equipment

# AUSTIN ENERGY
# WORKSHOP #4 WORKSHOP SUMMARY

Austin Energy Headquarters (4815 Mueller Blvd. Austin, TX 78723)
Thursday, Oct. 3, 2024 | 11:15 a.m. to 1:30 p.m.

## Key Workshop Takeaways

- **Workshop participants agreed with the Workshop #3 key takeaways**. After reporting out the survey findings from Workshop #3, there were no objections or additions to the key takeaways.
- **Austin Energy is moving in the right direction with values and objectives for the Resource Generation Plan**. After each presentation during Workshop #4, participants overall expressed that Austin Energy is moving in the right direction when it comes to developing the community value statements and objectives.
- **Workshop participants provided important feedback to make improvements to the value and objectives statements**. The Austin Energy team wrote objectives statements based on feedback heard from previous workshops. During Workshop #4, participants helped update and make changes.
- When the modeling process was introduced, in general, **workshop participants liked the idea that Austin Energy is looking at multiple alternatives** that reflect community values and provide diWerent energy resource mixes.

## Workshop Overview

AAustin Energy hosted the fourth in a series of workshops on Thursday, Oct. 3, 2024, from 11:15 a.m. to 1:30 p.m. at the Austin Energy Headquarters (4815 Mueller Blvd. Austin, TX 78723). The goals of Workshop #4 were to provide workshop participants with the results from the surveys taken from Workshop #3, give insight into how Austin Energy will be incorporating an equity lens to the Resource Generation Plan 2035, and gather feedback on drafted value and objectives statements. This workshop was recorded and streamed live on ATXN. A Webex link was available for those who wished to join virtually.

Lynda Rife with Rifeline LLC welcomed participants and began the workshop by giving a presentation that covered the results of the surveys taken during Workshop #3. She reviewed the Impacts Survey responses, results from the Priorities and TradeoWs Jellybean Exercise, showed quotes from individuals during the small group report out section, and finally, listed the four key takeaways from Workshop #3. After this presentation, Lynda paused and asked for participants feedback by a thumbs up, thumbs sideways, or thumbs down indication – thumbs up meant you generally agreed with the results, thumbs sideways meant there are parts you disagree with, and thumbs down meant you had major concerns. Overall, most participants indicated a thumbs up

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and expressed general agreement with the survey results and Workshop #3 key takeaways. The next section, Exploring Equity, Lynda began with reporting out on the results of the Most Vulnerable Survey and top takeaways from the TEPRI report presentation. The report out included a list of demographics respondents identified when thinking about equity. Responses were categorized into five groups: those with low income, specific neighborhoods, the medically vulnerable, renters and small businesses. Additionally, when asked what was the most important out of three Austin Energy mission pillars when thinking about the most vulnerable, Reliability and Resiliency was voted the highest at 55% with AWordability at 28% and Environmental Sustainability at 17%. Lynda again paused to gauge the group and ask if anyone had questions or comments regarding the survey results.

Lisa Martin with Austin Energy then gave a follow-up presentation to provide insight into how the equity feedback that's been received throughout the workshops is being incorporated in the Resource Generation Plan 2035. This included summarizing the feedback received on equity thus far, Austin Energy's tenets of energy equity (Procedural, Recognition and Distributional Equity) and how this energy equity approach will influence and guide the plan development process. Lisa paused and allowed Lynda to facilitate another thumbs up, thumbs sideways, thumbs down feedback indication. Overall, workshop participants think Austin Energy is heading in the right direction, however, there were participants who expressed concern over acknowledging past energy inequities and whether the approach adequately addressed racial equity. To see full comments from the participants, please see the Workshop #3 Report Out & Exploring Equity section below.

As promised in Workshop #3, the next section focused on reporting out the survey responses from the Objectives Survey. Lisa explained that the Austin Energy team had drafted value statements based on the feedback heard so far through the workshops. Lisa shared the draft value statements and then Lynda asked the workshop participants for feedback. Lynda obtained a thumbs up, thumbs sideways, thumbs down feedback indication on the value statements and received mostly thumbs up. Next, Lisa explained these values (and value statements) drive objectives, which are executed by key results, and ensure alignment from the community principals to outcomes. For each value, Lynda shared the results of the associated question in the Objectives Survey. Then, Lisa shared the proposed objective statement drafted after taking into consideration the survey results. Lynda asked for feedback from the group. This process was repeated for all three community values of reliability/resiliency, aWordability and environmental sustainability. A final slide shared all three co-drafted Resource Generation Plan 2035 objective statements. Lynda opened the floor for participants to provide additional feedback and thumbs up, thumbs sideways, thumbs down feedback on the objectives statements. To review the participant's feedback, please see the Lighting the Way Forward: Values, Objectives & Key Results section below.

The following portion of the workshop featured Lisa walking participants through the modeling process and how the modeling results inform the future portfolio options.

The final section included dedicated time for participants to share their biggest takeaways from the workshops, what they had learned along the way, and to comment on anything they'd like the Austin City Council to know as the Resource Generation Plan 2035 is being developed. Lynda also offered for those who didn't want to share at the time, they could speak to the videographer to share their thoughts. Full comments can be found in the Final Thoughts Discussion section below.

The closing remarks included letting participants know that they could potentially be called back for a fifth workshop in the coming months if additional feedback is needed. Participants were thanked for their time, participation and feedback over the course of the workshops and encouraged to inform the organization and communities they represent of what was learned and the work accomplished during the workshops. The Austin Energy team assured workshop participants that they would receive periodic email updates on the plan's development process. There were 28 workshop participants and six members of the public who attended Workshop #4.

Here is the recorded ATXN link for Workshop #4:
https://austintx.new.swagit.com/videos/316697

## Group Discussion and Questions

*Workshop #3 Report Out & Exploring Equity*

- **Online Chat Comment, Luke Metzger (Environment Texas):** It sounds like reliability for vulnerable communities was the top priority, which is of course different than reliability generally and can lead to diWerent solutions. For example, my family is privileged to not have any medically vulnerable people in it. If we have to go without power for eight hours (or even longer) in order to avoid devastation from Hurricane Helene etc., I'll gladly make that sacrifice. But we should absolutely ensure medically fragile people have backup power.
- **Ricardo Garay (City of Austin Equity Office):** With the community stakeholder group, has there been any acknowledgement of histories of communities also coming up with their own plans and implementations?
  - Timestamp (00:21:29)
- **Quincy Dunlap (Austin Area Urban League):** Was the equity assessment conducted via third party or was that done internally to the agency or organization?
  - Timestamp (00:23:56)
- **Online Chat Comment, Claire Walpole (Habitat for Humanity):** Regarding reliability for the medically vulnerable, trying to keep a specific home up and running is close

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to impossible. Curbing the cost for those homes is only a portion of the problem. Is there a strategy to provide backup power to people that are medically or otherwise specifically vulnerable? Is there a program to provide generators, or better yet, batteries to these homes?

- **Online Chat Comment, Claire Walpole (Habitat for Humanity):** And same as true for affordability. I'm happy to pay a bit more to have clean and reliable energy, as I suspect are many Austinites. We can do that while expanding the Customer Assistance Program to protect low-income customers. CAP could even include assessments to homes that need specific energy needs, which could include grants for upgrades to HVAC, adding solar, or installing backup systems.
- **Tiffany Wu (Texas Energy Poverty Research Institute):** Was the CAP program expansion something that was already happening or are those changes as a result of these conversations? Is it a budget increase or a removal of barriers to participation or doing better with finding those households?
  - » Timestamp (00:25:57)
- **Shane Johnson (Sierra Club):** Has the city's professionals in the Equity OWice reviewed or provided input on any of these definitions for energy equity or your process here? There's been many established processes and tools from the Climate Equity Plan that are the best practices that need to be followed.
  - » Timestamp (00:27:52)
- **Kaiba White (Public Citizen):** We're moving in the right direction, but there's more work to be done. The analysis of energy burden just looks at current rate structure and current programs. An expanded CAP program is great, but there's more work to be done.
  - » Timestamp (00:30:49)
- **Autumn Gallardo (Foundation Communities):** I think there's an opportunity on both depth and breadth in terms of the customer assistance programs. Something that I think a lot of us are hoping for is more clarity on what exactly is going to happen. If there's a goal, what actionable steps are there. I feel that it's not clear.
  - » Timestamp (00:31:39)
- **Shane Johnson (Sierra Club):** I was co-chair of the Climate Equity Plan and someone who trains people on equity issues. Some of the statements I heard showed a deep misunderstanding of equity issues. Generally, when we say equity, it's shorthand for racial equity. I heard energy equity and not racial equity. That demonstrates not incorporating an analysis of racial issues, which if you don't, then it's not equitable. When I've seen presentations at City Council, I've heard we need a new gas plant or to keep the coal plant open for equity because it's about lower bills. Equity means we've

listened to the communities who've borne the brunt of that pollution, none of which are here in this room, none of which are speaking or invited to the City Council. We're not fully heading in the right direction from my perspective.

» Timestamp (00:33:18)

» Lynda cited that two council districts, Districts 1 and 2, PODER, the Austin Area Urban League, and Foundation Communities are represented among workshop participants.

- **Quincy Dunlap (Austin Area Urban League):** The Urban League is here representing a lot of those marginalized communities, specifically the Black community and the East Side where a lot of the environmental injustice happens. There is representation here.
  » Timestamp (00:36:23)

*Lighting the Way Forward: Values, Objectives and Key Results*
*Value Statements: Our Guiding Light — Timestamp (00:41:09)*

- **Kaiba White (Public Citizen):** Energy equity, the word "understanding" falls a little short. I think you're trying to go beyond understanding and make it an action.
- **Ricardo Garay (City of Austin Equity Office):** I would add "reparations".
- **Farshad Shahsavary (Texas Facilities Commission):** We need predictability not just on service, but also the cost increases – predictability with aWordability. We need more time to plan for those cost increases.
- **Carmen Tilton (Texas Assisted Living Association):** Under reliability, if I remember right, we discussed communication quite a bit and expectations around how we can plan for disruptions in services and prepare for outages. There's a communication piece that has to be promoted by Austin Energy to consumers.
- **Luke Metzger (Environment Texas):** The summary of input was that reliability was a priority, but it's important to be specific. It sounded like the sentiment was reliability, especially for vulnerable populations and medically fragile, etc. It's important to distinguish that because the solutions might look diWerent. Reliability for vulnerable people might be back-up power at their homes, solar, batteries, etc. as opposed to a polluting power plant. Same with affordability, the sentiment is to protect low-income customers from high bills. We can do that by expanding the customer assistance programs. Many in the community are willing and able to contribute a little bit more to make sure we have a clean, reliable grid. The solutions look different.
- **Bob Hendricks (Citizens Climate Lobby):** Under environmental sustainability, we are ignoring the incredible cost that climate change is causing. Seeing what has happened with Hurricane Helene recently. This is happening more and more often. In aWordability and environmental sustainability, we should include more of the climate change issues. Austin wants to be one of the places solving the problem instead of adding to greenhouse gases and making things worse.

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- **Kaiba White (Public Citizen):** My comment about making the statements more actionable can also be for aWordability. Instead of "assess" or "assessing", use another term. I'm not speaking so much about the specificity but more about what the verb is.

- **Tiffany Wu (Texas Energy Poverty Research Institute):** I know we're mostly talking about the Generation Plan, but in the energy world, we are wanting to make sure people get electricity. That includes the distribution grid as well. Something that could be missing is, the values sound really good, but we don't know whether or not Austin Energy is going to meet those goals. Something that could be missing is transparency and whether or not you are setting clear goals. Maybe there's some dashboard for the community to make sure Austin Energy is hitting those goals.

*Objectives: Reliability Feedback — Timestamp (00:52:04)*

- **Dave Tuttle (UT Energy Institute):** Is that truly defendable about the assertion that carbon free approach comes at the expense of both aWordability and reliability. 95% of the outages are from distribution and have nothing to do with generation.
  - » Lisa and Lynda clarified that the statement was written as an additional comment by a survey respondent

- **Kaiba White (Public Citizen):** I like most of the words up there. I don't agree that we have to have reliability and resilience over other values. I don't agree that we have to have that fundamental tradeoW. There are ways to have it all to an extent especially if we find ways to mitigate any cost increases to those who are most vulnerable and lower income. It would be a fine statement to say, "prioritize reliability and resilience". Eliminate "over other values".

- **Online Chat Comment, Luke Metzger (Environment Texas):** Agreed. Plus, we need to actor in the cost of climate change when considering aWordability. The people who lost their house to Helene have much bigger economic problems than their electric bill. Climate is an existential crisis to the planet. It needs to be the priority.

- **Tiffany Wu (Texas Energy Poverty Research Institute):** "Mitigate the risk of statewide and localized system outage events" is a little bit strong. In some of the discussion points a lot of people thought a short duration outage might be okay, so I don't want this to be like we're targeting 100% reliability which is not reasonable.

*Objectives: Aaordability Feedback — Timestamp (00:56:21)*

- **Ricardo Garay (City of Austin Equity Office):** I think this is only focusing on bill increases, but not current aWordability. I want to call out highlighting current stress on the most vulnerable.

- **Shane Johnson (Sierra Club):** Affordability of other things like fees or disconnect/ reconnect and trying to minimize disconnections even if someone is behind on payment or something that highlights that as well.
- **Kaiba White (Public Citizen):** I'm confused by the "maintaining supportable levels" phrase.
  - » Lisa explained it means that aaordability or pricing isn't being put so low that it leads to being unable to maintain and support the values of reliability and environmental sustainability. It's putting the three into perspective, but Austin Energy will work on the specific language.

*Objectives: Environmental Sustainability Feedback — Timestamp (00:59:26)*

- **Autumn Gallardo (Foundation Communities):** If I were to add anything to this, I would include "reduce emissions and other pollutants, particularly air pollutants". I think it's a more holistic view of both the impact on human health and on the environment.
- **Tiffany Wu (Texas Energy Poverty Research Institute):** The only thing that's missing I think is resource conservation too because these assets require a lot of water, for example, and have wastewater. We're in the middle of a drought.
- **Christian Fogerty (Sunrise Movement):** If we're going to pursue hydrogen or any other fuels that require renewables to create them in the first place. Try to take account of the fact that we're using renewables to create something when we could've used those renewables in the first place. That would fall into the category of life cycle assessments and full transparency or any hydrogen-type fuels that we may pursue in the future.
- **Farshad Shahsavary (Texas Facilities Commission):** We could change the "reduce emissions" to "reduce emissions and environmental impact as much as possible".
- **Kaiba White (Public Citizen):** I'm not sure what "mitigate remaining emissions means". It makes me apprehensive. I did not agree that shifting our pollution to rural communities is a solution. I grew up in a rural area and I can tell you that grated on me that it would be our solution. Those are the people that are growing our food. I'm nervous about what this means in practice.
  - » Lynda confirmed this comment was in reference to Dr. Webber's comments about electric cars versus smokestacks on power plants in rural areas.
- **Ryan Pollock (IBEW Local 520):** I'm just not liking prioritizing reliability/resilience above all others. I don't think that's necessary to be done. I think we can do all these things at the same time; probably even much cheaper than a lot of other options we've been using.
  - » Lynda noted the Priorities and Tradeoas Jellybean Exercise where there were no participants who put all their beans into one category.

*Exploring Future Power Options: Modeling Work — Timestamp (01:09:51)*

- **Tiffany Wu (Texas Energy Poverty Research Institute):** I was involved in the reliability study for the Public Utility Commission. One of the things we asked for the Commission to ERCOT was an explanation of the inputs and assumptions for the models are. Is that something Austin Energy is going to provide as well?
  - » Lisa explained that yes, Austin Energy provided those inputs and assumptions to the Electric Utility Commission (EUC) and asked for feedback. Austin Energy has had ongoing conversations with those folks as well. Austin Energy is working on pulling all that information together and will put it up on the same webpage where the public will also be able to find the recordings and meeting summaries from these workshops.
- **Nancy Crowther (ADAPT):** It's good. I understand it. However, we really need to work on making sure that every individual who is examining this or impacted by this understands it. When you put in definitions, and include people with disabilities, there are communities that are going to feel like they're not covered by this information. I'm hoping you'll have a good level of information that defines everything, so people know that they are in it and represented and benefitting from this information. This looks like a technical guide to me but I'm not an electrician. This is for the people. This is for the community. The feedback you've gotten in the workshops can be put in vignettes to help people understand it more. Keep it at a third-grade level. Thank you all for the wonderful job. It's been an eye opener.

*Final Thoughts Discussion*

- **Tina Cannon (Austin LGBT Chamber of Commerce):** We represent around four to five hundred mid-to-small size businesses in the area. I want to make sure at some point in this that we're capturing the impact on, when we talk about marginalized communities, I don't think we talk about the small business and local operators that are just trying to sustain every day. They are looking at rising costs both from a very good tax rate election that's coming about but also rising healthcare costs that are at 17 to 22% over last year. I want to make sure we're including in the discussions, when we're talking about marginalized communities, that we include our small, what our Chamber calls, our mom-and-mom and pop-and-pop shops.
  - » Timestamp (01:14:15)
- **Mitch Jacobson (Pecan Street):** You guys did a great job. I wonder whether if we didn't have the two crazy freezes over the past four years, whether we'd be having the same conversation. I personally didn't have power for a week for each freeze. I hope we would because of what we see happening in North Carolina and all over the world. Without those two incidents happening, which were big in our world at the time, some of this balance would be diWerent based on our personal experiences. It is a balance and it's a tough balance, it really is. I pat you on the back for this process.
  - » Timestamp (01:15:20)

- **Kevin Fincher (ARMA):** We represent a significant number of small businesses who have to deal with many inputs, energy being one of those. It's important to keep in mind those businesses. The last slide talked about the future options. Throughout this I've seen solar and wind, but no one mentioned nuclear. In the past three months we've had a significant paradigm shift in the approach towards nuclear. In this plan, I think this has to be incorporated and discussed because small nuclear is coming and it's coming very quickly. The governor is behind it and the federal government surprisingly in a bipartisan vote is strongly behind that. I didn't see that mentioned, but it should be considered going forward.
  - » Timestamp (01:16:39)
- **Ryan Pollock (IBEW Local 520):** I empathize with small businesses and rising costs, but we have to remember that the people living and visiting here make up the customer base. If we're having increased disasters, that's a large impact financially on both city funds, on businesses and workers. My union represents a lot of workers who work for the data centers which are increasing demand. There is a balance to be made of are we going to want people to move here and live here for these things that we're building. At the same time, we also need to remember that we live here too, and we need to attract people to serve these businesses and services. It all feeds oW each other, so it's all equally important.
  - » Timestamp (01:18:00)
- **Online — Luke Metzger (Environment Texas):** In general, I think the values and objectives are headed in the right direction, but like others, I object to placing reliability over everything else. I think climate has to be a central organizing principle of our utility because we need to do what we can to avoid Hurricane Helene and the millions of climate refugees that global warming is causing. I am perfectly happy to lose power for a few hours a year if it means we're avoiding polluting the planet. At the same time, we need to absolutely protect the medically fragile. I would change the wording of that.
  - » Timestamp (01:19:30)
- **Online — Brittney Rodriguez (Greater Austin Hispanic Chamber of Commerce):** I think there's been tremendous feedback provided. I love the small business angle. The one thing I might add here is with regard to the Chamber, is maybe some idea, public relations girl speaking here, is how can we socialize the idea of integrating a means for younger generations to contribute proactively. We know that our city is largely comprised of Millennials and Gen Z demographics, and we know that those demographics have a disproportionate need to contribute to community. For us at the Chamber, we're working to help these next generations understand why we're relevant and how we're important. We also understand that they are reaching out to us seeking a need to give back. If there's a way we can socialize with new incoming demographics to the City of Austin, many of us are locals. We've been here, we know the good story

about what Austin Energy is doing already but if we can socialize this proactively with new folks that are coming into town and teach them ways to contribute alongside Austin Energy. For me, this is a great way to start helping people understand what's happening here and how we can all give back more thoughtfully. Some of our small businesses are contributing via very specialized programs, unfortunately, I don't know the name of that, but I think if we could socialize that better, there's anopportunity for partnership.

» Timestamp (01:20:30)

- **Hayden Baggett (Coalition for Clean, APordable, Reliable Energy):** Thank you Lynda and Austin Energy for putting this on. Overall, it's been a great process and I'm happy to participate. I want to focus on my advice to the Council and the EUC as they move forward with this. I want to reiterate Michael Webber's policy recommendation to be standards based rather than prescriptive. Leave it to the experts really. I'd like to remind them of the benefits of adding additional firm capacity to our load zone. Whether it's voltage support or black start capability or reducing price separation.

  » Timestamp (01:22:31)

- **Carmen Tilton (Texas Assisted Living Association):** My big note is to echo Nancy from ADAPT. You guys have a really great plan and have had a big room with good conversations. The communication piece with this process and about the plan and communication around outages and reliability. Communication about existing programs — I don't know where your communications team is on Austin Energy, but I would love to see better engagement and dialogue between the utility and the community so that the broader Austin community, businesses/residential/commercial/etc., is aware of what's going on and feels like they know how to engage with their utility provider when they have issues, questions and things are going on.

  » Timestamp (01:23:18)

- **Nancy Crowther (ADAPT):** I just wanted to reiterate also about the aging of our community and looking forward to their longevity and stability here in Austin. There are some folks that have been here for 80 years, and they say they can't take it anymore, can't afford it, can't do anything anymore. That's a sad thing. To save our community. That's what we got to remember. It's our community. Let's do it right.

  » Timestamp (01:24:15)

- **Autumn Gallardo (Foundation Communities:** Thank you for hosting these workshops first and foremost and gathering community feedback. I know a lot of us represent organizations that have broader depth than ourselves. It's important to note the people who aren't here. Looking around this room, it is a white, probably middle-income group of folks that are here. We can talk about, and we can represent a lot of people, but I think it's crucial on the communications side to make sure that actual low-income folks, POCs, LGBTQ, small business, and people showing up and engaging our utilities, not just people who are community organizers and leaders and all of us who are leading the way on some front. I think it's important to have the everyday person and people who are impacted here as well.

» Timestamp (01:25:17)

» Lynda agreed that is important but you have to go where they are. You can't just invite them to a meeting. They have too much on their plate.

- **Farshad Shahsavary (Texas Facilities Commission):** I'm coming from the state of Texas view. The last base rate increase increased our utility costs by over $2 million dollars a year. So, any future increase, I request respectfully to be very gradual and not a big chunk after. I know [Austin Energy] is trying to keep the prices low and steady, but we'd rather see the 2% or 3% increase a year than suddenly 20% increase in one shot. So, keep that in your equations.

  » Timestamp (01:26:36)

- **Kaiba White (Public Citizen):** I do appreciate the space that's been made here to gather feedback from the community. Obviously, it only gets to a certain level and that's understandable. For City Council going forward and Austin Energy in general and the community, I want us to collectively to understand that we are part of something bigger when we make these decisions. To a certain extent, we are in this situation with climate because there have been all these reasons why continuing to use polluting energy sources has been convenient or aWordable or helps with reliability. Now we're up against catastrophic climate change. I don't use that term lightly, so we're at the point where we need to choose to make big changes. This plan goes to 2035, but the impacts go far beyond that. We don't really get into that. The impacts outside of Austin and how we're a part of that bigger picture and generations into the future.

  » Timestamp (01:28:15)

- **Shane Johnson (Sierra Club):** We know Austin Energy is struggling financially in a lot of ways. We're all struggling at diWerent levels with the climate crisis impacts. I encourage [Austin Energy] to make sure that we choose a path forward is this plan update and in the next couple of years that immediately addresses those financial concerns with local clean energy solutions like solar and batteries that we can realistically build and start addressing these problems in the next year or two and not something like a big gas plant that's going to take several years.

  » Timestamp (01:29:44)

- **Online Chat Comment, Luke Metzger (Environment Texas):** Note that we got briefings on ERCOT, technology and energy poverty, but no presentation on climate.

- **Bob Hendricks (Citizens Climate Lobby):** I wanted to mention that yes, we need to deal with increasing energy prices and greenhouse gases. One of the ways that doesn't affect generation, but it aWects demand and is a highly cost-effective method is to increase energy efficiency, especially with millions of dollars being provided through various programs like the Inflation Reduction Act. It's a very aggressive program to get people to utilize these excellent cost-saving devices. For low-income families, the IRA is going to be providing 100% of upgrades for a number of things. I hope that can be a part of the process.

» Timestamp (01:31:31)

# AUSTIN ENERGY
# WORKSHOP #5 WORKSHOP SUMMARY

Virtual, Webex | Wednesday, Nov.13, 2024 | 11:30 a.m. to 1 p.m.

## Key Workshop Takeaways

- **Austin Energy hosted a fifth workshop to share final values and objective statements and to reveal the proposed Resource Generation Plan Toolkit**.
- **Workshop participants didn't suggest any additional changes to the updated values and objectives statements**. There were no objections or questions after reviewing the changes made to the values and objectives statements discussed in Workshop #4.
- **Workshop participants didn't suggest any changes to the toolkit categories** — Prioritize Customer Energy Solutions, Leverage Local Solutions, Achieve Decarbonization, and Foster a Culture of Innovation.
- **Workshop participants did provide suggestions of "tools" to add to the "toolkit"**. These additions were recorded and will be considered by Austin Energy.

## Workshop Overview

Austin Energy hosted the fifth in a series of workshops on Wednesday, Nov. 13, 2024, from 11:30 a.m. to 1 p.m. This workshop was entirely virtual and made available through a Webex link to both workshop participants and members of the public. The goals of Workshop #5 were to share with participants the updated values and objectives statements, learn about the key takeaways from the modeling, and to gather input on the "tools in the toolkit" of the Resource, Generation and Climate Protection Plan to 2035.

Lynda Rife with Rifeline LLC welcomed participants and began the workshop by reviewing the key takeaways from Workshops #1 through #4, including the takeaways from Dr. Michael Webber from the UT Austin Cockrell School of Engineering. The following slides reviewed the changes made to the values and objectives statements that came out of the discussions from Workshop #4. Lynda paused to ask for questions and feedback, and the workshop participants didn't have questions or suggested any additional changes.

Lynda concluded her portion of the presentation and passed it to Lisa Martin from Austin Energy. Lisa began her presentation with reminding participants of the mission of the 2035 plan, which is to "meet Austin's rising energy needs while enabling an equitable clean energy transition reflecting our community's values of reliability, affordability and environmental sustainability". The following slides outlined the current-day risks and immediate problems Austin Energy is facing while developing the plan. Lisa presented a timeline that spanned from 2020 to 2024 that showed significant milestones and/or events that have influenced Austin Energy's current approach to the 2035 plan, including

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but not limited to, extreme weather events, ERCOT market changes, increased energy costs, retirements of Decker Steam Units, peak demand growth records, and more.

Later, Lisa shared that extensive work went into the modeling with the goal of better understanding tradeoffs and resource plan needs. Lisa also shared with participants a list of key insights that came out of the modeling. Informed by these key insights, Austin Energy developed a "toolkit" of solutions organized into four major categories: Prioritize Customer Energy Solutions, Leverage Local Solutions, Achieve Decarbonization, and Foster a Culture of Innovation. The next slide identified working examples of tools or solutions within those categories. Please see Figure 1 below:

*Figure 1*

**Managing "Our Toolkit"**

Working Examples

**Prioritize Customer Energy Solutions**
- Energy Efficiency
- Demand Response
- Customer Sited Solar and Batteries

**Leverage Local Solutions**
- Local Solar
- Utility Scale Batteries
- Natural Gas Peaker Units

**Achieve Decarbonization**
- Carbon Free by 2035
- Exit Coal
- Remote Wind and Solar

**Foster a Cultrue of Innovation**
- Geothermal
- Advanced Nuclear
- Carbon Capture

Lynda paused the presentation and asked participants if they had any questions about the toolkit categories and if anyone had suggestions or ideas of solutions that could be added to the list. Please see the Participant Toolkit Comments & Additions below to review. Overall, participants didn't offer any changes to the four toolkit categories, but there was discussion on the "tools" included in those categories. There were participants who expressed concerns over the incorporation of natural gas peaker units as a solution and how this contradicts the goal of achieving full decarbonization by 2035. Other participants had questions and comments about the following:

- Transmission line upgrades
- Battery storage


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- Previous Decker Steam Unit operating costs
- Emphasizing cost predictability
- The difference between congestion costs now compared to 2020 and years past
- Affordability targets as it relates to business and commercial entities

The workshop concluded with Lynda inviting workshop participants to attend the next Austin Energy Utility Oversight Committee (AEUOC) meeting on Tuesday, Nov. 19 at 9 a.m. at Austin City Hall to be recognized and thanked by Austin City Council for their great work as participants in the workshops. There were 32 total attendees, with 22 workshop participants and 10 members of the public.

*Here is the Webex recording link (enter access code Gm3R8HPH):*
https://austinenergy.webex.com/recordingservice/sites/austinenergy/recording/playback/e2da1bc38412103d9fefc6d438d3e0d7

## Participant Toolkit Solution Comments and Additions

*Prioritize Customer Energy Solutions*

- Virtual power plants (VPPs)

*Leverage Local Solutions*

- Upgrade transmission lines

*Achieve Decarbonization*

- Remove peaker units
- Have this be broader to include local air pollution
- Remote batteries co-located wind and solar farms

*Foster a Culture of Innovation*

- Geothermal
- Electric energy storage (EES)
- Utility-scale batteries
- Vehicle-to-grid

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Customer Driven.
Community Focused.℠

# Resource Generation Plan Survey Results

| PARTICIPANTS | SURVEY DATES | PUBLIC MEETINGS |
|---|---|---|
| 7,512 | 8/22-9/29 | 4 |

**1.** Customer Type:

- **6,355** Residential
- **175** Business
- **24** Other interest (not an AE Customer)
- **22** Non-profit / Government

**2.** Respondent-ranked level of importance:

**% of respondents who ranked each item as #1**

- **38%** **Reliability:** Power is generated from resilient sources that can operate in a variety of conditions.
- **28%** **Affordability:** Power costs are kept as low as possible for customers.
- **28%** **Environmental Sustainability:** Power is generated with a reduced carbon footprint.
- **6%** **Cost stability:** Provide customer protections from price swings in energy costs.

**3.** Residential customer respondent willingness to pay more per month for increase in percentage of carbon-free generation:

- 34% **$0**
- 17% **$1-5**
- 15% **$6-10**
- 14% **More than $20**
- 12% **$16-20**
- 8% **$11-15**

**4.** Ways in which respondents are willing to contribute to Austin Energy's generation portfolio:

- **61%** Energy Efficiency – Using more efficient appliances.
- **56.5%** Weatherization – Insulating my house.
- **52%** Demand response – Adjsting my thermostat to help the grid.
- **47%** Adding solar panels to my home or business.
- **41%** Participating in Community Solar Program.
- **9%** I am not willing to contribute to Austin Energy's generation portfolio in any of these ways.
- **5%** Other

**5.** Themes identified from additional feedback comments related to the Resource Generation Plan Update:

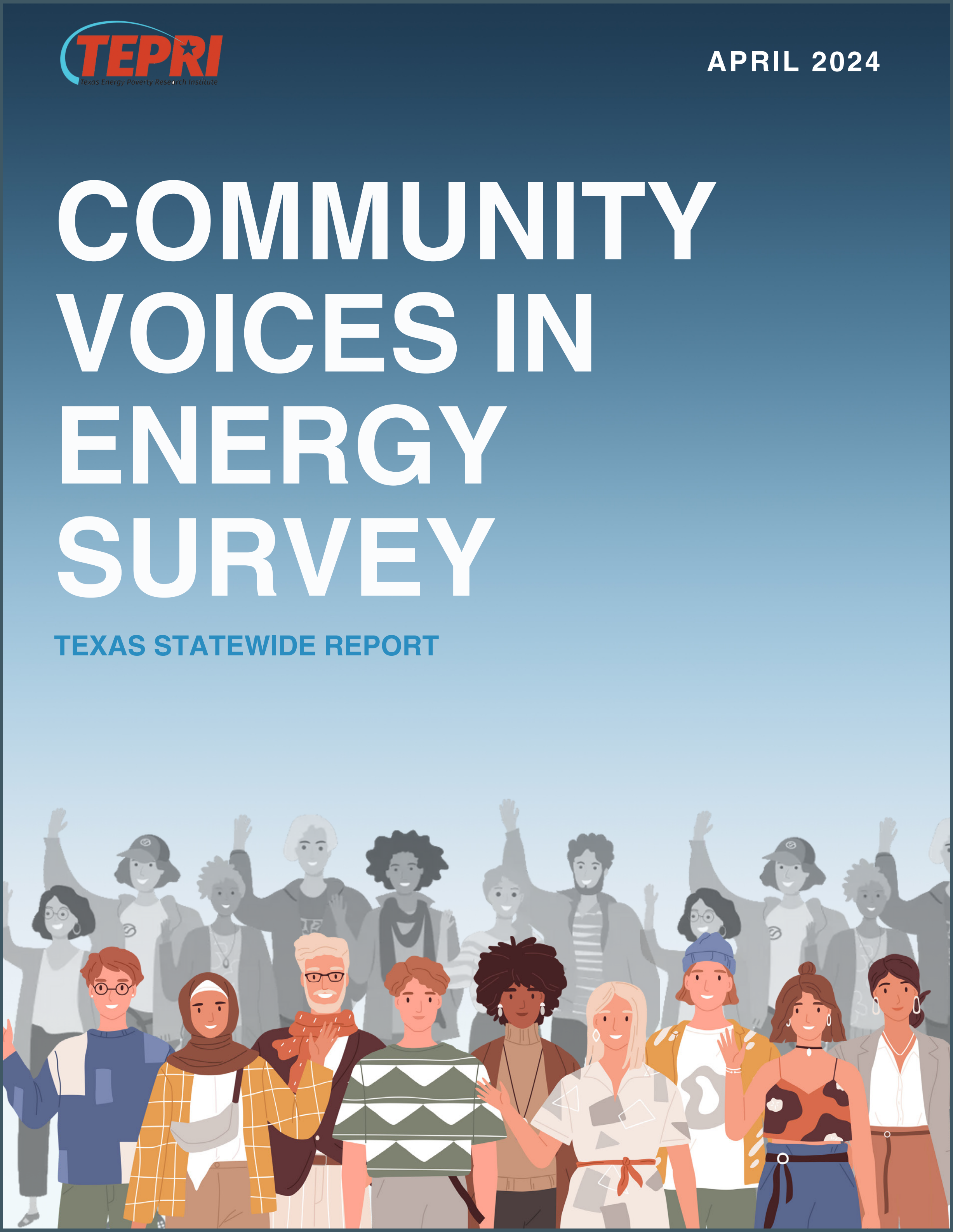
- **910** **Reliability:** (Categories: diversify supply and use energy sources which are most reliable during extreme weather, coal, gas, nuclear, less renewables, build more power plants)
- **498** **Environmental Sustainability:** (Categories: No coal, close Fayette, more renewables, more solar, more wind, no nuclear, environment is a priority, reduce fossil fuels)
- **394** **Affordability:** (Categories: Keep costs low, prioritize affordability)
- **106** **Cost stability:** (Categories: Time of use, demand response, congestion costs)

Full list of comments received available at **publicinput.com/generation**
For questions, email **community@austinenergy.com**

# AUSTIN ENERGY RESOURCE, GENERATION AND CLIMATE PROTECTION PLAN TO 2035

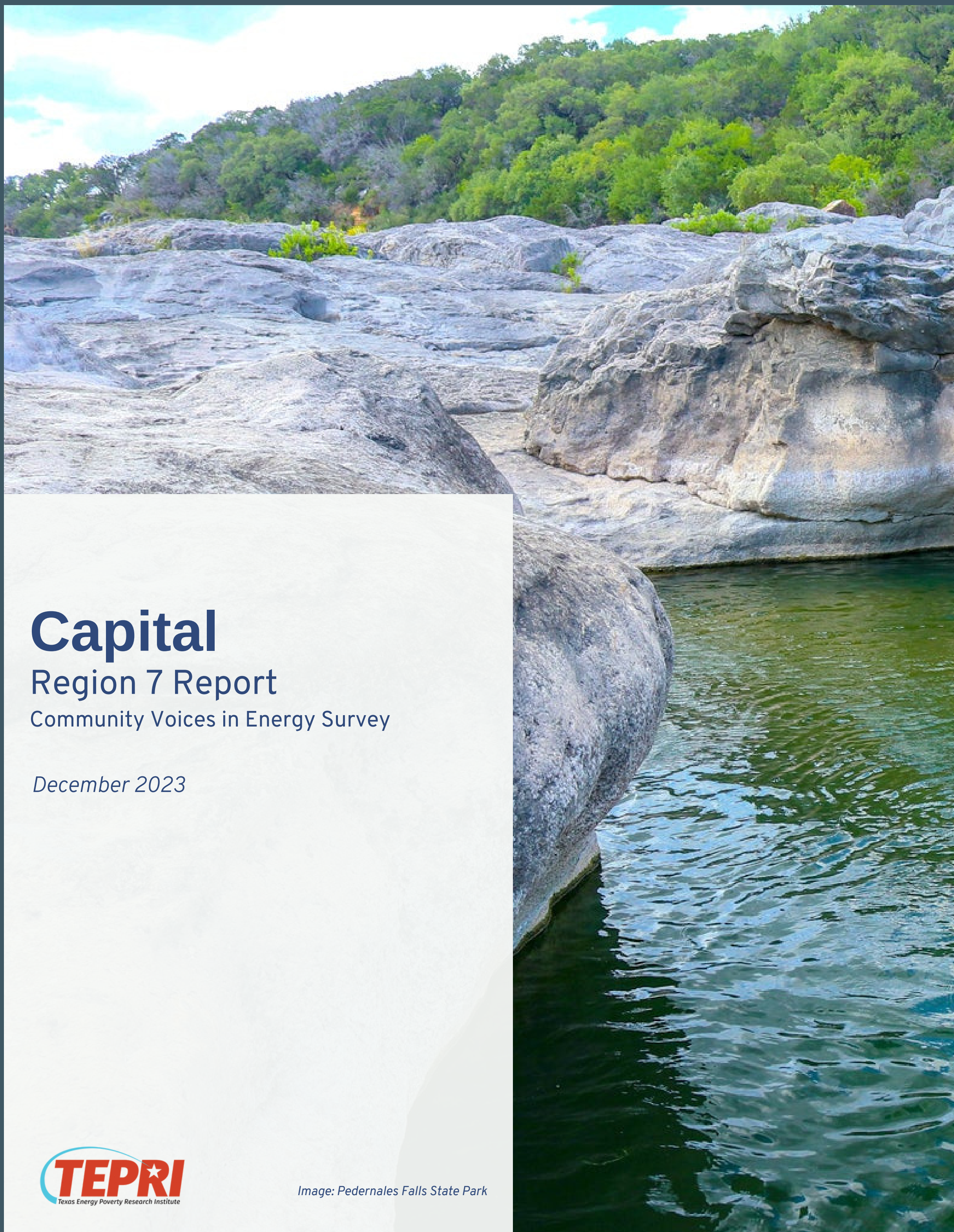
# TEXAS ENERGY POVERTY RESEARCH INSTITUTE, COMMUNITY VOICES IN ENERGY SURVEY

https://tepri.org/wp-content/uploads/2024/04/2024-CVES-Statewide-Report.pdf



# CAPITAL REGION 7 REPORT, COMMUNITY VOICES IN ENERGY SURVEY

https://tepri.org/wp-content/uploads/2023/12/CVES-Region-7-Report-Capital.pdf

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# Equity Considerations for the Resource, Generation and Climate Protection Plan

Key Takeaways from the Texas Energy Poverty Research Institute's Community Voices in Energy Survey — Texas Statewide Report April 2024 and Capital Region 7 Report December 2023

## Introduction and Purpose of Review

Austin Energy has prepared this summary of key takeaways from the Texas Energy Poverty Research Institute's (TEPRI) 2024 Community Voices in Energy Survey (CVES) report, and data specific to the Capital area, in support of the development of its Resource, Generation and Climate Protection Plan to 2035.One of the objectives of the TEPRI report is to provide "data-driven insights to inform stakeholders such as utilities, government agencies, policymakers and community-based organizations in developing solutions to improve energy access for Texans." Austin Energy seeks to ensure that future energy resource investments and related programs account for any disproportionate impacts experienced by customers in relation to energy availability and affordability. As outlined in the CVES, while energy insecurity affects people across various demographics, certain groups, such as low- to moderate-income (LMI) households, renters, and households including Black, Latino, children, elderly and people with disabilities, bear a disproportionate burden of its impacts.

The City of Austin adopted the Austin Climate Equity Plan in 2021 setting a goal for the City to be net-zero by 2040. That plan and its goals were developed with a dual focus on promoting and achieving equity in the community by evaluating plan actions against several equity themes including Affordability and Just Transition. We note these are consistent with the concept of Equitable Energy Transition, which is defined by TEPRI as:

> Applying the process of energy equity to the transition from our current fossil-fuel-dependent energy system to a more diverse clean fuel base that creates affordable, accessible, sustainable and resilient energy solutions for all.

We are seeking comment and input from our community stakeholders to ensure we incorporate an equity lens in our work that is consistent with community values and expectations.

## Terms and Metrics Used in the CVES Report that are Relevant to Resource and Generation Planning

Attached to this summary is a one-page Energy Equity Primer prepared by TEPRI with terminology and concepts to promote equitable energy opportunities. One important measure defined by TEPRI is energy burden, which is the percentage of a household's income that goes toward household energy expenses (which can include costs that go beyond electricity service). For this current Resource and Generation Plan effort, Austin Energy will estimate the approximate change in energy burden for an average LMI household for each of its modeled mixes of new resources (or portfolios).

## Concepts Covered in the CVES Report and Applicability to Austin Energy

The CVES surveyed over 6,500 LMI households across Texas, focusing on energy burden, energy insecurity and climate risks. Data was collected in 2022 and 2023, with results broken out by 13 geographic Regions. Respondents were asked to rank four key electricity-related issues: affordability, sustainability,

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reliability and resiliency. The results revealed that affordability and resiliency are LMI households' top two energy priorities.

The Central Texas area is represented in the study as Region 7, which includes Travis and the surrounding nine counties. To focus on the results most relevant to our community, we use the CVES results for Region 7 as representative of Austin Energy's customers since this region includes the Austin-Round Rock-Georgetown metro area, which accounts for 94% of Region 7 population. Relevant facts for Region 7 from the study include:

- TEPRI surveyed a total of 631 (primarily) LMI households in Region 7 during the study period.
- Region 7 has the highest median annual income of all regions in Texas at just over $84,000.
- 24% of households have an annual income at or below half the area median income.
- Nearly 49% of residents in Region 7 are people of color.
- 61% of residents in Region 7 live in owner-occupied homes.
- 10% of residents in Region 7 live below the Federal Poverty Level.
- 13% of residents in Region 7 are above the age of 65.

## CVES Findings Related to Affordability

- Across Region 7, the average LMI household experiences a 6.9% energy burden compared to an average of 3.69% for all households. An energy burden above 6% is considered unaffordable. Respondents earning 30% or less than the area median income experience an average of 13.2% energy burden, which is defined by TEPRI as extreme.
- Dense urban areas generally experience lower energy burdens than their rural counterparts in Region 7.
- Almost 50% of respondents do not consider their energy bills affordable. 39% of residents in Region 7 with annual incomes less than $13,000 strongly agree that they struggle to pay their monthly energy bills
- Respondents report cutting back on entertainment (48% of respondents), clothing (42%), and food (26%) to cover monthly energy costs.
- Statewide, approximately 27% of respondents turn off their air conditioning in summer to save costs and 36% of respondents set their thermostats to uncomfortable levels (cooling trade-offs). About 25% of respondents turn off their heaters in winter, and 31% set their thermostats to uncomfortable levels (heating trade-offs).
- Households with children and elderly members are more likely to make cooling tradeoffs to alleviate costs, including turning off their thermostats. 39% of households with at least one elderly member reported setting the temperature to an uncomfortable level during the summer and approximately 30% of households with at least one member under 18-years old opt to turn off their air conditioner in the summer to save money.
- Despite high disconnection/notices, only 10% of respondents in Region 7 reported participating in energy assistance programs. The most frequently cited barrier to energy program participation was lack of awareness, reported by 38% of respondents.

## CVES Findings Related to Reliability and Resiliency

- 92% of respondents in Region 7 expressed at least some concern about weather-related outages, with consistent results for owners and renters.
- 26% of respondents in Region 7 with annual household incomes below $50,000 report extreme concern, compared to 16% of respondents with moderate and high incomes.
- The CVES results provide insights into specific concerns of vulnerable populations related to power outages. Statewide, a large number of households with minors expressed concern about loss of home temperature control (61%), inability to charge devices (47%) and losing communication with friends and family (35%). Large numbers of households with seniors are also concerned about maintaining a comfortable home temperature (62%), home damage from fallen trees and poles (42%) and the inability to charge or power electronic devices (53%).
- More than half (51%) of respondents in Region 7 noted that they are willing to reduce their energy use for financial compensation (such as a credit on their energy bills) and about a third (36%) are willing to do so voluntarily.

## CVES Findings Related to Clean Energy Interest

- Survey results reported that 10% of respondents in Region 7 are currently enrolled in clean energy programs, mirroring the statewide participation average of 10%.
- For the lowest income respondents in Region 7, those with "extremely low" incomes (28% of respondents), "very low" incomes, (29%) and "low" incomes (31%), expressed a willingness to pay an extra $1 to $5 monthly for clean energy. Notably, 35% of respondents with annual household incomes of less than $50,000 are willing to pay $6 to $10 extra on their monthly energy bill for clean energy. However, most Region 7 respondents (40% to 60%) in every income category are not willing to pay any more money on their bill for cleaner sources of energy.
- Statewide, younger respondents (18 to 30 years old) showed the highest willingness to pay extra for clean energy, while those over 65 showed the least willingness.

## Policy Recommendations and Implications for Austin Energy's 2024 Resource and Generation Plan Effort

- Implement targeted outreach campaigns, streamlined application processes and partnerships with landlords to enhance access to energy assistance programs.
- Prioritize new infrastructure investments (including smart technologies, distributed energy resources and microgrids), establish community resilience hubs and develop public awareness campaigns to address reliability and resilience concerns.
- Develop educational resources and outreach programs, provide financial incentives (grants, rebates and low-interest financing) and support community-led initiatives to promote clean energy and energy efficiency options available to LMI customers.

A noteworthy finding from the CVES was that the percentage of LMI households participating in assistance programs was significantly lower than the percentage of households experiencing a high energy burden. The primary factor for non-participation was found to be a lack of awareness about these programs. Among the 63 respondents in Region 7 who participated in energy assistance programs, the most frequently cited sources for learning about these programs were energy providers, community centers and social media. In Travis County specifically (encompassing most of Austin Energy's service territory), the most frequently cited source is religious centers.

As a municipally owned utility, equity is a critical component of Austin Energy's mission — to safely deliver clean, affordable, reliable energy and excellent customer service. The utility takes TEPRI's policy recommendations to heart and continues to seek ways to build upon our current ways of promoting equity.

Austin Energy works to keep residential bills among the lowest in the state, and for customers most in need, we have programs to provide additional support for reliability, resiliency and access to clean energy. There are more details on our affordability efforts outlined in the attached Appendix B: Affordability Metrics and Appendix C: Customer Assistance Program Brochure.

Additionally, Austin Energy's Distribution Resiliency Program targets under-performing circuits for end-to-end rehabilitation, along with tactical infrastructure enhancements to improve areas with critical services, open maintenance tickets or a high number of repeat outages. A final example of alignment with TEPRI's recommendations is clean energy access with the Community Solar Program, which gives residential customers access to solar energy — no installation required. Rates are discounted for Customer Assistance Program customers.

Austin Energy's previous Resource Generation Plans have included commitments to equity and affordability, and those have helped shape existing customer programs. With the information laid out in the TEPRI CVES and input from the community, the utility is committed to continuing the focus on equity and improving the way it meets customers' needs.

# Energy Equity Primer

## Terminology and Concepts to Promote Equitable Energy Opportunities

TEPRI Texas Energy Poverty Research Institute

**ENERGY BURDEN** is the percentage of a household's income that goes towards household energy expenses. A household's energy burden can be measured in three categories:

| EXTREME | MODERATE | LOW |
|---|---|---|
| Greater than 10% of income | 6-10% of income | Less than 6% of income |

**ENERGY EQUITY** is a process of allocating resources and opportunities as needed to create affordable, accessible, sustainable, and resilient energy outcomes for all households, where:

- **Affordable** means energy costs are less than 6% of household income
- **Accessible** means readily having reliable and affordable access to energy services (i.e., the tasks performed using energy) in the required quantity
- **Sustainable** means the energy being used benefits—or at least minimizes harm to—people, planet, and prosperity
- **Resilient** means energy services are designed to avoid and/or withstand disruption, recover quickly from disruptions to minimize losses to households and the energy services, and adapt to changing conditions and/or support households' adaptation to changing conditions

**EQUITABLE ENERGY TRANSITION** is applying the process of energy equity to the transition from our current fossil-fuel-dependent energy system to a more diverse clean fuel base that creates affordable, accessible, sustainable, and resilient energy solutions for all

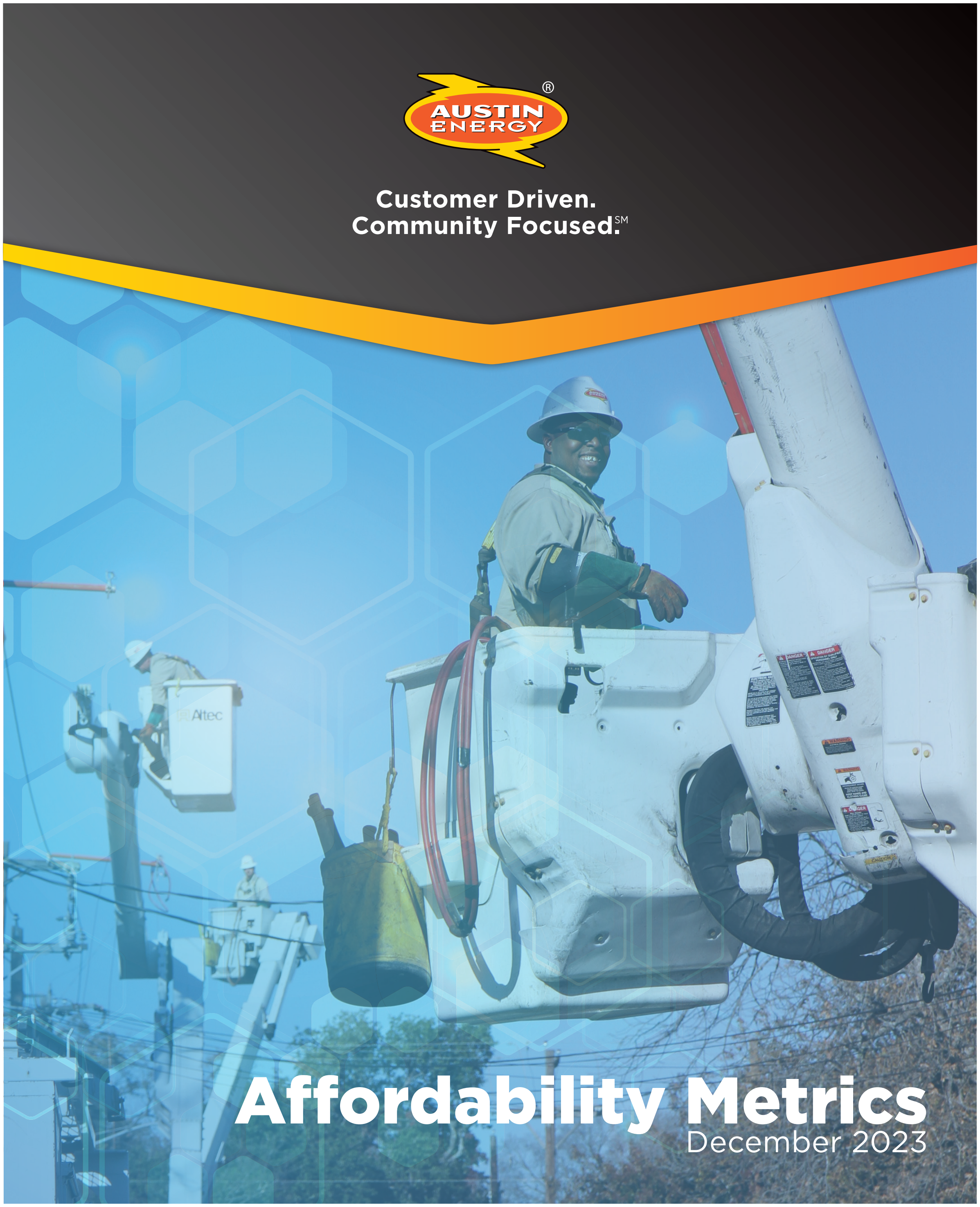
**ENERGY INSECURITY** the inability to meet basic energy needs due to high energy costs

**ENERGY POVERTY** occurs when the cost of energy needed to maintain a healthy lifestyle creates a significant or unnecessary economic burden

**ENERGY DISPARITIES** are differences in how people relate to, benefit from, and are harmed by energy

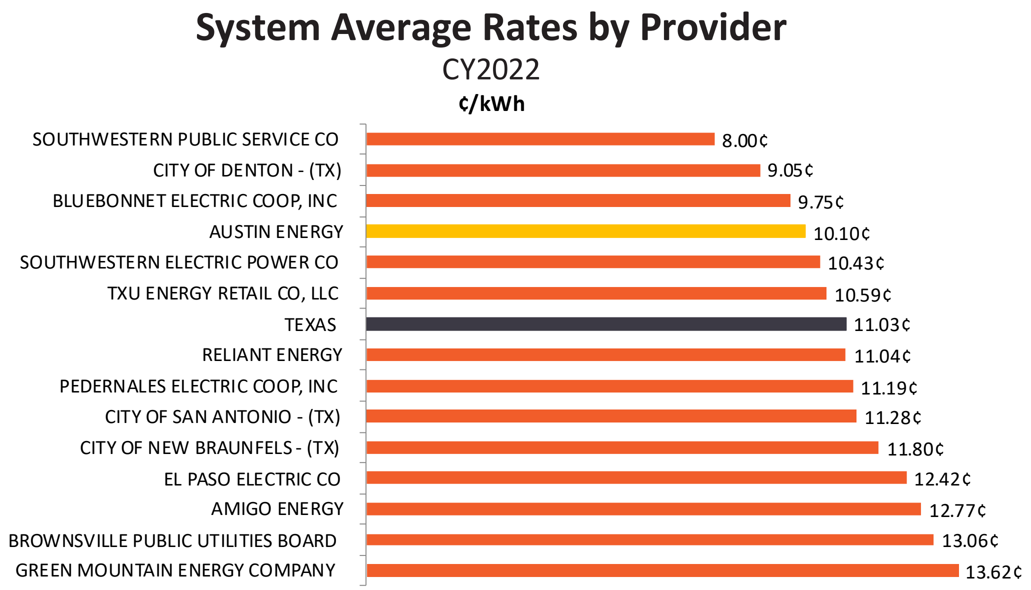
*Equity Considerations for the Resource, Generation and Climate Protection Plan • Page 4 of 22 — Printed 08/20/2024*

## Appendix B: Affordability Metrics (December 2023, Austin Energy)



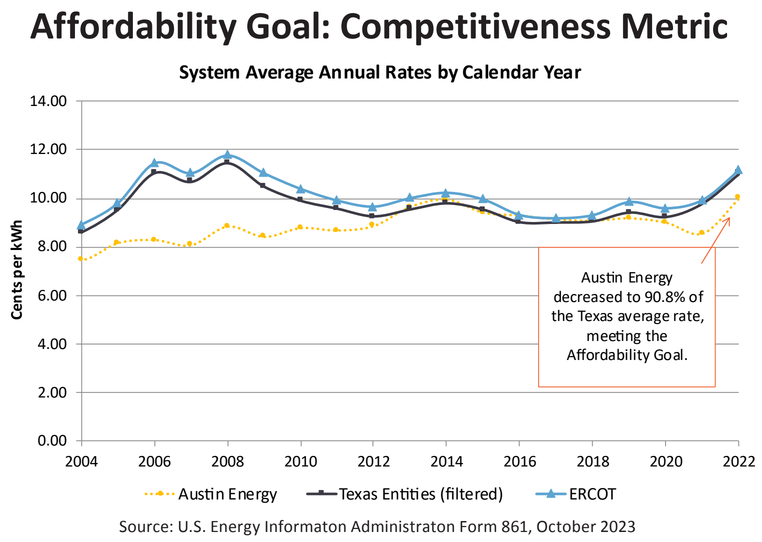
# OVERVIEW

Affordability is a pillar of Austin Energy's mission to safely deliver clean, affordable, reliable energy and excellent customer service — 24 hours a day, 365 days a year. To deliver on that mission, Austin Energy customer bills are affordable and competitive. Residential bills are among the lowest in the state. For our customers most in need, we further reduce their costs through one of the most robust Customer Assistance Programs in the industry. Austin Energy's affordability is driven by our efforts to promote energy efficiency, update building codes to further enhance efficiency and our successful efforts to control internal costs.



Source: U.S. Energy Informaton Administraton Form 861, October 2023

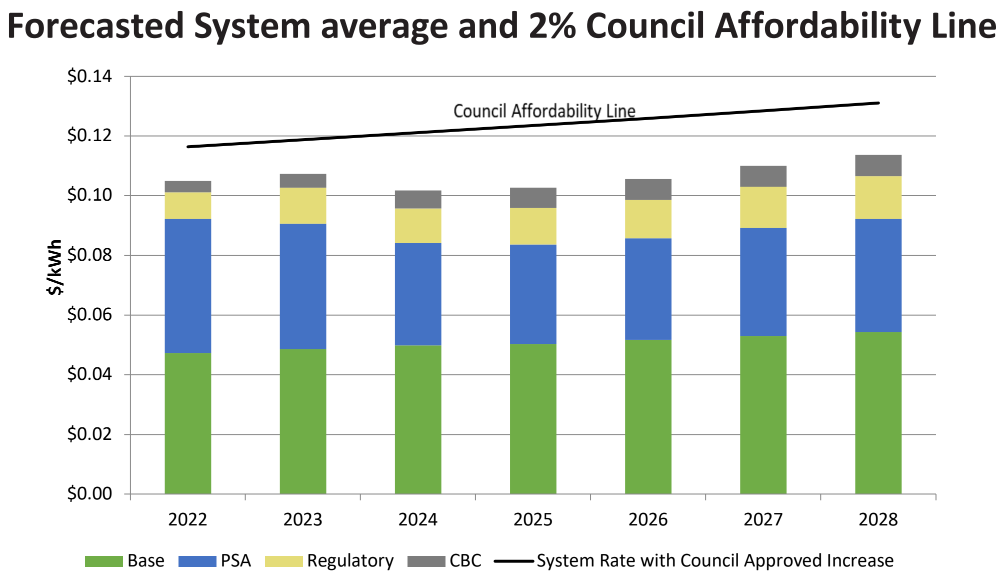
Austin Energy's affordability has been consistent over time with the system average rate lower than most other utilities in the state.



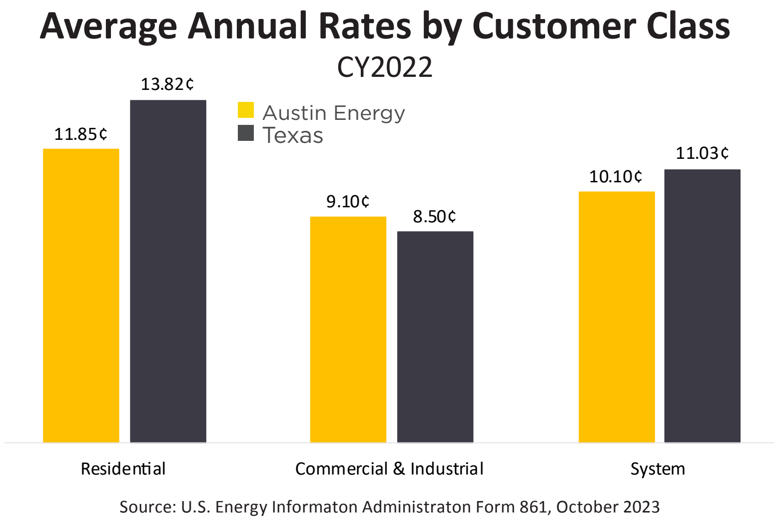

## Affordability Goals

In 2012, the Austin City Council identified two affordability goals for Austin Energy to meet going forward.

1. The first goal seeks to maintain system average rates at or below a 2% compounded annual growth rate that began October 2012. Austin Energy is meeting this goal as demonstrated below.

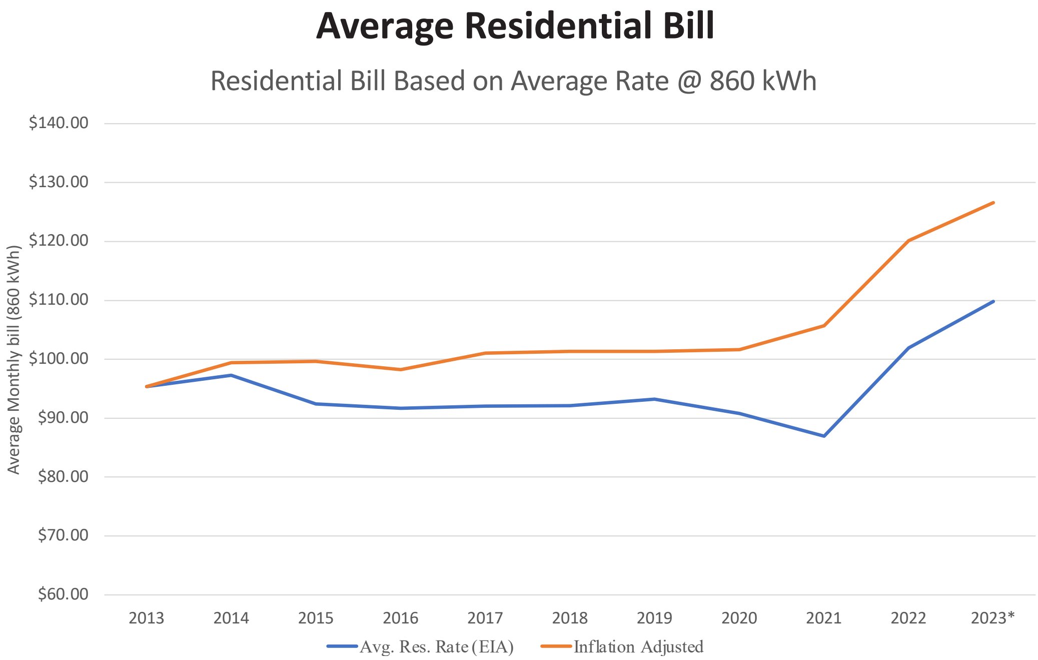


2. The second metric is to maintain an average annual system rate in the lower 50% of all Texas utilities serving residential, commercial and industrial customers as measured by published data from the Energy Information Administration (EIA).




## Cost Controls

Austin Energy only seeks to recover its costs. Strict cost controls allow Austin Energy customers' bills to track lower than inflation over time. The graph below shows the typical residential bill (assuming 860 kWh), over time, compared to an inflation-indexed bill.



As of FY2023, the actual typical residential bill is 15% below what a bill would be if it simply rose with the inflation rate.

Another measure of affordability is the "electricity burden," which is the annual average residential customer power cost divided by annual median household income. Using information from the U.S. Department of Energy and Census Bureau, Austin Energy's electricity burden is lower than the Texas average for both average residential and low-income residential customers.

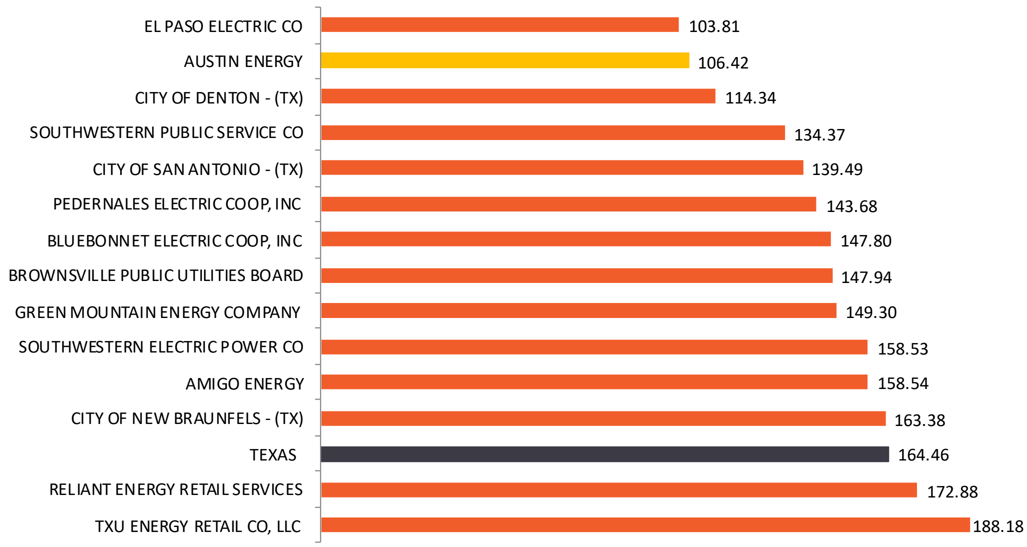
| | Electricity Burden Average Residential | Electricity Burden Low-income Residential |
|---|---|---|
| Austin Energy | **1.5%** | **3.8%** |
| Texas Average | **2.7%** | **5.0%** |

## Competitiveness

Austin Energy has a history of providing residential electric service to customers at some of the lowest bills in Texas. CY2022 Energy Information Administration data highlights that Austin Energy's residential bills are significantly lower than the state-wide average.

### Affordability Goal: Competitiveness Metric

**Residential Average Monthly Bill for CY 2022**




Source: U.S. Energy Informaton Administraton Form 861, October 2023

A local comparison, using surrounding utility's average consumption and current rates as of December 2023 is consistent with these results.



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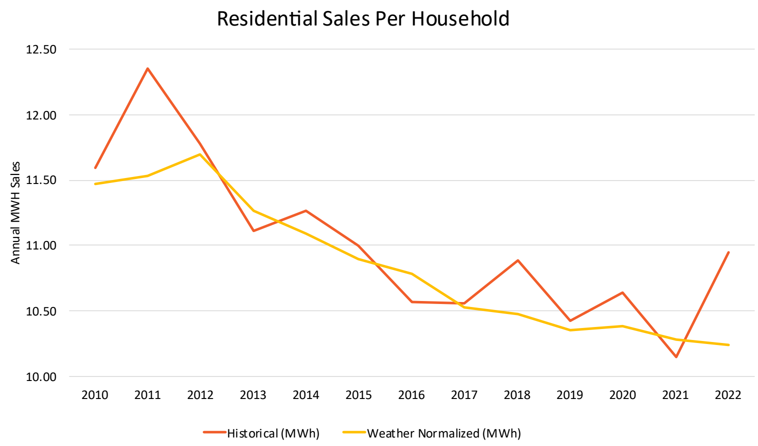
## Current Bill at Avg. kWh


## Affordability Programs

Energy Efficiency Services programs, combined with building codes, have helped lower average consumption within the service area.

## Declining Consumption per Customer




Austin Energy has three major program areas promoting affordability: Customer Assistance Programs, Customer Energy Solutions programs and Austin Energy payment arrangements.

## Customer Assistance Program

Austin Energy, on behalf of the City of Austin, manages a suite of programs to support our low-income customer base. These programs were developed in collaboration with community stakeholders to ensure a comprehensive support services model. These programs are managed within the Customer Care — Customer Services Management workgroup and specifically with the Customer Assistance Team. Low-income programming consists of the following:

- Discounts
- Weatherization
- Education
- Emergency Financial Assistance

The **Customer Assistance Discount Program** is the flagship program, which has more than 58,000 registered low-income households as of December 2023. On average, customers enrolled in the Discount Program can reduce their utility bill an average of $560 a year.

Discount Program customers can receive the following discounts based on the services they have at their primary residence within the Austin Energy/Austin Water Service territory.

- Electric Customer Charge
- Electric Community Benefit Charge*
- 10% Electric Usage
- Water Customer Charge
- Water Tiered Fixed Charge
- Water Volume Charge
- Water Community Benefit Charge
- Wastewater Customer Charge
- Community Benefit Charge
- Wastewater Volumetric Charge
- 50% Drainage Fee (based on impervious cover)
- Multi Family Water Discount

This Discount Program currently provides the typical residential CAP customer a 23% discount compared to the typical non-CAP residential bills. Austin Energy waives the Customer Charge (currently $14), the CAP Community Benefit Charge (currently .00242 / kWh) and provides a 10% reduction for the balance of the electric bill. For a CAP customer using a typical 860 kWh per month, this results in a $25.97 savings per month.

### Typical Residential Bill Impact

860 kWh

| | Current Rates | CAP Rates |
|---|---|---|
| Customer Charge | $14.00 | $ 0.00 |
| Energy Charge | | |
| Tier 1 | 12.26 | 11.03 |
| Tier 2 | 28.64 | 25.78 |
| Base Revenue | $54.90 | $36.81 |
| PSA | $41.51 | $37.36 |
| CBC | 6.77 | 4.22 |
| Regulatory Charge | 11.82 | 10.64 |
| Pass-throughs | $60.10 | $52.22 |
| Total Bill | $115.00 | $89.03 |

*Equity Considerations for the Resource, Generation and Climate Protection Plan • Page 11 of 22 — Printed 08/20/2024*

Residential customers on low or fixed incomes who participate in certain state, federal, or local assistance programs can automatically qualify for the City of Austin's Customer Assistance Discount Program. Customers who don't automatically qualify can gain eligibility through self-enrollment by showing they are at or below 200% of the Federal Poverty Income Level.

These services were expanded in 2023 from an average yearly enrollment of 35,000 low-income households. Austin Energy has committed to expand the program through 2026 to ensure as many low income households as possible receive this benefit to help with utility affordability.

**Emergency Financial Assistance Program (Plus 1)** – Serious illness, a recent job loss or other emergencies can make it difficult for some customers to pay their utility bills. The Plus 1 fund helps by providing emergency financial aid to residential customers who are having a temporary problem paying their utility bills. Funding is distributed by local social service agencies. These agencies screen applicants, determine eligibility and arrange for funding to be applied to the customer's utility account.

Austin Energy provides $2.4 million in emergency financial assistance thru our network of local social service agencies. These agencies provide additional resources they provide our customers that increase our collective contributions year over year to the tune of about $4 to $8 Million per year in emergency financial assistance to Austin Energy customers.

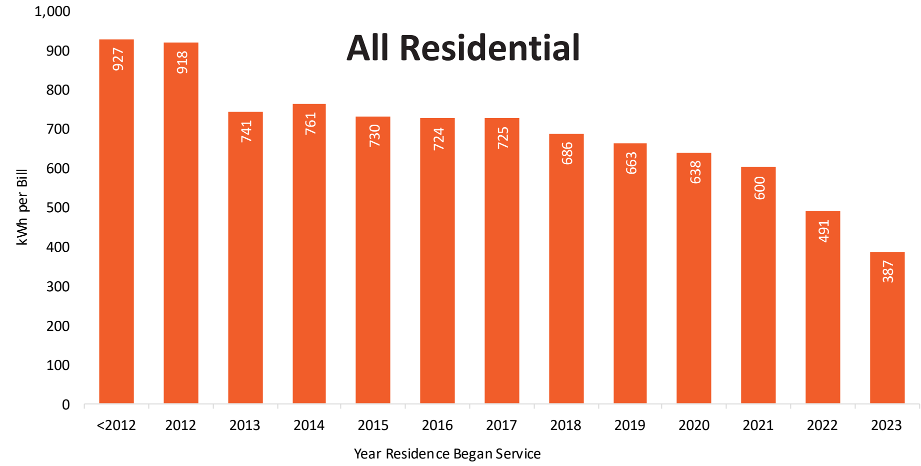
**Weatherization Assistance** — Offers free home whole home energy improvements, except HVAC replacement, for low-income customers who qualify through the Customer Assistance Program. These improvements not only lower energy costs to make bills more affordable but also improve indoor comfort and air quality, making homes healthier and safer. CAP customers can also qualify for rebates and incentives for HVAC replacement. CAP customers who are also on the Medically Vulnerable Registry can qualify for free HVAC replacement.

## Customer Energy Solutions

The Customer Energy Solutions (CES) portfolio supports the implementation of energy or fuel saving technologies to reduce costs for customers while maintaining or increasing their comfort and access. CES advances affordability in the following ways:

- Reducing household usage (through energy efficiency and renewables).
- Reducing peak load which helps keep utility rates low for all customers by reducing transmission costs and mitigating the need to acquire more generation.
- Bridging the affordability gap for new technologies, such as e-bikes.

Austin Energy analyzed the average consumption by the age of the home. The results highlight the average consumption for newer homes decreases, ultimately resulting in a greater than 50% reduction in monthly average consumption over the last ten years. This result is driven by Austin Energy's energy efficiency efforts, the City of Austin's updates to building codes, a more diverse and energy efficient housing mix, and improving energy efficiency of new appliances and lighting.




## Energy Efficiency Services

The mandate of Energy Efficiency Services is to encourage implementation of energy saving measures that reduce household/building energy costs while maintaining comfort and increasing indoor air quality. The portfolio also includes Demand Response, which coupled with Energy Efficiency, reduces loads throughout the Austin Energy territory, peak demand during the summer months and ultimately costs for all utility customers.

### Commercial/Multifamily

- **Commercial Energy Efficiency:** Rebates focused on energy efficiency and reducing peak demand that decrease demand charges, create bill savings, improve comfort and decrease work orders and maintenance costs. Rebates are based on projected kW savings and are offered on a range of products and services from weatherization to energy efficient appliances.

- **Multifamily Energy Efficiency:** The standard and Income-Qualified Multifamily Rebate Programs are designed to make energy efficiency upgrades easier and more cost-effective for multifamily properties, at low-to-no cost. Services include free or low-cost weatherization improvements, energy savings, bill savings, improved comfort and indoor air quality, as well as health and safety improvements. Projects are covered at up to 80% for standard multifamily units and at 100% for income-qualified properties.

### Residential

- **Home Energy Savings (formerly Home Performance with ENERGY STAR®):** A whole home program available to any Austin Energy customer to implement energy efficiency. Services include attic insulation, duct work, HVAC replacement, weatherstripping, and incentives can be paid out as an $1,800 rebate or through a low-interest loan up to $20,000. From January to April 2024, rebates increase to $2,600 during a limited time offer to increase affordability for participating customers.

- **Weatherization Assistance Program:** A whole home program that covers 100% of costs up to $10,000 for home energy efficiency upgrades (excluding HVAC replacement) for eligible low-to-moderate income customers, who qualify in the Customer Assistance Program or as 80% of median family income.
  - HVAC Loan and Rebate Program: For customers needing to replace their HVAC unit, there are special incentives available including a $450 - $950 rebate or a 0% interest loan for up to $10,000.
  - Medically Vulnerable Registry HVAC Program: For customers on the Medically Vulnerable Registry AND receiving Customer Assistance Program benefits, Austin Energy will replace qualifying HVAC units free of charge.
- **Appliance Efficiency Program:** A retail rebate program that provides individual rebates for purchase and installation of qualifying energy efficient appliances.
  - HVAC: $400 - $750
  - Variable Speed Pool Pump: $300
  - Heat Pump Water Heaters: $800
  - Window A/C Unit: $50
  - Smart Thermostat: $30
  - Solar Screens: $1 / per sq ft
- **Strategic Partnership of Utilities and Retailers:** An in-store retail rebate program that provides instant savings and hassle-free discounts on eligible energy efficient products, including ENERGY STAR® products, at participating Austin-area stores. Rebate/savings amounts may vary depending on the product but are assessed annually.
- **School Based Education:** Energy All Stars 6th grade educational curriculum that encourages behavioral change to promote energy efficiency and conservation. By cultivating smart energy habits in kids, the benefits of energy and cost savings can be passed on to parents and spread to entire households.

## Demand Response

- Demand Response programs partner with customers to reduce peak load, which directly reduces all utility customer bills. The demand response season typically spans from June to September, but Austin Energy is considering a winter month expansion of some programs.
- **Behavioral Demand Response:** Messaging to residential customers intended to influence behavior by alerting customers of an upcoming high energy day, educating them on ways to conserve energy and gamifying their performance to encourage participation. There is no incentive associated with this program as it is still in the proof-of-concept phase.

- **Commercial Demand Response:** Participating commercial and industrial customers temporarily reduce their energy use and earn incentives. Customers are paid for performance on a per kW basis. Rebate levels vary based on availability, duration and performance.

- **Smart Home Rewards:** A demand response program designed to make multifamily communities more energy efficient with smart thermostats and water heater controllers with leak detectors. Austin Energy prioritizes communities that serve low- and moderate-income households or have an existing property-wide Wi-Fi signal that can provide communication for smart devices. Participating community owners receive $5 per year for every eligible device installed, up to $10 per residence. Residents earn a one-time $50 bill credit when they enroll in Smart Home Rewards, plus up to $35 every year they stay in the program.

- **Power Partner Thermostat and EV:** Participants help the community manage energy use on days when the need is highest. During these peak times, Austin Energy briefly adjusts enrolled smart thermostats and EV charging stations to use less energy. The incentives for this program are a $50 per device bill credit upfront and $25 per device for annual participation. Customers can enjoy a seasonal offer through January 31 that increases the standard bill credit to $75 for each thermostat enrolled.

## Green Building and Electric Vehicles

### EVs are for EVeryone

This work brings electric vehicle programs and support to all community members including low-to-moderate income groups. The goal is to create a future of mobility that is equitable, affordable and accessible while helping the environment.

- **Home and Commercial Charging Rebates**
  - Austin Energy offers rebates as high as $1,200 on home charging stations. Commercial customers can get rebates from $700 to $5,000 per charging station installed.
- **Electric Ride (E-Ride) Rebates**
  - Starting in 2023, Customer Assistance Program (CAP) customers are eligible for an enhanced rebate up to $1,300 per E-Ride vehicle — an electric bike, scooter, moped, motorcycle, etc.
- **E-bike access and safety trainings**
  - Austin Energy has conducted over 200 free E-bike access and safety trainings for underserved community members, especially to help customers identify a new, affordable mode of electric transportation.
- **EV's for Schools**
  - EV charging stations for school staff, students, parents and visitors.
  - Curriculum designed to meet Texas Essential Knowledge and Skills (TEKS) standards.
  - Affordable and accessible on-campus charging to increase EV awareness and adoption.

## Austin Energy Green Building Ratings

AEGB provides design tools and rates the sustainability of new and remodeled Single Family, Multifamily and Commercial buildings.

- **S.M.A.R.T. Housing collaboration**
  - » All projects participating in the City's S.M.A.R.T. Housing program are required to earn a 1-Star Austin Energy Green Building rating to help ensure that these homes are healthy and efficient, resulting in more affordable utility costs.
- **Rating points are rewarded for measures that:**
  - » Reduce energy and water use
  - » Increase durability
  - » Increase resilience
  - » Promote healthier indoor & outdoor environments
  - » Promote transportation options that work for everyone
  - » Increase human health & well-being
  - » Improve construction worker health and safety
  - » Provide affordable housing

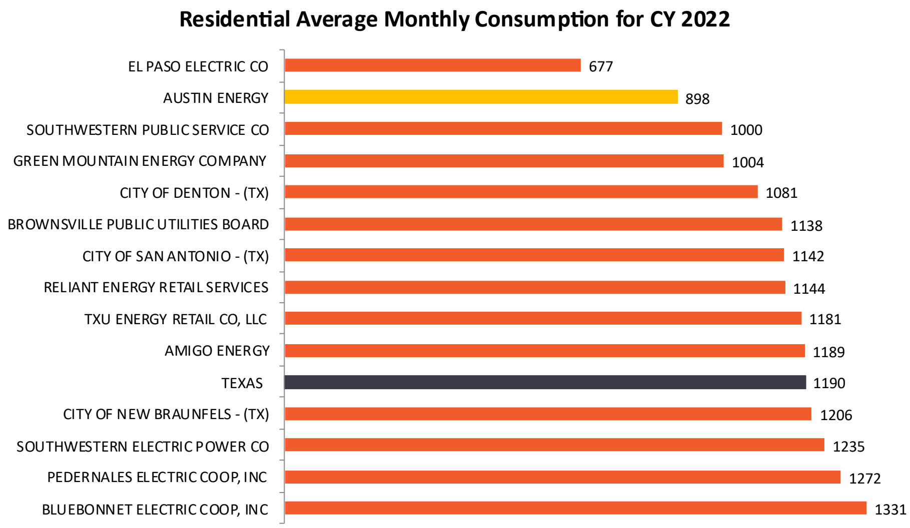
## Customer Renewable Solutions

Customer Renewable Solutions supports the installation of solar within the Austin Energy territory that can reduce individual customer bills.

- **Residential Solar** — This program provides consumer education, up-front rebates and ongoing production rebates for qualifying residential solar installations. Solar can reduce customer's monthly bills by offsetting their usage.
- **Commercial Solar** — This program provides both up-front and production rebates for qualifying commercial solar installations. These installations can reduce customers' bills by offsetting their usage.
- **Community Solar Subscription CAP** — This program is available for Customer Assistance Program customers. Subscribers receive the benefits of community solar, where 100% of their usage is accounted for using local solar production, while also receiving a slight bill discount.

Austin Energy's Customer Energy Solutions efforts have helped lead to some of the lowest average residential consumption levels in the state, as shown in the chart below.

## Affordability Goal: Competitiveness Metric




Source: U.S. Energy Informaton Administraton Form 861, October 2023

## Payment Arrangements

To help customers avoid creating and accruing debt, Austin Energy offers a robust system of no-cost payment arrangements to help our customers remain in good standing while working to pay off past-due utility balances. With a payment arrangement, the past-due amount is spread over a specified period of time. Paying both the monthly installment and current utility charges affords customers extra time to bring their utility accounts up to date.

Such low-income payment arrangement types include:

- **Good Standing —** Affordable payment plans extending up to 24 months with a payment of no more than $48 a month for residential customers.
- **Bona Fide —** Payment arrangements up to 24 months to help ease the burden of illness, loss of employment, facing deportation, economic loss or domestic violence.
- **Account Watch —** Available up to 24 months for customers with 1 prior broken payment arrangement with an outstanding balance less than $1,000.
- **Subject to Disconnect —** Available for up to 8 months for customers with 2 or more outstanding payment arrangements with an outstanding balance.

## Appendix C: CAP Brochure

CITY OF AUSTIN UTILITIES

# CUSTOMER ASSISTANCE PROGRAM

Helping qualified customers receive discounts and special services

coautilities.com/go/cap



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# Customer Assistance Discount Program

The Customer Assistance Discount Program offers a yearly average of $1092 in discounts to low-income customers served by Austin Energy, Austin Water and Watershed Protection.

## Discounts Available

1. Electric Customer Charge waiver
2. Discount on your community Benefit Charges
3. Discount on your total electrical usage
4. Water Multi-family Program Discount*
5. Water Customer Charge waiver
6. Water Tiered Fixed Charge waiver
7. Water Volume Charge Discount
8. Water Community Benefit Charge Discount
9. Wastewater Customer Charge Discount
10. Wastewater Community Benefit Charge Discount
11. Wastewater Volumetric Charge waiver
12. Drainage Fee 50% Discount

## How to Qualify

You qualify for discounts if you or someone in your household currently participates in any one of these assistance programs:

» All Medicaid types
» Supplemental Nutrition Assistance Program (SNAP)
» Children's Health Insurance Program (CHIP)
» Telephone Lifeline Program
» Travis County Comprehensive Energy Assistance Program (CEAP)
» Medical Access Program (MAP)
» Supplemental Security Income (SSI)
» Veterans Affairs Supportive Housing (VASH)

You may also be eligible for the program if your household income is less than 200% of the Federal Poverty Level.

**2024 Federal Poverty Guidelines**

| Persons in Family/Household | 200% of Federal Poverty Guidelines |
|---|---|
| 1 | $30,120 |
| 2 | $40,880 |
| 3 | $51,640 |
| 4 | $62,400 |
| 5 | $73,160 |
| 6 | $83,920 |
| 7 | $94,680 |
| 8 | $105,440 |
| Families with more than 8 Persons | Add $9,440 for each additional person |

*Applies to customers who do not get billed for individual water consumption. The discount is $17 per month.

**ELECTRIC SERVICE** — 123 RESIDENTIAL BLVD, ZIP: 78704

**Meter #** 0123456 — **Next Read Date Approx. 05/24**

| Read Date | 03/21/24 | 04/21/2024 | Consumption |
|---|---|---|---|
| Read | 46781 | 47781 | 1000 |
| | Reading Difference | | 1000 |
| | Total Consumption in KWH | | 1000 |

| | COA - Electric Residential | |
|---|---|---|
| | Customer Charge | $14.00 |
| 1 | Cust Assist Program Cust Charge Discount | -$14.00 |
| | Tier 1 first 300 kWh at $0.04088 per kWh | $12.26 |
| | Tier 2 next 600 kWh at $0.05115 per kWh | $30.69 |
| | Tier 3 next 100 kWh at $0.07492 per kWh | $7.49 |
| | Regulatory Charges 1,000 kWh at $0.01374 per kWh | $13.74 |
| | Community Benefit Charges | $7.88 |
| 2 | Community Benefit Charge - Cust Assist Prog. Credit | -$2.42 |
| | Power Supply Adjustment 1,000 kWh at $0.04598 per kWh | $45.98 |
| | Power Supply Administrative Adjustment 1,000 kWh at $0.00724 per kWh | $7.24 |
| 3 | Cust Assist Program Bill Discount | -$12.29 |
| 4 | Austin Water Multi-Family CAP Program Discount | -$17.00 |
| | Residential Sales Tax | |
| | Taxable Amount | $93.57 |
| | City Sales Tax 1% | $0.94 |

**WATER SERVICE** — 123 RESIDENTIAL BLVD, ZIP: 78704

**Meter #** 01234567 — **Next Read Date Approx. 05/24**

| Read Date | 03/21/2024 | 04/21/2024 | Consumption |
|---|---|---|---|
| Read | 252 | 352 | 100 |
| | Reading Difference in Hundreds | | 100 |
| | Total Consumption in Gallons | | 10000 |

| | City of Austin Water - Residential | |
|---|---|---|
| | Customer Charge | $7.45 |
| 5 | Cust Assist Program Cust Charge Discount | -$7.45 |
| | Tiered Fixed Charge 6,001 - 11,000 Gallons | $9.25 |
| 6 | Cust Assist Program Tiered Fixed Charge Discount | -$9.25 |
| | 2,000 Gallons at $3.00 per 1,000 | $6.00 |
| | 4,000 Gallons at $4.99 per 1,000 | $19.96 |
| | 4,000 Gallons at $8.65 per 1,000 | $34.60 |
| 7 | Cust Assist Program Volume Charge Discount | -$19.50 |
| | 10,000 Gallons at $0.15 per 1,000 - Water Community Benefit Charge | $1.50 |
| 8 | 10,000 Gallons at $-0.15 per 1,000 - Comm Benefit Chg-CAP Discount | -$1.50 |
| | 10,000 Gallons at $0.05 per 1,000 - Reserve Fund Surcharge | $0.50 |
| | **TOTAL CURRENT CHARGES** | **$41.56** |

**WASTEWATER SERVICE** — 123 RESIDENTIAL BLVD, ZIP: 78704

| | City of Austin Wastewater - Residential | |
|---|---|---|
| | Customer Charge | $10.35 |
| 9 | Cust Assist Program Cust Charge Discount | -$10.35 |
| | 2,000 Gallons at $5.10 per 1,000 | $10.20 |
| | 2,100 Gallons at $10.45 per 1,000 | $21.95 |
| | 4,100 Gallons at $0.15 per 1,000 - WW Community Benefit Charge | $0.62 |
| 10 | 4,100 Gallons at $-0.15 per 1,000 - WW CBC-CAP Discount | -$0.62 |
| | Summary of Consumption Charges | $32.15 |
| 11 | Cust Assist Program Volume Charge Discount | -$9.34 |

**DRAINAGE SERVICE** — 123 RESIDENTIAL BLVD, ZIP: 78704

| Service Dates | 03/21/2024 | 04/21/2024 |
|---|---|---|
| City of Austin Drainage | | |
| Monthly Charge | | $17.47 |
| 12 Cust Assist Program Cust Charge Discount | | -$8.73 |
| **TOTAL CURRENT CHARGES** | | **$8.74** |

This sample utility bill represents a residential customer using 1,000 kWh of electricity and 10,000 gallons of water. Not every customer will receive the same discounts.

*Format is subject to change.*

Call 855-319-6630 for an application.

*Equity Considerations for the Resource, Generation and Climate Protection Plan • Page 19 of 22 — Printed 08/20/2024*

## Financial Support Plus 1 Program

This Program assists customers who are having financial difficulties and are unable to pay their utility bill due to unexpected emergencies.

### Please contact one of these agencies:

| | |
|---|---|
| *AISD International High School | 512-414-6817 |
| Aging and Disability Resource Center/Area Agency on Aging of the Capital Area | 1-855-937-2372 |
| *Any Baby Can | 512-454-3743 |
| *ASHwell | 512-467-0088 |
| *Asian Family Support Services of Austin (AFSSA) | 877-281-8371 |
| *Austin Community College District | 512-223-6072 |
| Austin Public Health–Neighborhood Services Unit | 512-972-5780 |
| *Austin Voices for Education & Youth —AISD school-based Family Resource Centers: | |
| Burnet Middle School | 512-414-4341 |
| Dobie Colleg Prep Academy | 512-414-3443 |
| Houston Elementary School | 512-414-4355 |
| Martin Middle School | 512-414-3243 |
| Mendez Middle School | 512-841-1016 |
| Navarro Early College High School | 512-414-4344 |
| Northeast (formerly Reagan) Early College High School | 512-414-6361 |
| Berkeley United Methodist Church | 512-766-0385 |
| Bethany United Methodist Church | 512-258-6017 |
| *Capital Idea | 512-457-8610 |
| *Caritas of Austin | 512-479-4610 |
| Catholic Charities of Central Texas | 512-651-6100 |
| *Communities In Schools | 512-462-1771 |
| David Chapel Missionary Baptist Church | 512-472-9748 |
| *Easterseals Central Texas | 214-282-2757 |
| First United Methodist Church | 512-478-5684 |
| *Foundation Communities | 737-717-4000 |
| Foundation for the Homeless | 512-453-6570 |
| *Goodwill Central Texas | 512-637-7580 |
| Greater Mt. Zion Baptist Church | 512-469-9020 |
| Hope Food Pantry Austin | 512-592-3171 |
| *Hospice Austin | 512-342-4700 |
| *Housing Authority of the City of Austin | 512-767-7659 |
| *Interfaith Action of Central Texas (iACT) | 512-386-9145 |
| *LifeWorks | 512-735-2400 |
| Loaves and Fishes Ministry All Saints' Episcopal Church | 512-637-2826 |
| *Meals on Wheels Central Texas | 512-476-6325 |
| Muslim Community Support Services (MCSS) | 512-240-2257 |
| Sacred Heart–SVDP | 512-926-1171 |
| St. Albert the Great Catholic Church–SVDP | 512-836-0020 |
| St. Austin Catholic Church | 512-477-9471 |
| St. Austin Parish–SVDP | 512-477-1589 |
| St. Christopher Conference–SVDP | 512-255-1389 |
| St. John Neumann Catholic Church–SVDP | 512-328-3220 |
| St. Louis Catholic Church–SVDP | 512-419-1667 |
| Saint Louise House | 512-297-2129 ext.211 |
| Saint Mary Cathedral–SVDP | 512-476-3750 |
| St. Paul Catholic Church–SVDP | 512-420-4077 |
| St. Thomas More Catholic Church–SVDP | 512-258-1161 |
| Society of St. Vincent de Paul | 512-251-6995 |
| *Student Emergency Services–UT Austin | 512-471-5017 |
| *Texas VFW Foundation | 512-291-6850 |
| *The SAFE Alliance | 512-267-7233 |
| *The Salvation Army Austin | 512-634-5919 |
| Travis County | |
| Pflugerville (North Rural) | 512-854-1530 |
| Central (Airport) | 512-854-4120 |
| Del Valle (South Rural) | 512-854-1520 |
| Jonestown (Northwest Rural) | 512-854-1500 |
| Manor (East Rural) | 512-854-1550 |
| Oak Hill (West Rural) | 512-854-2130 |
| UPLift–University Presbyterian Church | 512-476-5321 ext.114 |
| *Welcome Table | 512-943-7978 |
| *Vivent Health | 512-458-2437 |

*Must be a current client of these agencies to receive Plus 1 utility assistance.

## Medically Vulnerable Registry

For customers with medical needs requiring electricity, the Medically Vulnerable Registry provides extra support during a power outage. To qualify, customers must meet one of the following criteria:

» **LIFE SUPPORT:** The resident is sustained by a life support system that requires uninterrupted electric or water service.

» **CRITICAL ILLNESS:** The resident is being treated by a licensed medical provider for paraplegia, hemiplegia, quadriplegia, multiple sclerosis, scleroderma or other medical conditions that require heating or air conditioning.

» **SERIOUS ILLNESS:** The resident is being treated by a licensed medical provider for a serious physical or mental illness impacted by changes in temperature.†

» **MEDICALLY INDIGENT:** (Deposit Waiver Only): The resident is not able to perform three or more of the activities of daily living defined as bathing, dressing, grooming, routine hair and skin care, meal preparation, feeding, exercising, toileting, transfer/ambulation, positioning and range of motion.

Customers on the registry receive personal case management from the City of Austin and partnering social service agencies. They are not guaranteed uninterrupted power or priority restoration during an emergency. However, they will work with a case manager to set up a personalized emergency backup plan. Their case manager can also assist with flexible pay plans* and other options.

To apply, visit coautilities.com/go/mvrapp or call 512-494-9400.

*Customers on the registry must still pay their monthly utility bill on time and can still be disconnected for non-payment.

†Must be determined by a licensed medical provider.



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## Community Outreach

The Customer Assistance Program (CAP) hosts community events throughout the year that connect residents with local social service providers and nonprofit organizations.

### Community Connections Education

Community Connections is a one-time education class for customers participating in CAP. Topics include:

- » Understanding Your Bill
- » Energy and Water Conservation
- » Indoor Air Quality
- » Budgeting
- » Safety Hazards
- » Sources of Energy and Water
- » Reduce, Reuse, Recycle
- » Tenant Rights

### Community Connections Resource Fair

This annual event, hosted by CAP, connects customers with 100+ local organizations and nonprofits. Attendees can enjoy free food, games, and activities while learning about available services. CAP also participates in these local events:

- » National Night Out
- » HopeFest
- » La Feria
- » Boo the Flu
- » Women's Resource Fair
- » Shots for Tots

### Case Management

The CAP team provides one-on-one case management to help customers participating in Weatherization Assistance, the Medically Vulnerable Registry, and Arrearage Management.

Call 512-494-9400 for more information.

### Arrearage Management Program (AMP)

The Arrearage Management Program (AMP) helps City of Austin Utilities customers eliminate debt from past due utility bills. The City of Austin will apply partial payments over time if the customer pays the agreed upon monthly charges on or before the due date.

## Weatherization

Customers participating in the CAP Discount Program may automatically qualify for free home energy improvements through the Weatherization Assistance Program. Home energy improvements can help customers save energy and lower their utility bills. The program also provides customers with up to 18 months of follow-up services.

**Improvements may include**:
- » Attic insulation
- » Duct replacement or repair
- » Sealing around doors
- » Solar screens
- » Carbon monoxide and smoke detectors
- » High-efficiency lighting
- » Smart thermostat

To learn more, visit austinenergy.com/weatherization.

coautilities.com/go/cap

# Initial Modeling Results

## Austin Energy's Resource, Generation and Climate Protection Plan to 2035

*The following pages show data results associated with preliminary modeling efforts for the Resource, Generation and Climate Protection Plan to 2035.* ***These results do not reflect a recommendation, and they do not reflect a plan.*** *These results are for informational purposes only.*

*All modeling reflects the input assumptions coordinated with the Electric Utility Commission earlier this year.*

Customer Driven.
Community Focused.[SM]

AUSTIN ENERGY'S RESOURCE, GENERATION AND CLIMATE PROTECTION PLAN TO 2035

## WHAT DID YOU OBSERVE?

## WHAT SURPRISED YOU?

## WHAT QUESTIONS DO YOU HAVE?

## IF YOU COULD CHANGE SOMETHING AND THEN RE-RUN THE MODEL, WHAT WOULD IT BE?

# Reference Guide to Numbered Portfolios

| REF # | PORTFOLIO | DESCRIPTION |
|---|---|---|
| 1 | No New Commitments | Existing DSM commitments, no new generation |
| 2 | 2030 Current Plan | 100% Carbon-Free by 2035, 65% Renewables by 2027, existing DSM commitments, REACH on gas |
| 3 | Local Gen/Storage + Margin | **575 MW new local peakers and combined cycle starting 2027, 275 MW local storage,** 100% DNV projections*, replace PPAs, Decker/SHEC run through 2035 |
| 4 | Local Dispatchable + Margin | **1,100 MW new local peakers & combined cycle starting 2027**, 50% DNV projections, REACH on FPP, Decker/SHEC run through 2035 |
| 5 | Meet Env Goals + Expand DSM | **Retire Decker in 2027**, 100% DNV projections, 100% CF, 65% RE, REACH on gas, retire SHEC 2034 |
| 6 | Aggressive DSM + Storage + Keep PPAs | **Aggressive DNV projections**, **replace PPAs**,100% CF, REACH on gas, retire Decker/SHEC 2034 |
| 7 | Aggressive DSM + Storage + 65% RE Goal | **Aggressive DNV projections, 65% RE**, 100% CF, REACH on gas, retire Decker/SHEC 2034 |
| 8 | Hydrogen-Capable Local Plant | **1,100 MW local hydrogen-capable peakers starting in 2030**, 100% DNV projections, 100% CF, 65% RE, REACH on gas, retire Decker/SHEC 2034 |
| 9 | Hydrogen + Local Storage | **550 MW local hydrogen peakers, 395 MW local storage**, 100% DNV projections, 100% CF, 65% RE, REACH on gas, retire Decker/SHEC 2034 |
| 10 | Keep Existing Gas + Local Storage | **Decker/SHEC run past 2035**, **395 MW local storage**, 100% DNV projections, 65% RE, REACH on gas |
| 11 | Replace FPP in 2028 w/Gas | **FPP retire end of 2028, 575 MW new local peakers and combined cycle**, 100% DNV projections, 65% RE, REACH on FPP and gas |
| 12 | EUC – 1 (Working Group Recs) | **525 MW local storage, 700 MW local solar, 540 MW new EE, 300 MW DR, 100% RE as % of load,** 100% CF, REACH on gas, retire Decker/SHEC 2034 |
| 13 | EUC – 2 | **925 MW local storage**, aggressive DNV projections,100% RE as % of load, 100% CF, REACH on gas, retire Decker/SHEC 2034 |

*DNV projections refers to the quantities of Demand-Side Management (Demand Response, Energy Efficiency, and Local Solar) resulting from the market potential study performed by DNV Energy Insights

| Portfolio | Net Cost 20-yr NPV ($MM) | 2035 Bill Impact ($/Month) | 2035 Energy Burden (%) | Total Liquidity Need ($MM) | 2035 Reliability Risk Events 4+ Hours (Count) | 2035 Reliability Risk Hours (Hours) | Total $CO_2$ Emissions (Million Metric Tons) | Total NOx Emissions (Metric Tons) | Total SOx Emissions (Metric Tons) | Total PM Emissions (Metric Tons) |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | $9,771 | $38 | 3.7% | $1,291 | 9 | 165 | 14 | 1596 | 49 | 389 |
| 2 | $13,026 | $67 | 4.5% | $1,685 | 17 | 2,204 | 6 | 589 | 8 | 152 |
| 3 | $8,659 | $33 | 3.5% | $424 | 0 | 0 | 27 | 3016 | 88 | 761 |
| 4 | $7,336 | $21 | 3.2% | $365 | 0 | 0 | 40 | 8978 | 1036 | 869 |
| 5 | $13,029 | $68 | 4.5% | $1,657 | 20 | 2,115 | 6 | 599 | 7 | 153 |
| 6 | $12,913 | $68 | 4.5% | $1,643 | 25 | 2,141 | 6 | 584 | 4 | 150 |
| 7 | $13,053 | $69 | 4.5% | $1,445 | 24 | 2,136 | 6 | 573 | 4 | 148 |
| 8 | $10,629 | $43 | 3.8% | $653 | 0 | 3 | 9 | 1730 | 20 | 259 |
| 9 | $11,665 | $55 | 4.1% | $961 | 20 | 438 | 8 | 1355 | 17 | 235 |
| 10 | $12,155 | $56 | 4.1% | $549 | 4 | 41 | 6 | 650 | 4 | 554 |
| 11 | $9,273 | $35 | 3.6% | $359 | 0 | 0 | 25 | 5267 | 562 | 167 |
| 12 | $13,244 | $75 | 4.7% | $1,111 | 55 | 1,369 | 4 | 440 | 0 | 114 |
| 13 | $14,315 | $81 | 4.9% | $1,313 | 56 | 2,449 | 4 | 457 | 1 | 118 |

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| Portfolio | Net Cost 20-yr NPV | 2035 Bill Impact | 2035 Energy Burden | Total Liquidity Need | 2035 Reliability Risk Events 4+ hours | 2035 Reliability Risk Hours | Total $CO_2$ Emissions | Total NOx Emissions | Total SOx Emissions | Total PM Emissions |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 4 | 4 | 4 | 8 | 6 | 6 | 10 | 9 | 10 | 10 |
| 2 | 9 | 8 | 8 | 13 | 7 | 12 | 5 | 5 | 7 | 5 |
| 3 | 2 | 2 | 2 | 3 | 1 | 1 | 12 | 11 | 11 | 12 |
| 4 | 1 | 1 | 1 | 2 | 1 | 1 | 13 | 13 | 13 | 13 |
| 5 | 10 | 10 | 10 | 12 | 8 | 9 | 6 | 6 | 6 | 6 |
| 6 | 8 | 9 | 9 | 11 | 11 | 11 | 4 | 4 | 3 | 4 |
| 7 | 11 | 11 | 11 | 10 | 10 | 10 | 3 | 3 | 3 | 3 |
| 8 | 5 | 5 | 5 | 5 | 1 | 4 | 9 | 10 | 9 | 9 |
| 9 | 6 | 6 | 6 | 6 | 8 | 7 | 8 | 8 | 8 | 8 |
| 10 | 7 | 7 | 7 | 4 | 5 | 5 | 7 | 7 | 3 | 11 |
| 11 | 3 | 3 | 3 | 1 | 1 | 1 | 11 | 12 | 12 | 7 |
| 12 | 12 | 12 | 12 | 7 | 12 | 8 | 1 | 1 | 1 | 1 |
| 13 | 13 | 13 | 13 | 9 | 13 | 13 | 2 | 2 | 2 | 2 |

Ranks each portfolio 1-13 (1 = best, 13 = worst) within each output metric column

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| Portfolio | 1 - No New Commit-ments | 2 - 2030 Current Plan | 3 - Local Gen/ Storage + Margin | 4 - Local Dispatch-able + Margin | 5 - Meet Env Goals + Expand DSM | 6 - Aggressive DSM + Local Storage and Maintain Current RE Levels | 7 - Aggressive DSM + Local Storage and Meet 65% RE Goal | 8 - Hydrogen | 9 - Hydrogen + Storage | 10 - Keep Existing Gas + Storage | 11 - Replace FPP in 2028 w/ Gas | 12 - EUC- Workgroup Recs | 13 - EUC- Increase Batteries |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **RESOURCES** | | | | | | | | | | | | | |
| Non-Local Solar (New) | | 700 | 118 | | 700 | 118 | 700 | 700 | 700 | 700 | 700 | 1000 | 1000 |
| Non-Local Wind (New) | | 1100 | 932 | | 1100 | 932 | 1100 | 1100 | 1100 | 1100 | 1100 | 1500 | 1500 |
| NG CC | | | 225 | 600 | | | | | | | 225 | | |
| NG CT | | | 350 | 500 | | | | | | | 350 | | |
| NG-H2 CT | | | | | | | | 1100 | 550 | | | | |
| Local 2-hr | | | 25 | | | 25 | 25 | | 25 | 25 | | 25 | 25 |
| Local 4-hr | | | 100 | | | 100 | 100 | | 100 | 100 | | 200 | 360 |
| Local 12-hr | | | 150 | | | 150 | 150 | | 150 | 150 | | 300 | 540 |
| Local 100-hr | | | | | | 120 | 120 | | 120 | 120 | | | |
| Decker CT | 200 | | 200 | 200 | | | | | | 200 | 200 | | |
| Sand Hill CC | 315 | | 315 | 315 | | | | | | 315 | 315 | | |
| Sand Hill CT | 280 | | 280 | 280 | | | | | | 280 | 280 | | |
| FPP Coal | | | | | | | | | | | | | |
| STP Nuke | 430 | 430 | 430 | 430 | 430 | 430 | 430 | 430 | 430 | 430 | 430 | 430 | 430 |
| NAC Biomass | 105 | 105 | 105 | 105 | 105 | 105 | 105 | 105 | 105 | 105 | 105 | 105 | 105 |
| Non-Local Wind | 864 | 864 | 864 | 864 | 864 | 864 | 864 | 864 | 864 | 864 | 864 | 864 | 864 |
| Non-Local Solar | 826 | 826 | 826 | 826 | 826 | 826 | 826 | 826 | 826 | 826 | 826 | 826 | 826 |
| Customer-Sited Solar | 290 | 290 | 371 | 330 | 371 | 439 | 439 | 371 | 371 | 371 | 371 | 640 | 371 |
| Community Solar | 42 | 42 | 60 | 51 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 |
| Demand Response | 120 | 120 | 270 | 195 | 270 | 325 | 325 | 270 | 270 | 270 | 270 | 300 | 270 |
| Energy Efficiency | 360 | 360 | 360 | 360 | 360 | 360 | 360 | 360 | 360 | 360 | 360 | 540 | 360 |

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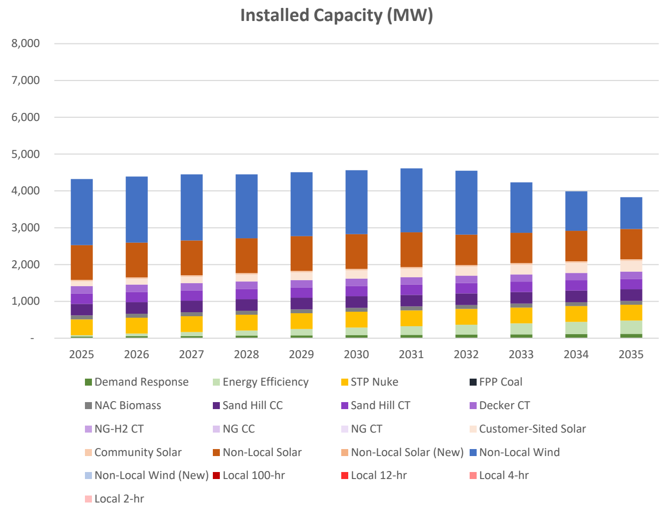
# Portfolio #1 – No New Commitments

| Output Metric | Value | Rank |
| --- | --- | --- |
| NPV Net Cost ($millions) (Normal/Avg of Scenarios) | $7,934/ $9,771 | 4 |
| 2035 Bill Increase ($/Month) | $38 | 4 |
| Liquidity Risk | $1.3B | 8 |
| Reliability Risk Hours (2035) | 165 | 6 |
| Total $CO_2$ (Million Metric Tons) | 14.3 | 10 |
| Total NOx (Metric Tons) | 1,596 | 9 |

- FPP Retires: 2024
- Decker/SHEC Retire: Past 2035
- New Local Solar* (MW): 332
- New Local Storage (MW): 0
- New Local Gas (MW): 0
- DSM Projection: Existing commitments
- RE Goal: Not included
- 100% Carbon-Free Goal : No

*includes existing commitments

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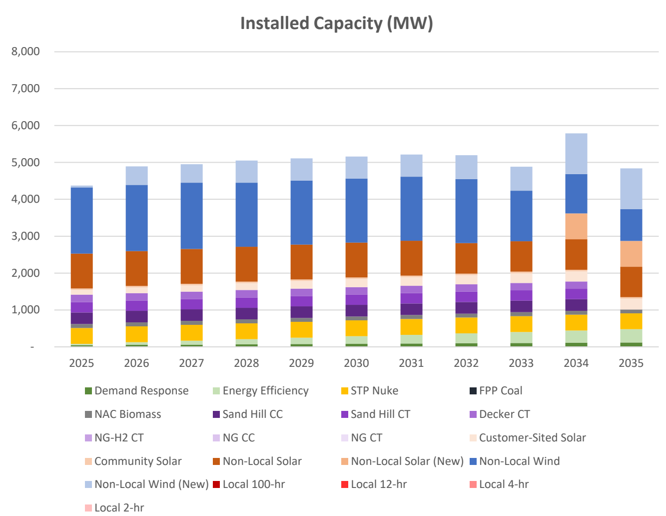
# Portfolio #2 – Meet 2030 Plan

| Output Metric | Value | Rank |
| --- | --- | --- |
| NPV Net Cost ($millions) (Normal/Avg of Scenarios) | $10,509/ $13,026 | 9 |
| 2035 Bill Increase ($/Month) | $67 | 8 |
| Liquidity Risk | $1.69B | 13 |
| Reliability Risk Hours (2035) | 2,204 | 12 |
| Total $CO_2$ (Million Metric Tons) | 5.8 | 5 |
| Total NOx (Metric Tons) | 589 | 5 |

- FPP Retires: 2024
- Decker/SHEC Retire: 2034
- New Local Solar* (MW): 332
- New Local Storage (MW): 0
- New Local Gas (MW): 0
- DSM Projection: Existing commitments
- RE Goal: 65%
- 100% Carbon-Free Goal: Yes

*includes existing commitments

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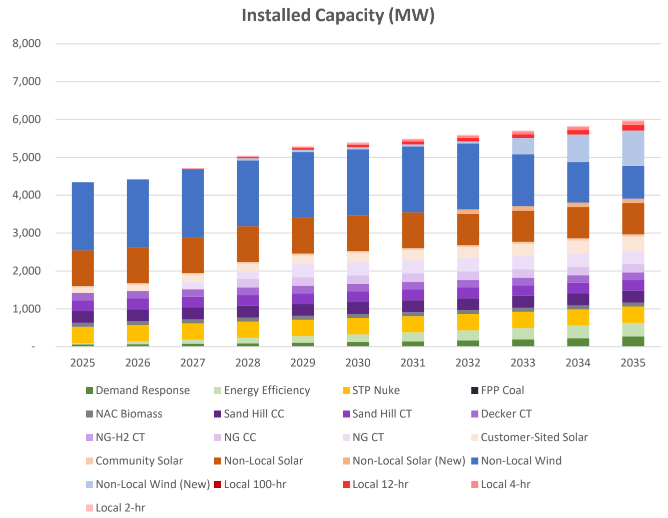
# Portfolio #3 – Local Gen/Storage + Margin

| Output Metric | Value | Rank |
|---|---|---|
| NPV Net Cost ($millions) (Normal/Avg of Scenarios) | $7,628/ $8,659 | 2 |
| 2035 Bill Increase ($/Month) | $33 | 2 |
| Liquidity Risk | $424M | 3 |
| Reliability Risk Hours (2035) | 0 | 1 |
| Total $CO_2$ (Million Metric Tons) | 26.6 | 12 |
| Total NOx (Metric Tons) | 3,016 | 11 |

- FPP Retires: 2024
- Decker/SHEC Retire: Past 2035
- New Local Solar* (MW): 431
- New Local Storage (MW): 275
- New Local Gas (MW): 575
- DSM Projection: DNV Study
- RE Goal: Replace PPAs
- 100% Carbon-Free Goal: No

*includes existing commitments

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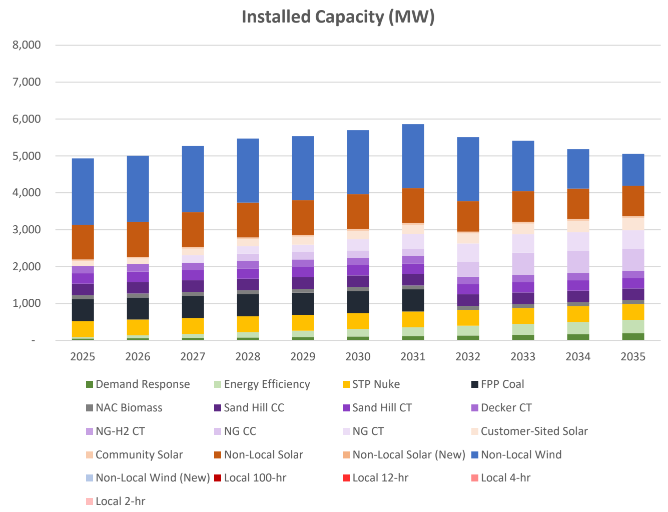
# Portfolio #4 – Local Dispatchable + Margin

| Output Metric | Value | Rank |
|---|---|---|
| NPV Net Cost ($millions) (Normal/Avg of Scenarios) | $6,696/ $7,336 | 1 |
| 2035 Bill Increase ($/Month) | $21 | 1 |
| Liquidity Risk | $365M | 2 |
| Reliability Risk Hours (2035) | 0 | 1 |
| Total $CO_2$ (Million Metric Tons) | 40.4 | 13 |
| Total NOx (Metric Tons) | 8,978 | 13 |

- FPP Retires: 2031
- Decker/SHEC Retire: Past 2035
- New Local Solar* (MW): 381
- New Local Storage (MW): 0
- New Local Gas (MW): 1,100
- DSM Projection: 50% DNV Study
- RE Goal: Not included
- 100% Carbon-Free Goal: No

*includes existing commitments

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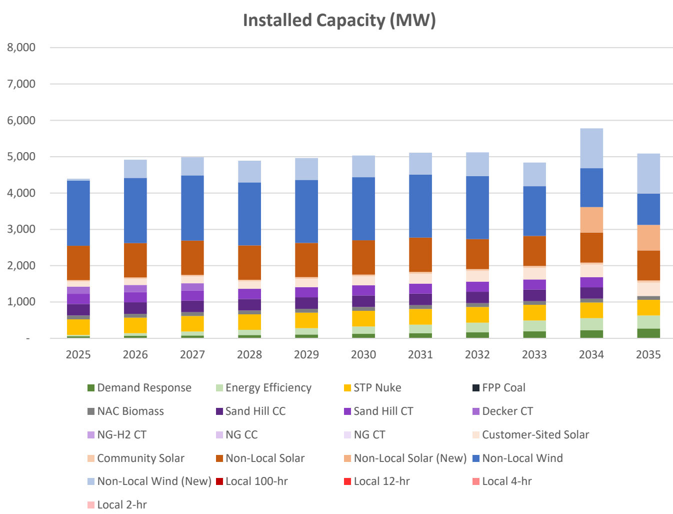
# Portfolio #5 – Meet Env Goals + Expand DSM

| Output Metric | Value | Rank |
|---|---|---|
| NPV Net Cost ($millions) (Normal/Avg of Scenarios) | $10,480/ $13,029 | 10 |
| 2035 Bill Increase ($/Month) | $68 | 10 |
| Liquidity Risk | $1.66B | 12 |
| Reliability Risk Hours (2035) | 2115 | 9 |
| Total $CO_2$ (Million Metric Tons) | 5.8 | 6 |
| Total NOx (Metric Tons) | 599 | 6 |

- FPP Retires: 2024
- Decker/SHEC Retire: 2027/2034
- New Local Solar* (MW): 431
- New Local Storage (MW): 0
- New Local Gas (MW): 0
- DSM Projection: DNV Study
- RE Goal: 65%
- 100% Carbon-Free Goal: Yes

*includes existing commitments



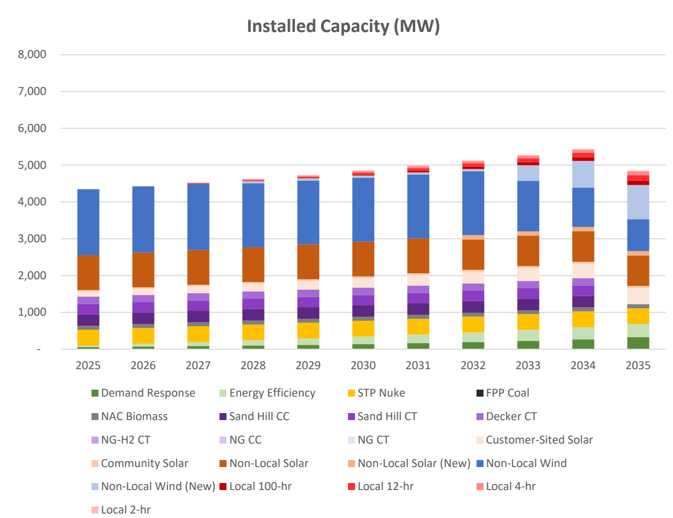



# Portfolio #6 - Aggressive DSM + Storage + Keep PPAs

| Output Metric | Value | Rank |
|---|---|---|
| NPV Net Cost ($millions) (Normal/Avg of Scenarios) | $10,355/ $12,913 | 8 |
| 2035 Bill Increase ($/Month) | $68 | 9 |
| Liquidity Risk | $1.64B | 11 |
| Reliability Risk Hours (2035) | 2141 | 11 |
| Total $CO_2$ (Million Metric Tons) | 5.7 | 4 |
| Total NOx (Metric Tons) | 584 | 4 |

- FPP Retires: 2024
- Decker/SHEC Retire: 2034
- New Local Solar* (MW): 499
- New Local Storage (MW): 395
- New Local Gas (MW): 0
- DSM Projection: DNV Study+
- RE Goal: Replace PPAs
- 100% Carbon-Free Goal: Yes

*includes existing commitments



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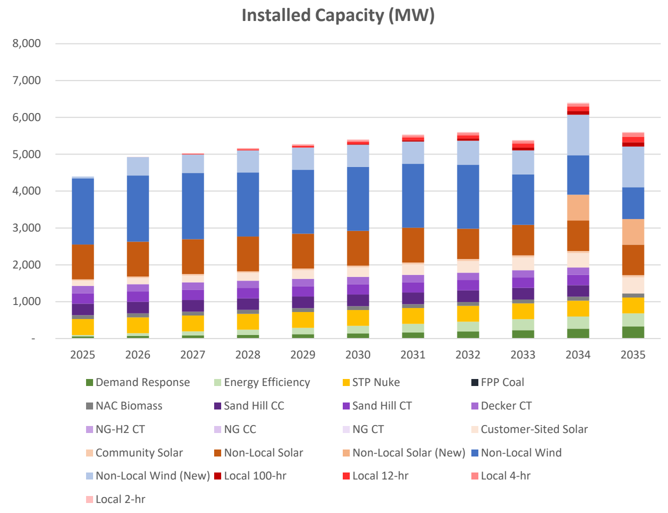
# Portfolio #7 – Aggressive DSM + Storage + 65% RE

| Output Metric | Value | Rank |
|---|---|---|
| NPV Net Cost ($millions) (Normal/Avg of Scenarios) | $10,552/ $13,053 | 11 |
| 2035 Bill Increase ($/Month) | $69 | 11 |
| Liquidity Risk | $1.45B | 10 |
| Reliability Risk Hours (2035) | 2136 | 10 |
| Total $CO_2$ (Million Metric Tons) | 5.6 | 3 |
| Total NOx (Metric Tons) | 573 | 3 |

- FPP Retires: 2024
- Decker/SHEC Retire: 2034
- New Local Solar* (MW): 499
- New Local Storage (MW): 395
- New Local Gas (MW): 0
- DSM Projection: DNV Study+
- RE Goal: 65%
- 100% Carbon-Free Goal: Yes

*includes existing commitments

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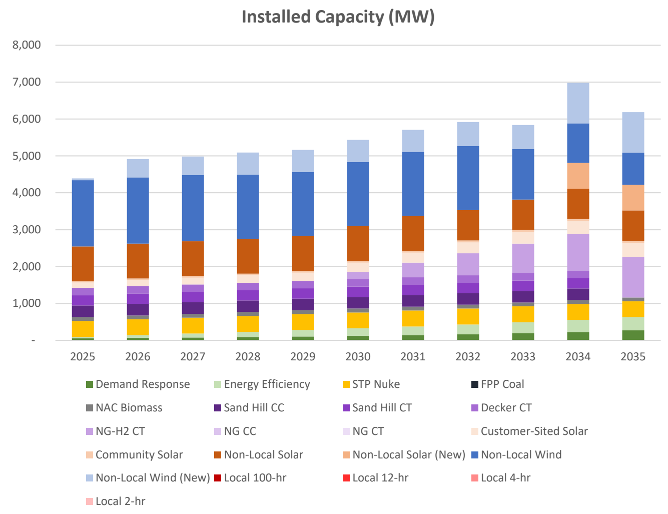
# Portfolio #8 – Hydrogen-Capable Local Plant

| Output Metric | Value | Rank |
|---|---|---|
| NPV Net Cost ($millions) (Normal/Avg of Scenarios) | $8,874/ $10,629 | 5 |
| 2035 Bill Increase ($/Month) | $43 | 5 |
| Liquidity Risk | $653M | 5 |
| Reliability Risk Hours (2035) | 3 | 4 |
| Total $CO_2$ (Metric Tons) | 9.0 | 9 |
| Total NOx (Metric Tons) | 1,730 | 10 |

- FPP Retires: 2024
- Decker/SHEC Retire: 2034
- New Local Solar* (MW): 431
- New Local Storage (MW): 0
- New Local Gas (MW): 0
- DSM Projection: 100% DNV Study
- RE Goal: 65%
- 100% Carbon-Free Goal: Yes

*includes existing commitments

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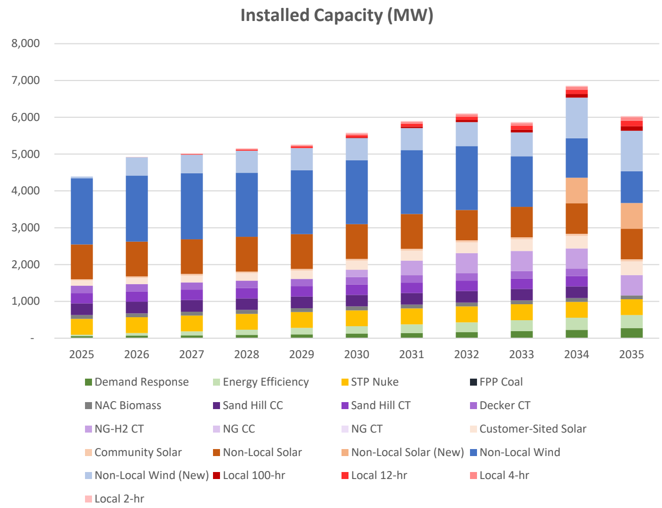
# Portfolio #9 – Hydrogen + Local Storage

| Output Metric | Value | Rank |
|---|---|---|
| NPV Net Cost ($millions) (Normal/Avg of Scenarios) | $9,595/ $11,665 | 6 |
| 2035 Bill Increase ($/Month) | $55 | 6 |
| Liquidity Risk | $961M | 6 |
| Reliability Risk Hours (2035) | 438 | 7 |
| Total $CO_2$ (Metric Tons) | 8.2 | 8 |
| Total NOx (Metric Tons) | 1,355 | 8 |

- FPP Retires: 2024
- Decker/SHEC Retire: 2034
- New Local Solar* (MW): 431
- New Local Storage (MW): 395
- New Local Gas (MW): 0
- DSM Projection: 100% DNV Study
- RE Goal: 65%
- 100% Carbon-Free Goal: Yes

*includes existing commitments

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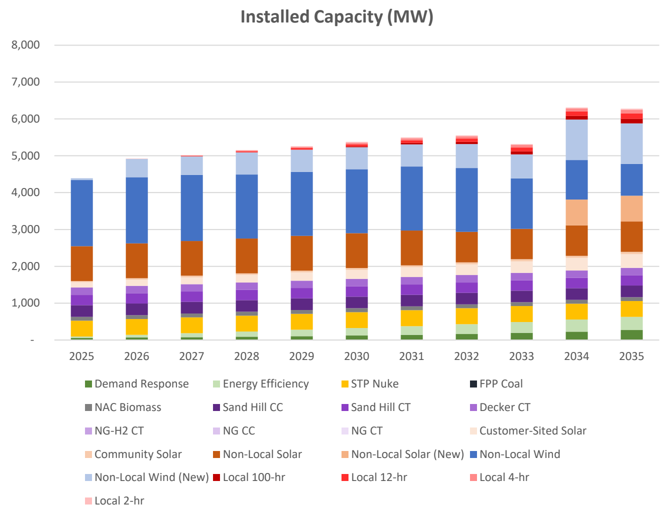
# Portfolio #10 – Keep Existing Gas + Local Storage

| Output Metric | Value | Rank |
|---|---|---|
| NPV Net Cost ($millions) (Normal/Avg of Scenarios) | $9,823/ $12,155 | 7 |
| 2035 Bill Increase ($/Month) | $56 | 7 |
| Liquidity Risk | $549M | 4 |
| Reliability Risk Hours (2035) | 41 | 5 |
| Total $CO_2$ (Metric Tons) | 6.3 | 7 |
| Total NOx (Metric Tons) | 650 | 7 |

- FPP Retires: 2024
- Decker/SHEC Retire: After 2035
- New Local Solar* (MW): 431
- New Local Storage (MW): 395
- New Local Gas (MW): 0
- DSM Projection: 100% DNV Study
- RE Goal: 65%
- 100% Carbon-Free Goal: No

*includes existing commitments

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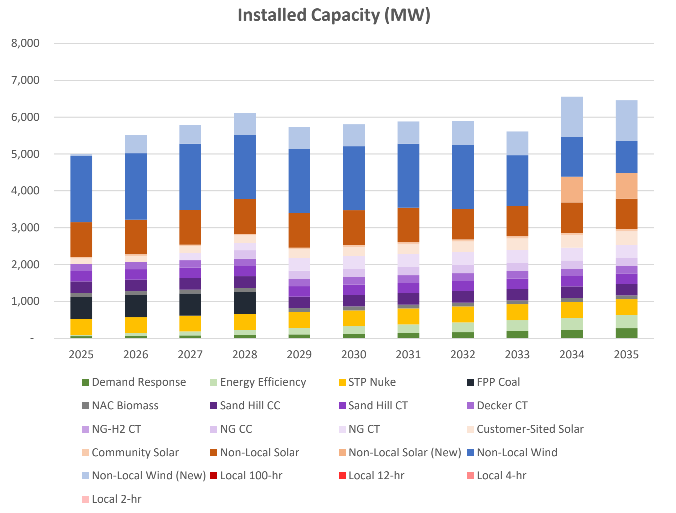
# Portfolio #11 – Replace FPP in 2028 w/ Gas

| Output Metric | Value | Rank |
|---|---|---|
| NPV Net Cost ($millions) (Normal/Avg of Scenarios) | $8,033/ $9,273 | 3 |
| 2035 Bill Increase ($/Month) | $35 | 3 |
| Liquidity Risk | $359M | 1 |
| Reliability Risk Hours (2035) | 0 | 1 |
| Total $CO_2$ (Metric Tons) | 24.5 | 11 |
| Total NOx (Metric Tons) | 5,267 | 12 |

- FPP Retires: 2028
- Decker/SHEC Retire: Past 2035
- New Local Solar* (MW): 431
- New Local Storage (MW): 0
- New Local Gas (MW): 575
- DSM Projection: 100% DNV Study
- RE Goal: 65%
- 100% Carbon-Free Goal: No

*includes existing commitments

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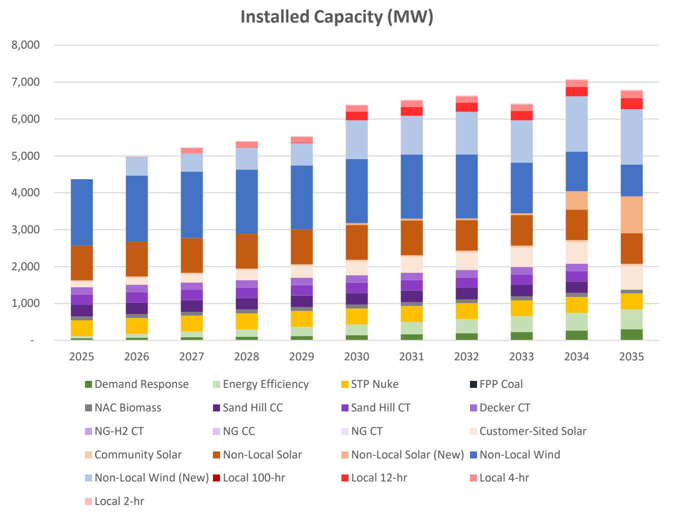
# Portfolio #12 – EUC Working Group

| Output Metric | Value | Rank |
|---|---|---|
| NPV Net Cost ($millions) (Normal/Avg of Scenarios) | $10,858/ $13,244 | 12 |
| 2035 Bill Increase ($/Month) | $75 | 12 |
| Liquidity Risk | $1.11B | 7 |
| Reliability Risk Hours (2035) | 1,369 | 8 |
| Total $CO_2$ (Metric Tons) | 4.3 | 1 |
| Total NOx (Metric Tons) | 440 | 1 |

- FPP Retires: 2024
- Decker/SHEC Retire: 2034
- New Local Solar* (MW): 700 [1]
- New Local Storage (MW): 525
- New Local Gas (MW): 0
- DSM Projection: DNV Study+ [1]
- RE Goal: 100% of load
- 100% Carbon-Free Goal: Yes

*includes existing commitments




[1] Outside upper bound of DNV Market Potential Study

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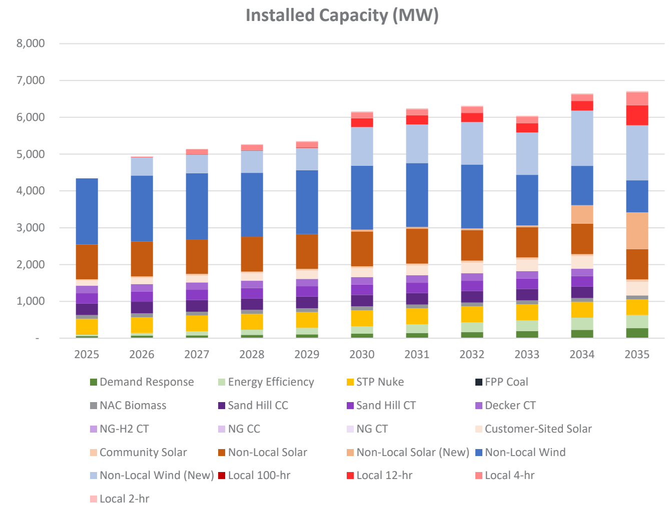
# Portfolio #13 – Increase Local Storage

| Output Metric | Value | Rank |
|---|---|---|
| NPV Net Cost ($millions) (Normal/Avg of Scenarios) | $11,647/ $14,315 | 13 |
| 2035 Bill Increase ($/Month) | $81 | 13 |
| Liquidity Risk | $1.31B | 9 |
| Reliability Risk Hours (2035) | 2,449 | 13 |
| Total $CO_2$ (Metric Tons) | 4.4 | 2 |
| Total NOx (Metric Tons) | 457 | 2 |

- FPP Retires: 2028
- Decker/SHEC Retire: 2034
- New Local Solar* (MW): 431
- New Local Storage (MW): 925
- New Local Gas (MW): 0
- DSM Projection: 100% DNV Study
- RE Goal: 100% of load
- 100% Carbon-Free Goal: Yes

*includes existing commitments

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# Portfolio Modeling Results

## Austin Energy Resource, Generation and Climate Protection Plan to 2035


Michael Enger

Vice President, Energy Market Operations & Resource Planning


September 30, 2024



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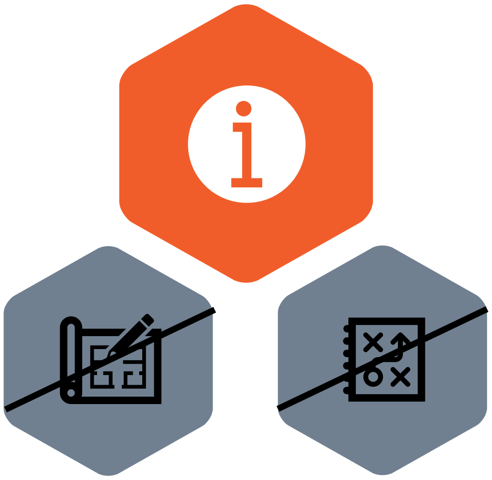
# Important Context for this Discussion



## Models provide information

**not a specific plan or recommendation**

The following slides show data results associated with preliminary modeling efforts for the Resource, Generation and Climate Protection Plan to 2035. **These results do not reflect a recommendation, and they do not reflect a plan.** These results are for informational purposes only. All modeling reflects the input assumptions coordinated with the Electric Utility Commission earlier this year.

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# Reference Guide to Numbered Portfolios

| REF # | PORTFOLIO | DESCRIPTION |
|---|---|---|
| 1 | No New Commitments | Existing DSM commitments, no new generation |
| 2 | 2030 Current Plan | 100% Carbon-Free by 2035, 65% Renewables by 2027, existing DSM commitments, REACH on gas |
| 3 | Local Gen/Storage + Margin | **575 MW new local peakers and combined cycle starting 2027, 275 MW local storage,** 100% DNV projections*, replace PPAs, Decker/SHEC run through 2035 |
| 4 | Local Dispatchable + Margin | **1,100 MW new local peakers & combined cycle starting 2027**, 50% DNV projections, REACH on FPP, Decker/SHEC run through 2035 |
| 5 | Meet Env Goals + Expand DSM | **Retire Decker in 2027**, 100% DNV projections, 100% CF, 65% RE, REACH on gas, retire SHEC 2034 |
| 6 | Aggressive DSM + Storage + Keep PPAs | **Aggressive DNV projections**, **replace PPAs,**100% CF, REACH on gas, retire Decker/SHEC 2034 |
| 7 | Aggressive DSM + Storage + 65% RE Goal | **Aggressive DNV projections, 65% RE**, 100% CF, REACH on gas, retire Decker/SHEC 2034 |
| 8 | Hydrogen-Capable Local Plant | **1,100 MW local hydrogen-capable peakers starting in 2030**, 100% DNV projections, 100% CF, 65% RE, REACH on gas, retire Decker/SHEC 2034 |
| 9 | Hydrogen + Local Storage | **550 MW local hydrogen peakers, 395 MW local storage**, 100% DNV projections, 100% CF, 65% RE, REACH on gas, retire Decker/SHEC 2034 |
| 10 | Keep Existing Gas + Local Storage | **Decker/SHEC run past 2035, 395 MW local storage**, 100% DNV projections, 65% RE, REACH on gas |
| 11 | Replace FPP in 2028 w/Gas | **FPP retire end of 2028, 575 MW new local peakers and combined cycle**, 100% DNV projections, 65% RE, REACH on FPP and gas |
| 12 | EUC – 1 (Working Group Recs) | **525 MW local storage, 700 MW local solar, 540 MW new EE, 300 MW DR, 100% RE as % of load,** 100% CF, REACH on gas, retire Decker/SHEC 2034 |
| 13 | EUC – 2 | **925 MW local storage**, aggressive DNV projections,100% RE as % of load, 100% CF, REACH on gas, retire Decker/SHEC 2034 |

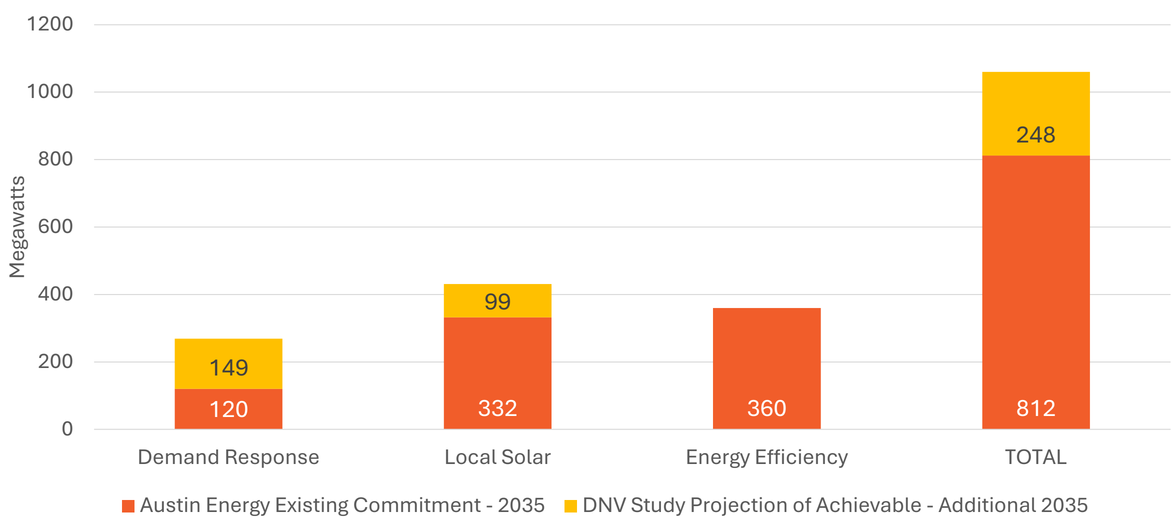
*DNV projections refers to the quantities of Demand-Side Management (Demand Response, Energy Efficiency, and Local Solar) resulting from the market potential study performed by DNV Energy Insights

# Glossary of Terms

| Term | Definition |
|---|---|
| Ascend Analytics | Consultant currently providing additional modeling support – Ascend's modeling uses the same set of inputs and assumptions as AE's UPLAN modeling, but the main difference in their approach is that their software designs optimized portfolios based on constraints and UPLAN relies on the modeling team to design the portfolios |
| DNV Study | DNV is a consultant that is currently working on a demand-side management market potential study for Austin Energy – preliminary data from DNV related to Austin's market potential for additional local solar, demand response and energy efficiency is included in the modeling – "100% of DNV study" indicates that a portfolio includes 100% of the additional DSM savings based on DNV's data |
| Local Congestion | When transmission lines that bring power into the Austin Energy service territory begin to reach their maximum carrying capacity, they experience "congestion" which can cause cost increases and potential reliability issues |
| Local vs. Non-Local Generation | An asset is considered "local" generation if it is physically located within the Austin Energy service territory – this is important in the context of relieving "local congestion" (see definition above) |
| Portfolios | A specific mix of electricity generation and demand-side management resources year by year over the modeling period of 2025-2035, provided in MW capacity |
| Scenarios | Different possible future worlds with different kinds of stressors (extreme events, local congestion, ERCOT market rule changes) that test each portfolio's performance in that future through modeling |
| UPLAN | Modeling software used by Austin Energy to simulate how a portfolio of resources will perform operationally and financially under projected normal conditions and in various future states (scenarios) |

# Demand-Side Management 2035

## Austin Energy 2035 Commitments & Market Penetration Study Projections




*Note: All new MW capacity figures provided in graph represent cumulative additions projected by 2035. Energy Efficiency figures do not include pre-2024 installations (~828 MW).*

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# Portfolio Comparison – Financial Impacts

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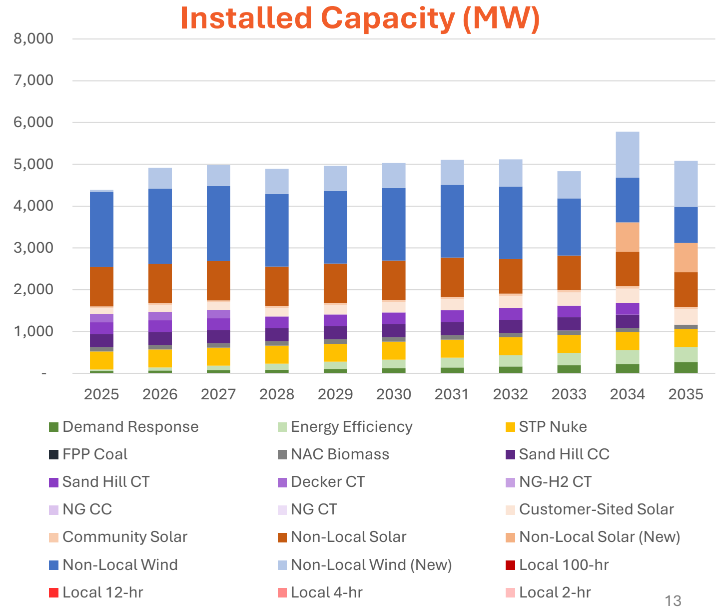
# Portfolio #5 – Meet Environment Goals + Expand DSM

| Output Metric | Value | Rank |
|---|---|---|
| NPV Net Cost ($millions) (Normal/Avg of Scenarios) | $10,480/ $13,029 | 10 |
| 2035 Bill Increase ($/Month) | $68.30 | 10 |
| Liquidity Risk | $1.66B | 12 |
| Reliability Risk Hours (2035) | 2115 | 9 |
| Total $CO_2$ (Million Metric Tons) | 5.8 | 6 |
| Total NOx (Metric Tons) | 599 | 6 |

- FPP Retires: 2024
- Decker/SHEC Retire: 2027/2034
- New Local Solar* (MW): 431
- New Local Storage (MW): 0
- New Local Gas (MW): 0
- DSM Projection: DNV Study
- RE Goal: 65%
- 100% Carbon-Free Goal: Yes

*includes existing commitments

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## Net Cost

- "Net Cost" = Total capital + O&M costs to generate power – Total revenue from sale of power for a given portfolio mix.
- Capital costs for new assets amortized (spread out evenly) over expected life of asset.
- O&M costs include fuel, personnel, regular maintenance, etc.
- To compare a single "Net Cost" value across portfolios we use the Net Present Value (NPV) of the annual net costs for the 20-year period 2025-2045 using 7.8% discount rate.

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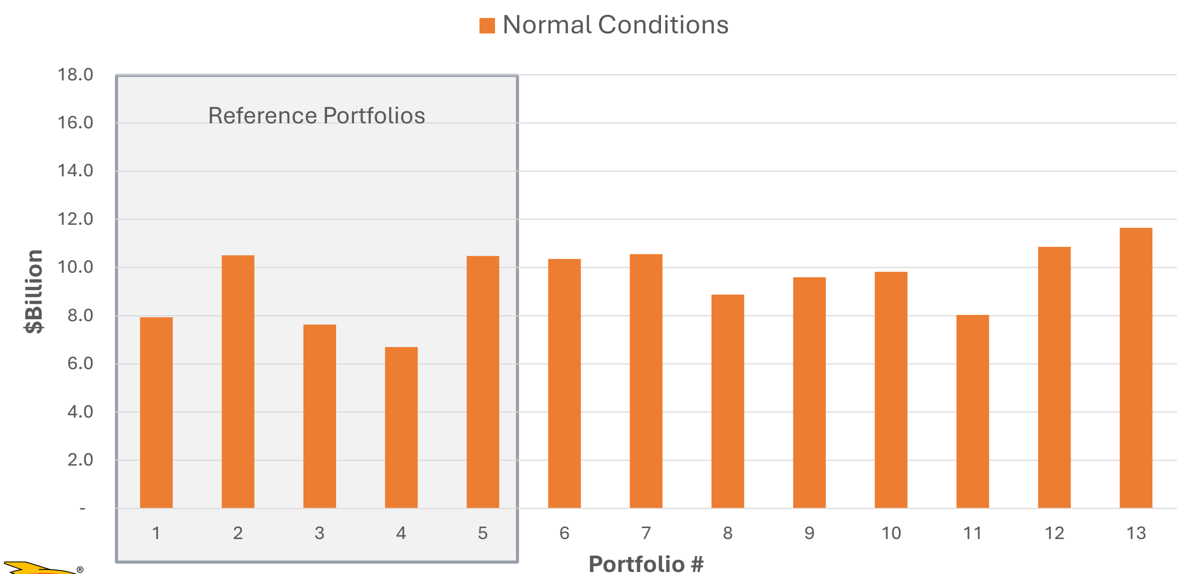
## Net Present Value of 20-Yr Annual Net Costs

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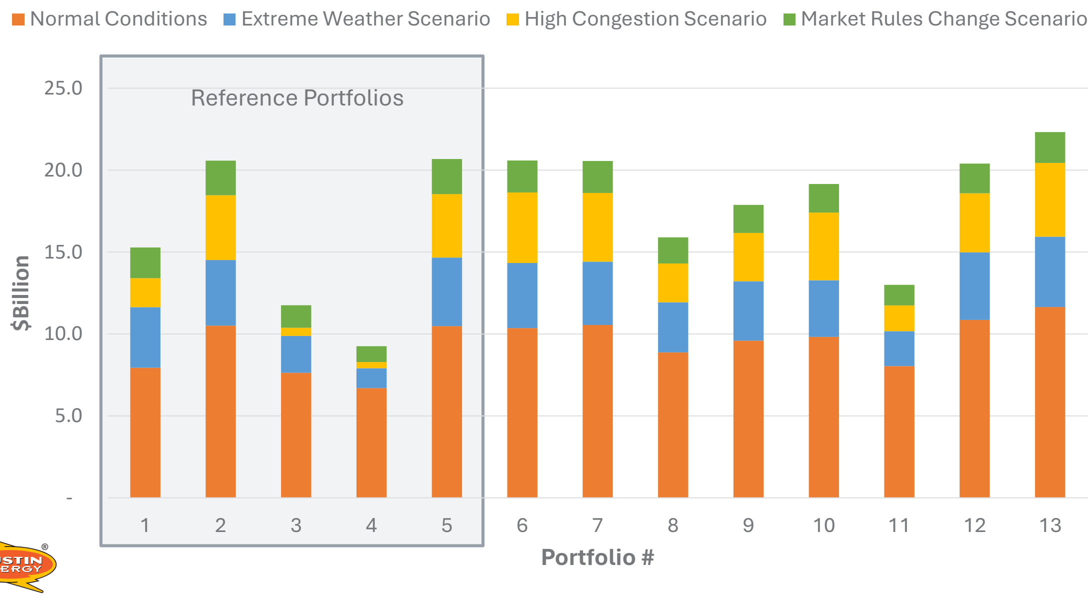
## Net Present Value of 20-Yr Annual Net Costs

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## Bill Impact

- "Average Monthly Residential Bill Increase" = expected increase in a typical Austin Energy residential customer's monthly electricity bill in 2035 compared with today due to the additional net costs associated with the generation portfolio only.
- Based on the "Net Cost" of each portfolio.
- Does not account for any other new or required AE capital or O&M costs in the future.

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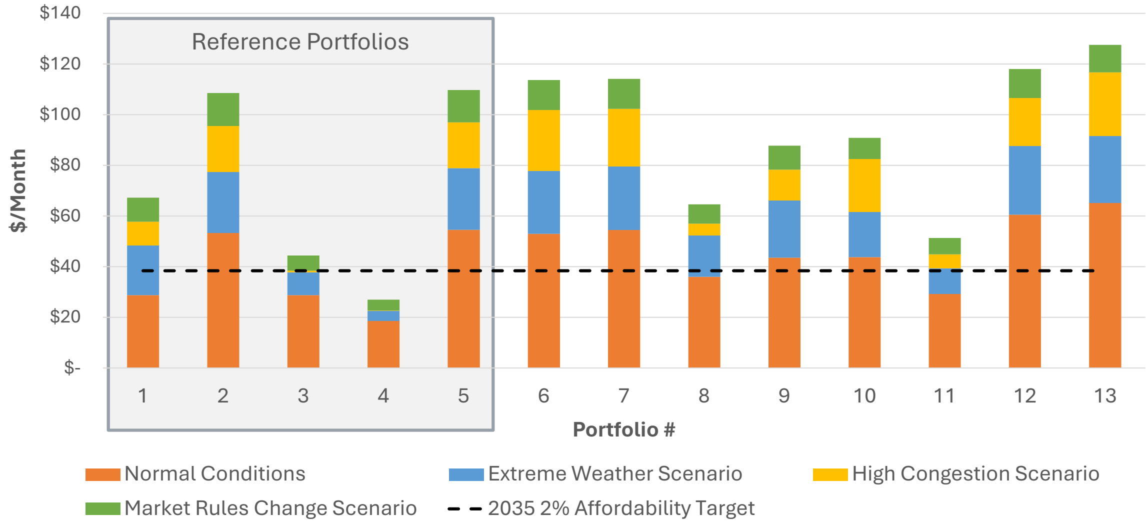
# 2035 Average Monthly Residential Bill Increase




**DISCLAIMER:** These are representative results based on modeling for the 2035 Resource Generation Plan and are not projections of Austin Energy's future prices. The results are not inclusive of factors beyond the scope of this Resource Generation Plan modeling.

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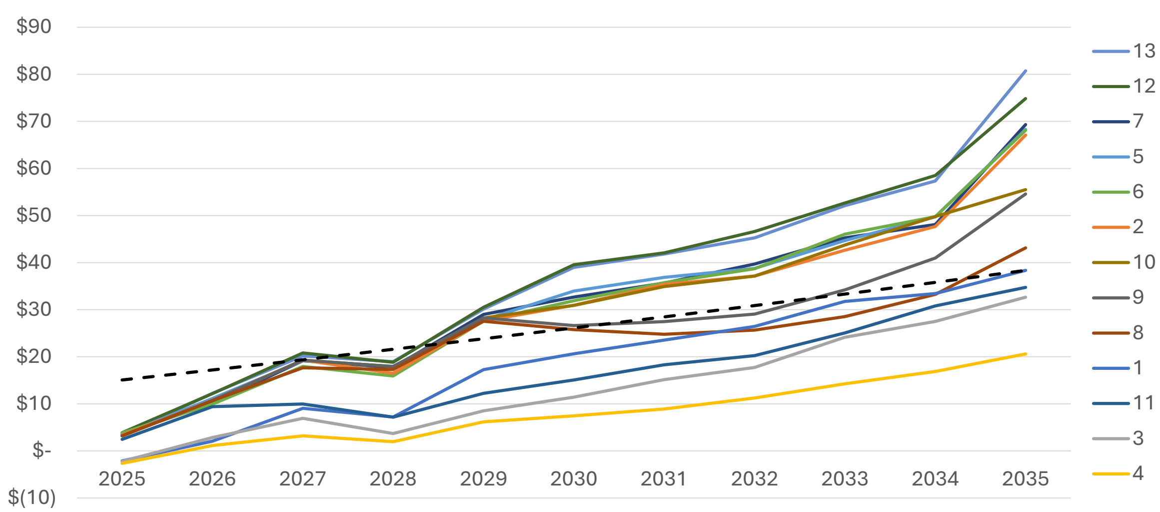
# Avg. Monthly Bill Impact by Year – Avg. of All Scenarios




**DISCLAIMER:** These are representative results based on modeling for the 2035 Resource Generation Plan and are not projections of Austin Energy's future prices. The results are not inclusive of factors beyond the scope of this Resource Generation Plan modeling.

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# Electricity Burden

- "Electricity Burden" is the percentage of a household's monthly income that goes toward their electricity bill
- A higher percentage of income dedicated to electricity costs indicates a higher "electricity burden" for that household
- For this analysis AE estimates the electricity burden for a typical customer in its Customer Assistance Program (CAP) using the 2023 Federal Poverty Income guidelines as a reference for estimated annual income

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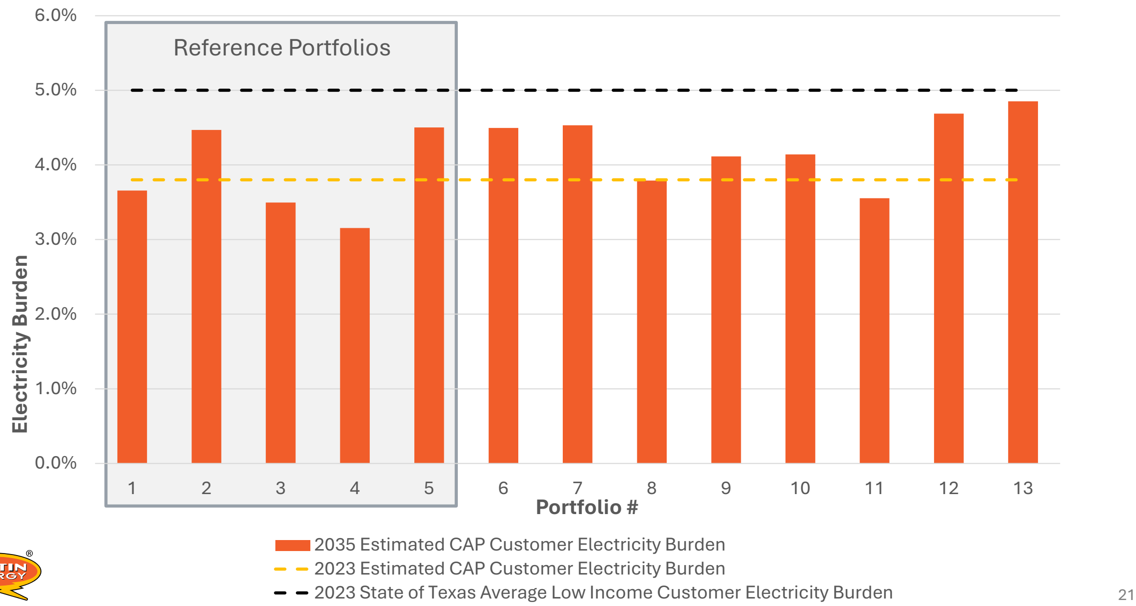
# 2035 Estimated Customer Assistance Program (CAP) Customer Electricity Burden (Avg of Scenarios)

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# Liquidity Risk

- "Liquidity Risk" = Risk to Austin Energy of not having enough cash on-hand to settle financial account with ERCOT after an extreme event.
- Uses a modeling technique called "backcasting" to estimate how a portfolio of resources would have performed financially during an event similar to Winter Storm Uri.
- During an extreme event, ERCOT prices can spike – Austin Energy must purchase power from ERCOT to cover local load – if Austin Energy does not sell enough electricity at the same prices to cover expense, it must pay the difference to ERCOT immediately.
- Based on portfolio mix in 2035.

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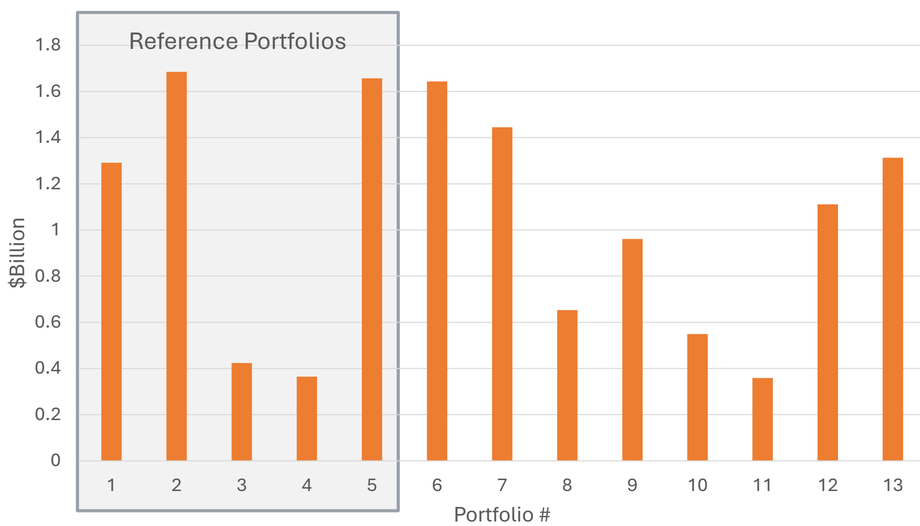
# Stress Test Results – Total Liquidity Risk

## Based on 2035 portfolio mix

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# Portfolio Comparison - Reliability Impacts

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## Reliability Risk Hours

- "Reliability Risk Hours" = total number of hours in a given year that the model predicts there will be increased risk of local outages.
- Local outages in this case are a result of not enough electricity physically available to meet Austin's load.
- Can be caused by high local load, decrease in local power generation, decrease in import capacity, or a combination of these factors.

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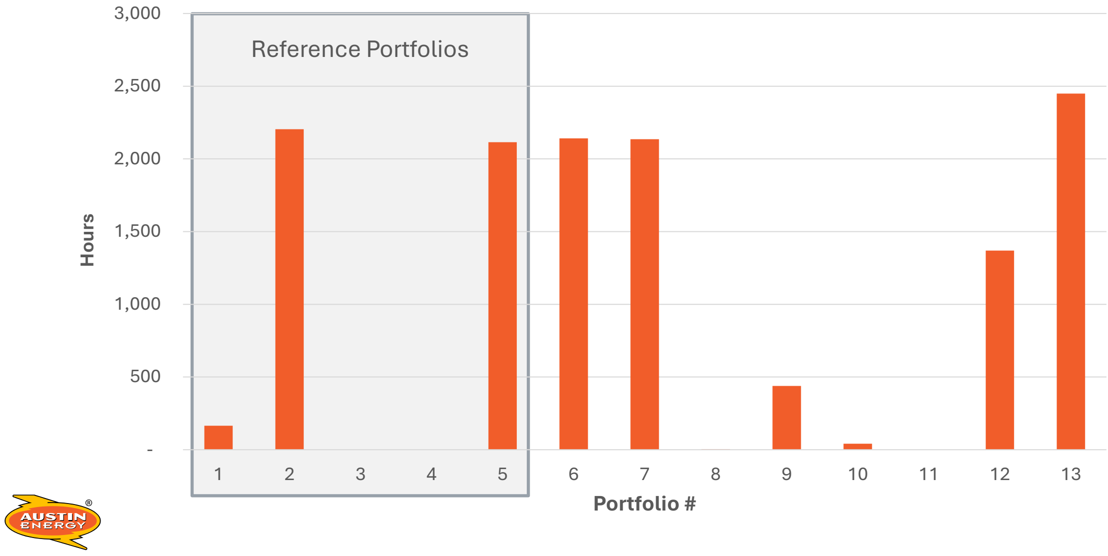
## 2035 Reliability Risk Hours

One year = 8,760 hours

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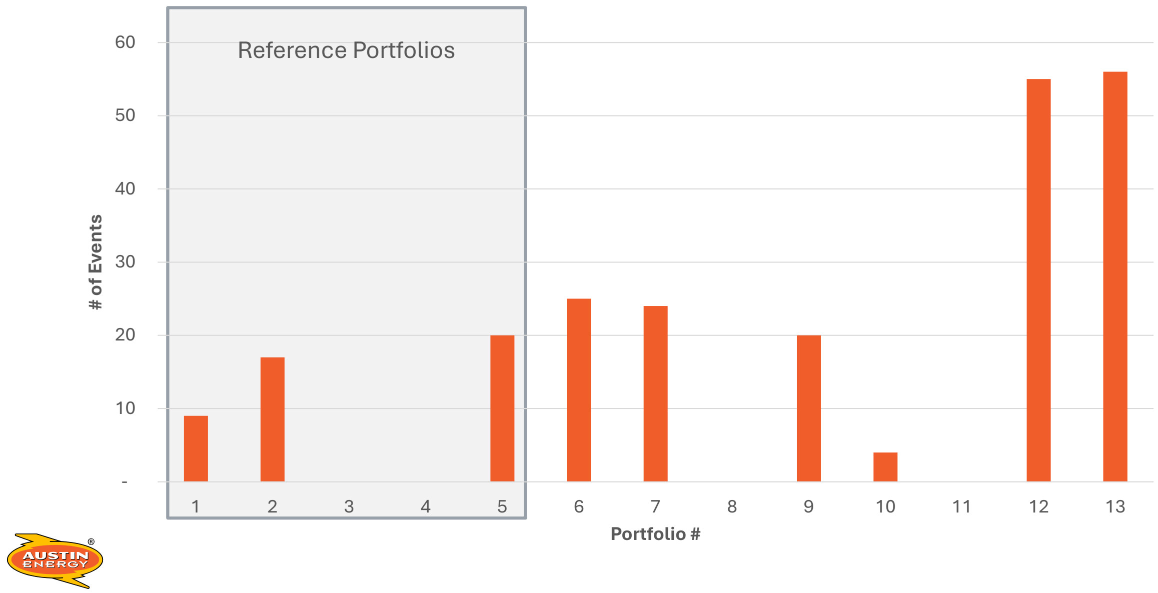
## 2035 Reliability Risk Events of 4,6 or 8 Hours

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# Portfolio Comparison – Emission Impacts

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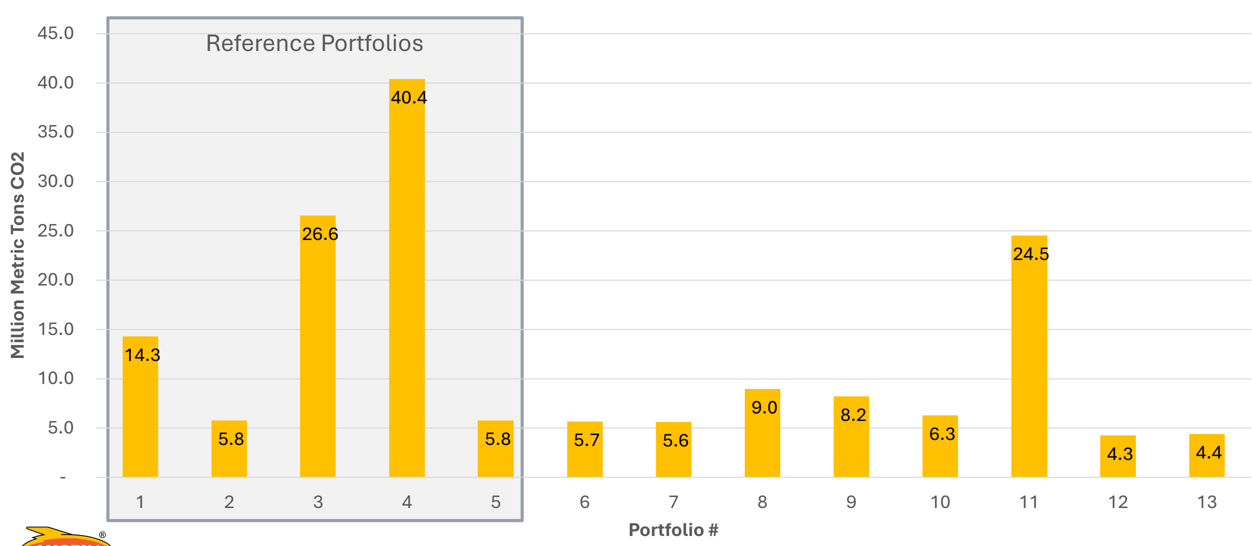
# Total $CO_2$ Emissions (Million Metric Tons)

2025-2035

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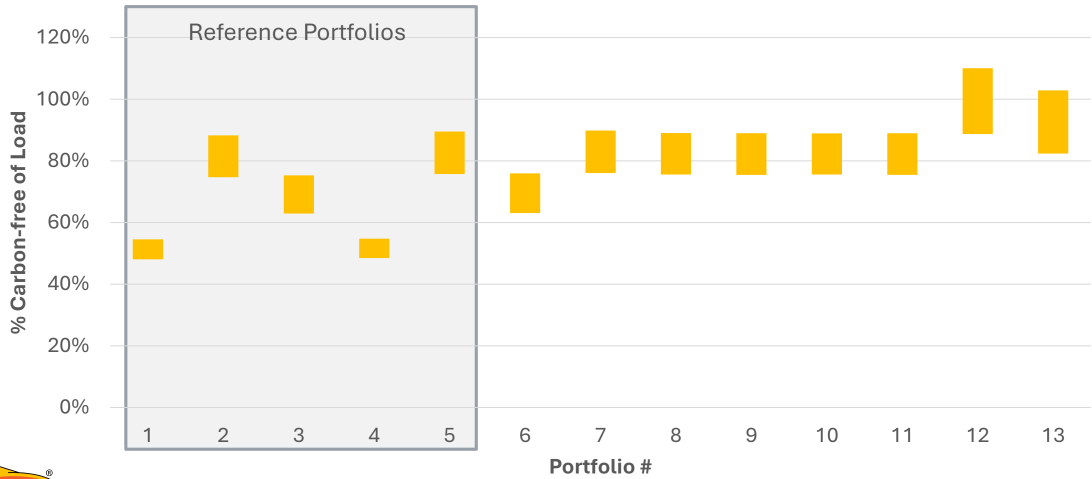
## Percent of Load Matched with Carbon-Free Energy in 2035

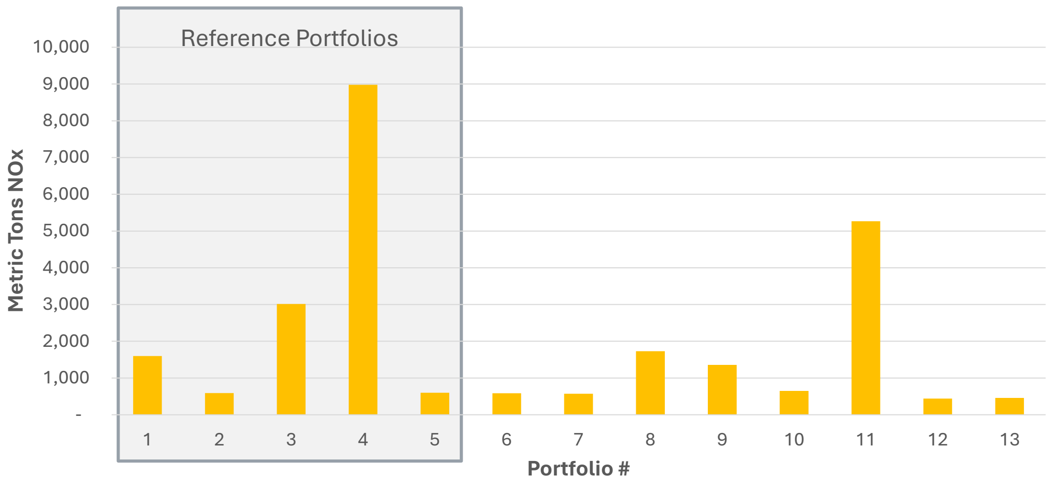
Range Accounts for Curtailments






## Total NOx Emissions (Metric Tons)

2025-2035



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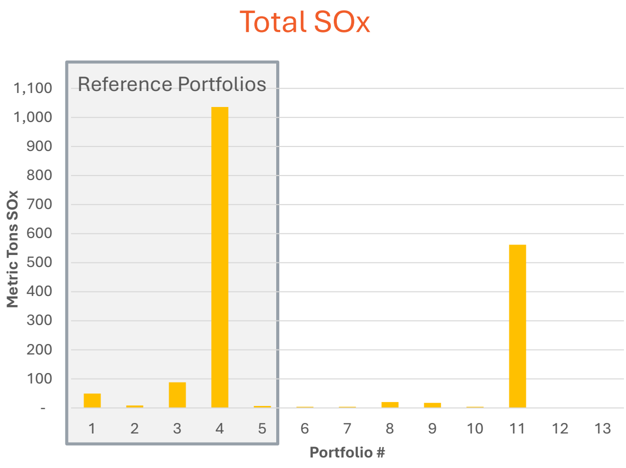
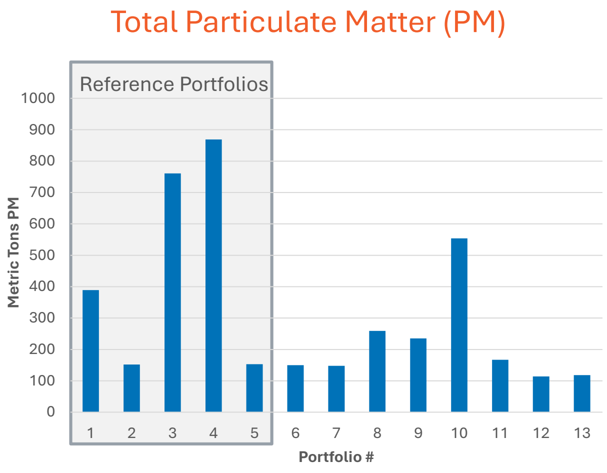
# Emissions 2025-2035

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# Summary Tables with Overall Values and Rankings

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| Portfolio | Net Cost 20-yr NPV ($MM) | 2035 Bill Impact ($/Month) | 2035 Energy Burden (%) | Total Liquidity Need ($MM) | 2035 Reliability Risk Events 4+ Hours (Count) | 2035 Reliability Risk Hours (Hours) | Total $CO_2$ Emissions (Million Metric Tons) | Total NOx Emissions (Metric Tons) | Total SOx Emissions (Metric Tons) | Total PM Emissions (Metric Tons) |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | $9,771 | $38 | 3.7% | $1,291 | 9 | 165 | 14 | 1596 | 49 | 389 |
| 2 | $13,026 | $67 | 4.5% | $1,685 | 17 | 2,204 | 6 | 589 | 8 | 152 |
| 3 | $8,659 | $33 | 3.5% | $424 | 0 | 0 | 27 | 3016 | 88 | 761 |
| 4 | $7,336 | $21 | 3.2% | $365 | 0 | 0 | 40 | 8978 | 1036 | 869 |
| 5 | $13,029 | $68 | 4.5% | $1,657 | 20 | 2,115 | 6 | 599 | 7 | 153 |
| 6 | $12,913 | $68 | 4.5% | $1,643 | 25 | 2,141 | 6 | 584 | 4 | 150 |
| 7 | $13,053 | $69 | 4.5% | $1,445 | 24 | 2,136 | 6 | 573 | 4 | 148 |
| 8 | $10,629 | $43 | 3.8% | $653 | 0 | 3 | 9 | 1730 | 20 | 259 |
| 9 | $11,665 | $55 | 4.1% | $961 | 20 | 438 | 8 | 1355 | 17 | 235 |
| 10 | $12,155 | $56 | 4.1% | $549 | 4 | 41 | 6 | 650 | 4 | 554 |
| 11 | $9,273 | $35 | 3.6% | $359 | 0 | 0 | 25 | 5267 | 562 | 167 |
| 12 | $13,244 | $75 | 4.7% | $1,111 | 55 | 1,369 | 4 | 440 | 0 | 114 |
| 13 | $14,315 | $81 | 4.9% | $1,313 | 56 | 2,449 | 4 | 457 | 1 | 118 |

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| Portfolio | Net Cost 20-yr NPV | 2035 Bill Impact | 2035 Energy Burden | Total Liquidity Need | 2035 Reliability Risk Events 4+ hours | 2035 Reliability Risk Hours | Total $CO_2$ Emissions | Total NOx Emissions | Total SOx Emissions | Total PM Emissions |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 4 | 4 | 4 | 8 | 6 | 6 | 10 | 9 | 10 | 10 |
| 2 | 9 | 8 | 8 | 13 | 7 | 12 | 5 | 5 | 7 | 5 |
| 3 | 2 | 2 | 2 | 3 | 1 | 1 | 12 | 11 | 11 | 12 |
| 4 | 1 | 1 | 1 | 2 | 1 | 1 | 13 | 13 | 13 | 13 |
| 5 | 10 | 10 | 10 | 12 | 8 | 9 | 6 | 6 | 6 | 6 |
| 6 | 8 | 9 | 9 | 11 | 11 | 11 | 4 | 4 | 3 | 4 |
| 7 | 11 | 11 | 11 | 10 | 10 | 10 | 3 | 3 | 3 | 3 |
| 8 | 5 | 5 | 5 | 5 | 1 | 4 | 9 | 10 | 9 | 9 |
| 9 | 6 | 6 | 6 | 6 | 8 | 7 | 8 | 8 | 8 | 8 |
| 10 | 7 | 7 | 7 | 4 | 5 | 5 | 7 | 7 | 3 | 11 |
| 11 | 3 | 3 | 3 | 1 | 1 | 1 | 11 | 12 | 12 | 7 |
| 12 | 12 | 12 | 12 | 7 | 12 | 8 | 1 | 1 | 1 | 1 |
| 13 | 13 | 13 | 13 | 9 | 13 | 13 | 2 | 2 | 2 | 2 |

Ranks each portfolio 1-13 (1 = best, 13 = worst) within each output metric column

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# Portfolio Modeling Overview

**Austin Energy Modeling Process**

Utilizing *UPLAN* and *PowerSIMM* modeling tools to evaluate the performance of multiple **human-made portfolios** across various scenarios.

**3rd Party Modeling Process**

Ascend's resource planning methodology and modeling tools generate **optimized portfolios based on specified constraints**.

**Portfolio Evaluation**

All modeling results will be evaluated to select portfolios for further consideration.

- PORTFOLIO A
- PORTFOLIO B
- PORTFOLIO C
- PORTFOLIO D
- PORTFOLIO E
- PORTFOLIO F

Shortlist of Portfolios

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# Austin Energy Appendices

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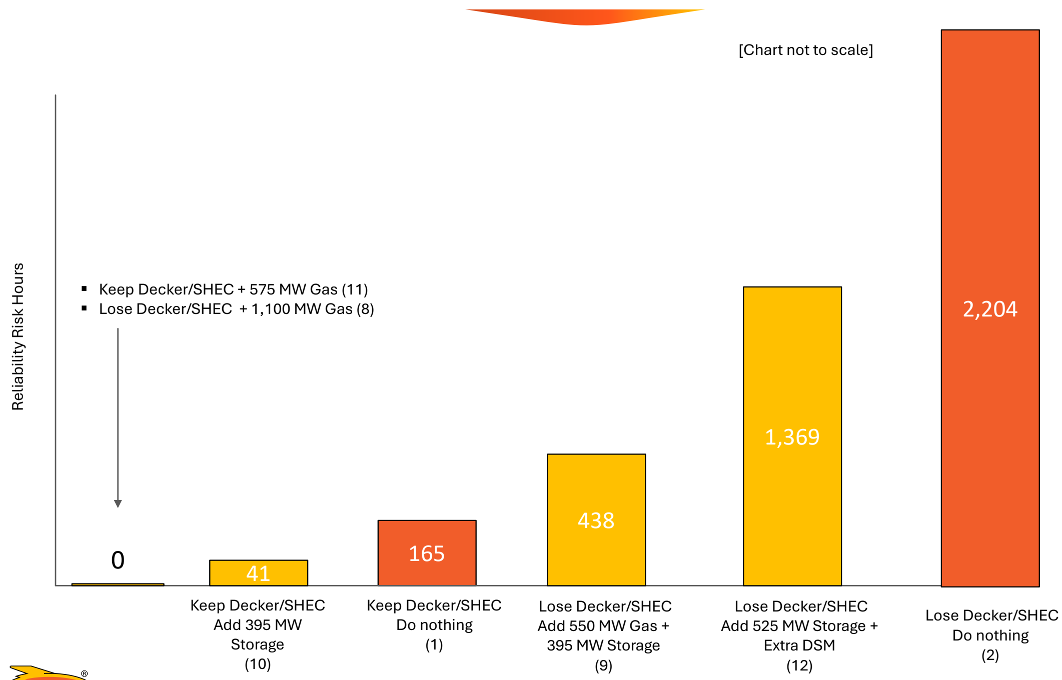


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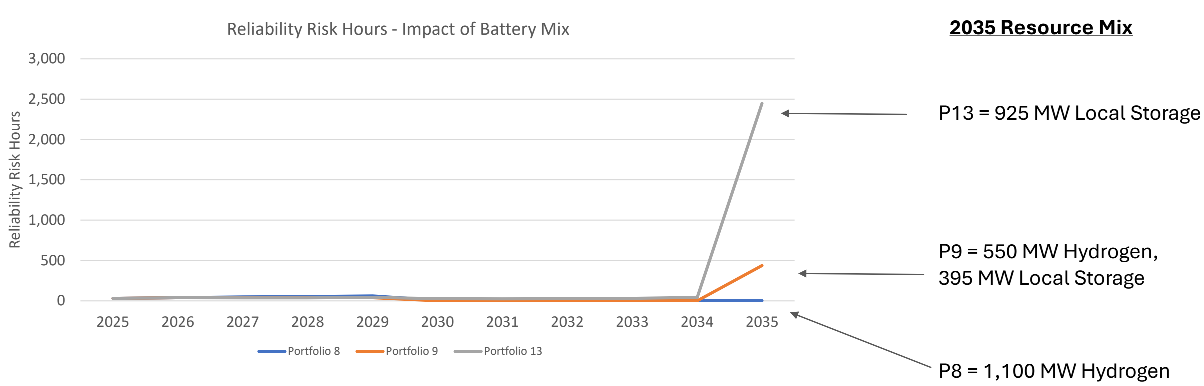
# Reliability Risk Hours – Impact of Battery Mix




Decker, SHEC retire 2034

Max DSM for all

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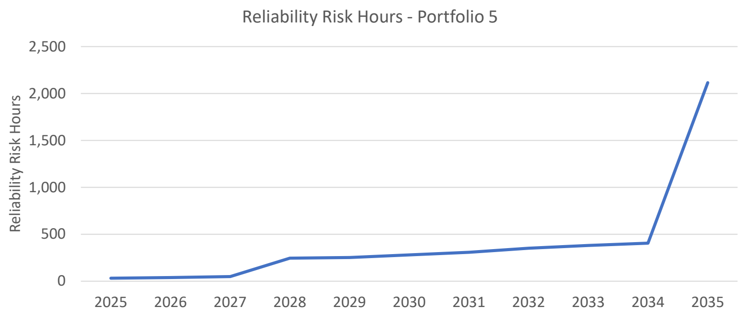
# Reliability Risk Hours – Importance of Local Resources

**Portfolio 5**

- Decker CTs shut down in 2027 (200 MW)
- SHEC shuts down in 2034 (795 MW)
- No new local storage or gas

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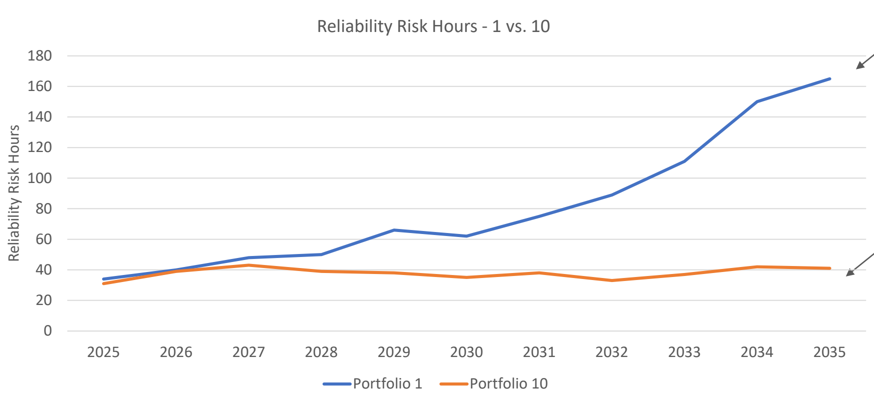
# Reliability Risk Hours – 1 vs. 10




P1 adds no new generation or DSM

P10 adds 395 MW batteries by 2035 + Max DSM

Decker, SHEC do not retire in 2034 (795 MW)

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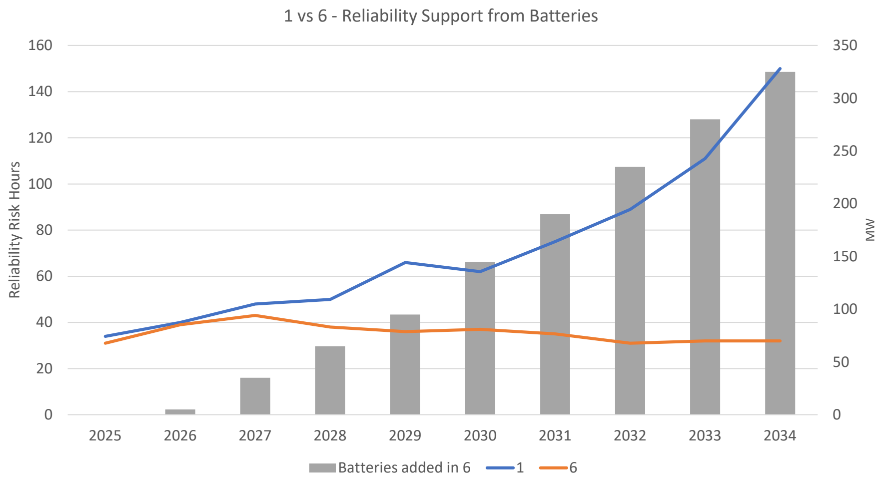
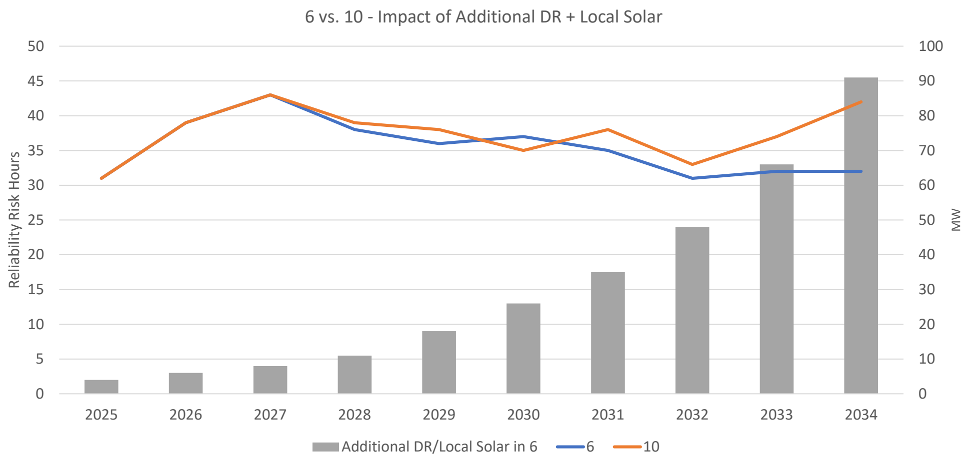
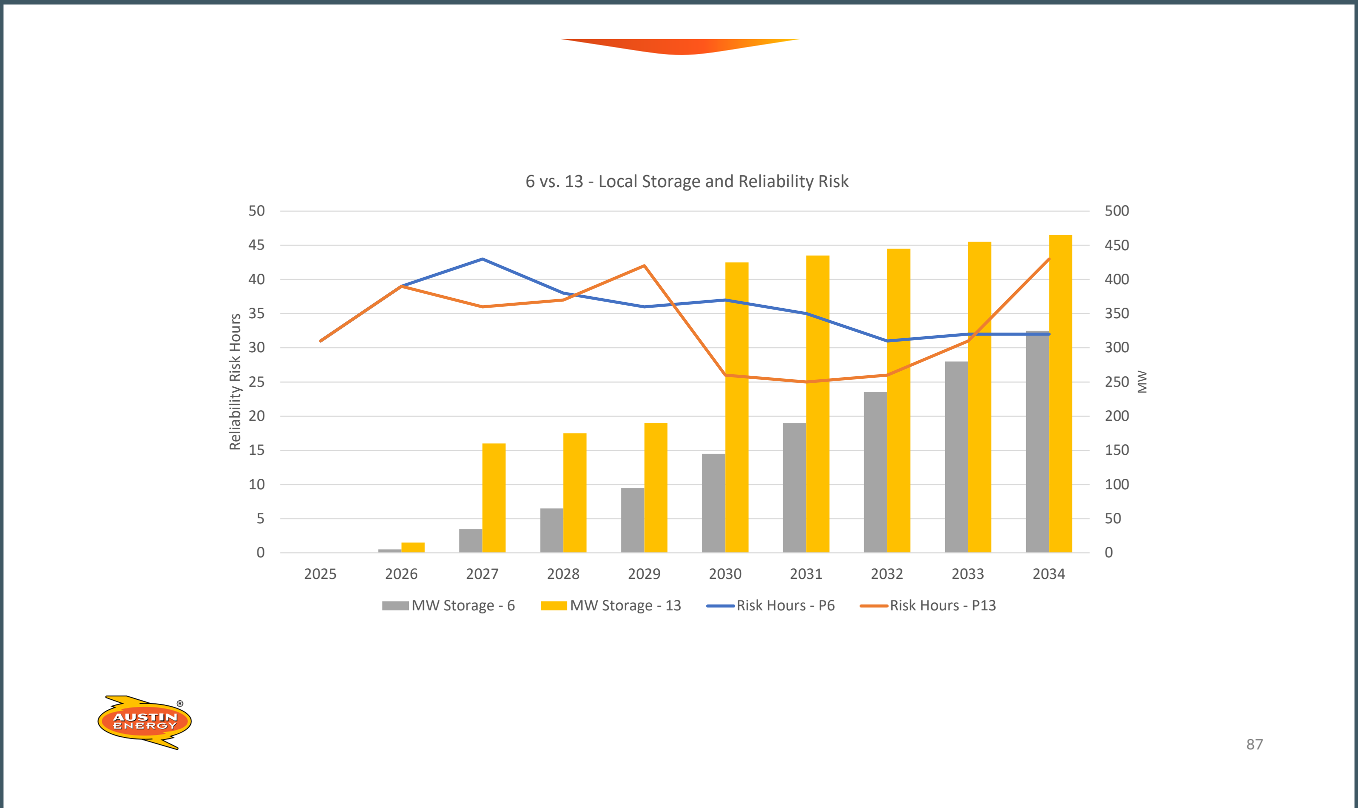
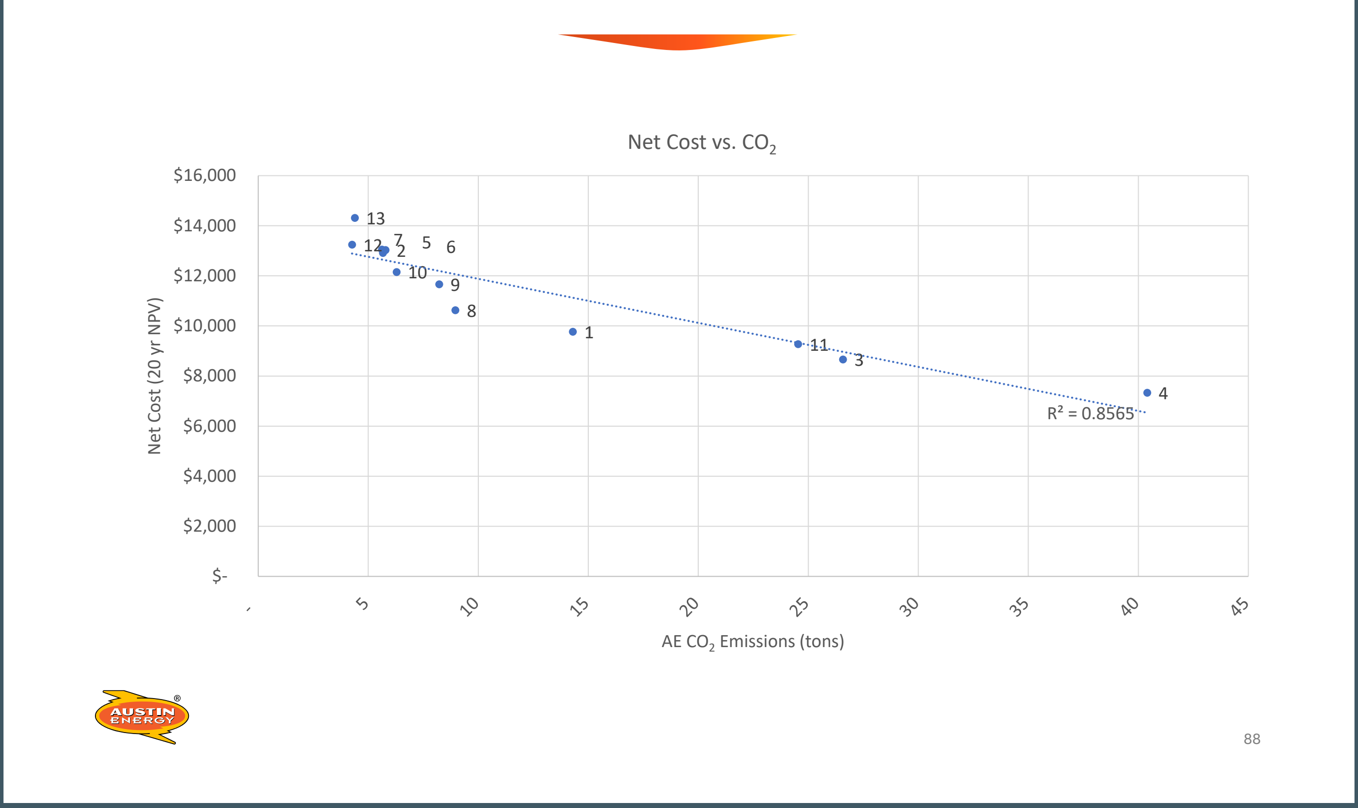
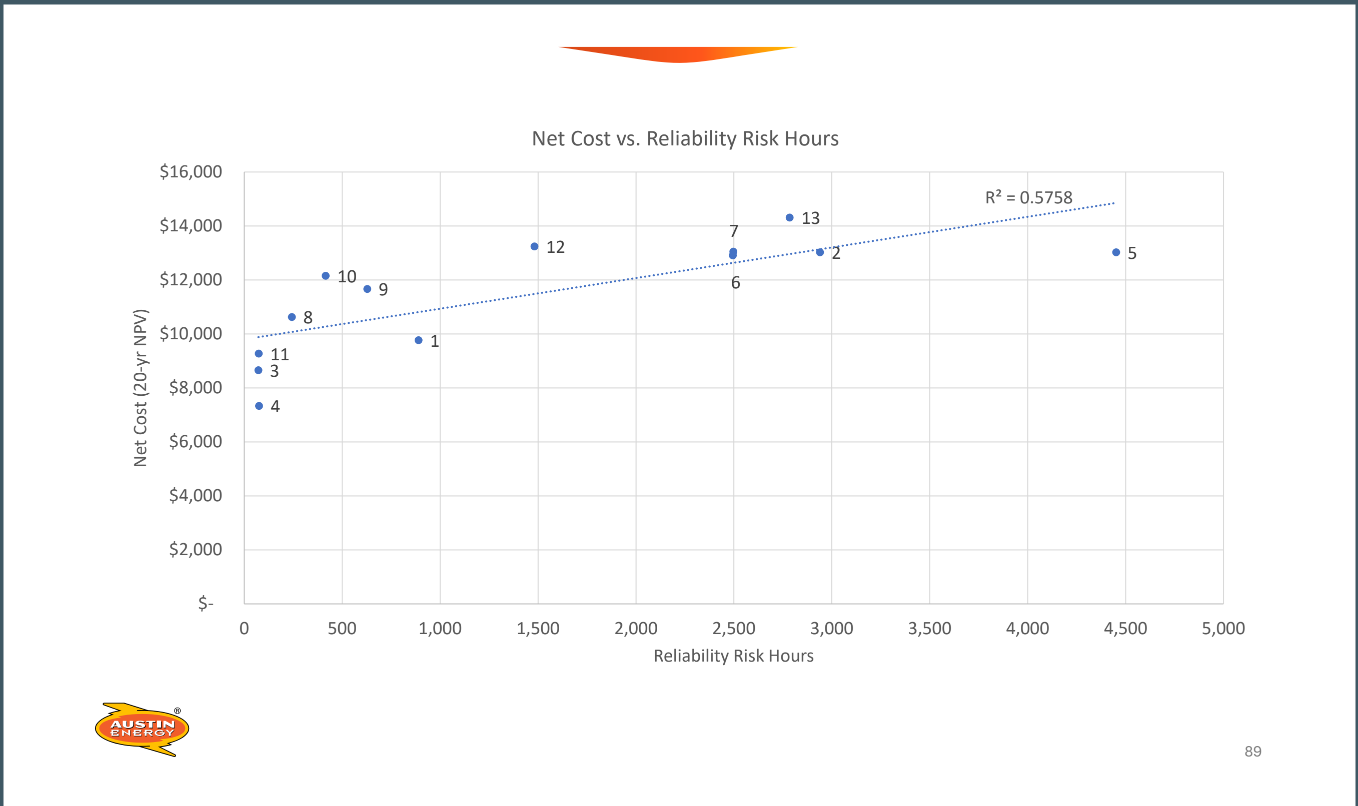

1 vs 6 - Reliability Support from Batteries
Reliability Risk Hours
MW
160
140
120
100
80
60
40
20
0
350
300
250
200
150
100
50
0
2025
2026
2027
2028
2029
2030
2031
2032
2033
2034
Batteries added in 6
1
6

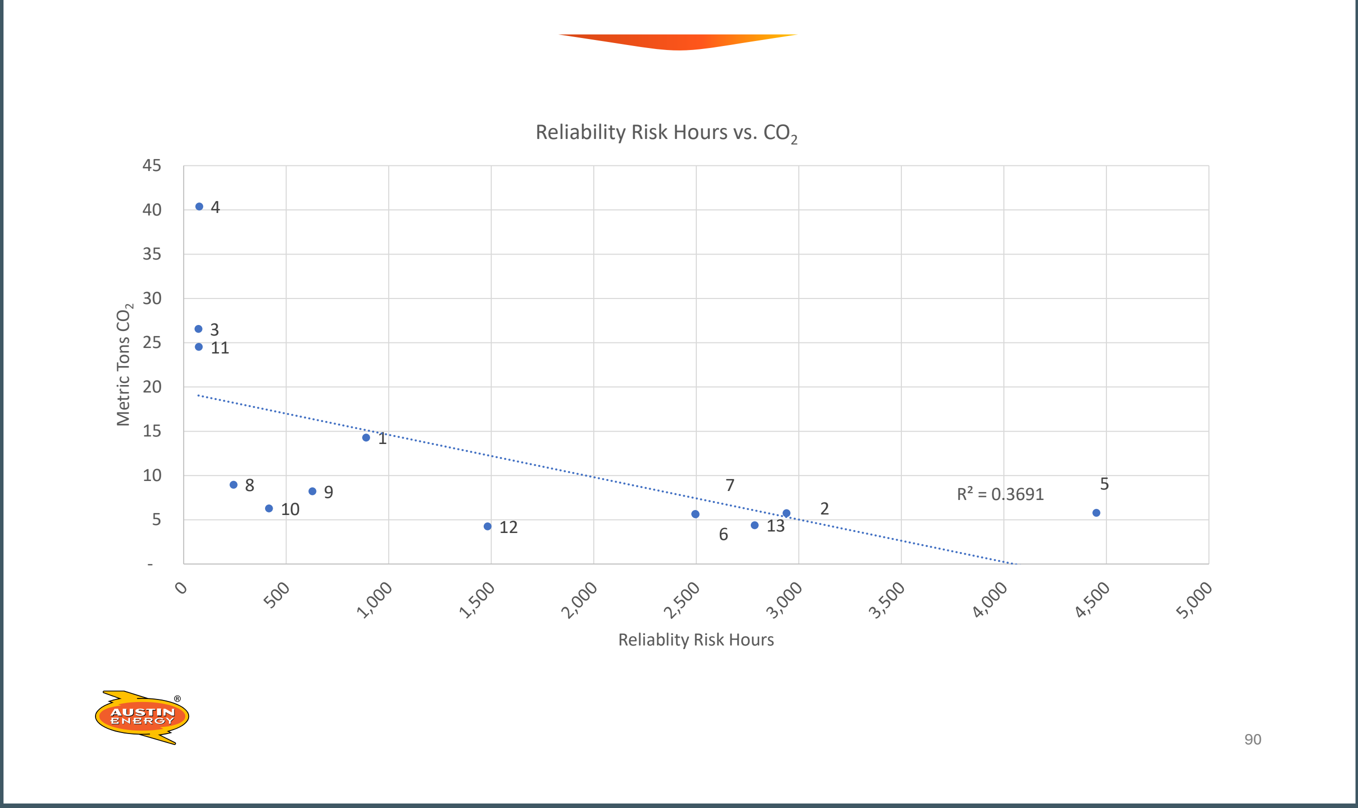



6 vs. 10 - Impact of Additional DR + Local Solar
Reliability Risk Hours
MW
50
45
40
35
30
25
20
15
10
5
0
100
90
80
70
60
50
40
30
20
10
0
2025
2026
2027
2028
2029
2030
2031
2032
2033
2034
Additional DR/Local Solar in 6
6
10

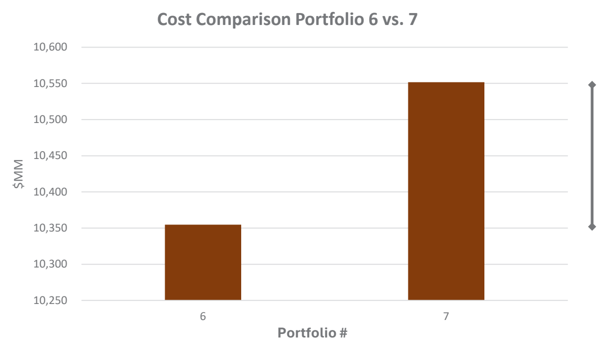

6 vs. 13 - Local Storage and Reliability Risk
Reliability Risk Hours
MW
2025
2026
2027
2028
2029
2030
2031
2032
2033
2034
MW Storage - 6
MW Storage - 13
Risk Hours - P6
Risk Hours - P13
87


Net Cost vs. $CO_2$
Net Cost (20 yr NPV)
AE $CO_2$ Emissions (tons)
$R^2$ = 0.8565
88


Net Cost vs. Reliability Risk Hours
$16,000
$14,000
$12,000
$10,000
$8,000
$6,000
$4,000
$2,000
$-
Net Cost (20-yr NPV)
0
500
1,000
1,500
2,000
2,500
3,000
3,500
4,000
4,500
5,000
Reliability Risk Hours
$R^2 = 0.5758$
1
2
3
4
5
6
7
8
9
10
11
12
13
89


Reliability Risk Hours vs. $CO_2$
45
40
35
30
25
20
15
10
5
-
Metric Tons $CO_2$
0
500
1,000
1,500
2,000
2,500
3,000
3,500
4,000
4,500
5,000
Reliablity Risk Hours
$R^2 = 0.3691$
1
2
3
4
5
6
7
8
9
10
11
12
13
90

# Net Cost of Non-Local Wind and Solar




Only difference between Portfolios 6 and 7 is the amount of non-local wind and solar PPAs added

P6 just replaces existing PPAs
P7 adds enough new to meet 65% RE goal

$197M net cost difference ($18M/year)

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# Scenarios

## Future states (2025-2035) through which portfolios are stress-tested to measure risk to customers

**Extreme grid-wide events**
(extreme summer heat, Uri-like winter freeze, extreme low wind)

**Local congestion**
(simulates local generation and/or transmission outages)

**New market regulations**
(models impact of potential new PUCT rules on generation capacity)

*Note: Extreme grid-wide events and new market regulations scenarios are based on data and assumptions published by ERCOT.*

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# Sensitivity Analysis

- Adjust certain model variables between model runs to measure impact to output metrics
- Expected to be conducted only on short-list portfolios

**Austin Energy Load:**
Uses higher load growth projection from Webber Energy Group study

**Fuel Prices:**
Increased prices ERCOT-wide over modeling horizon

**Import/Export Capacity:**
Changes import capacity to Austin Energy Load Zone

**ERCOT Resource Retirements:**
Accelerates coal plant shutdowns across ERCOT due to new EPA regulations

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Customer Driven.
Community Focused.[SM]

# Round II Modeling Results – Supplement – Portfolio 14

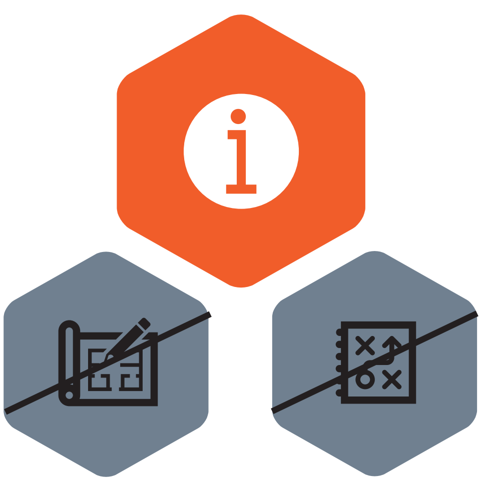
## Austin Energy Resource, Generation and Climate Protection Plan to 2035

Michael Enger
Vice President, Energy Market Operations & Resource Planning

October 28, 2024



## Important Context for this Discussion



### Models provide information

**not a specific plan or recommendation**

The following slides show data results associated with preliminary modeling efforts for the Resource, Generation and Climate Protection Plan to 2035. **These results do not reflect a recommendation, and they do not reflect a plan.** These results are for informational purposes only. All modeling reflects the input assumptions coordinated with the Electric Utility Commission earlier this year.

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## Round II Portfolios

Austin Energy and EUC selected four new portfolios to improve our understanding of risks and tradeoffs

**14**
- Variation of Portfolio 10 with incremental new local storage + gas
- Tests "floor" level of local resources needed to maintain reliability

**15**
- Variation of Portfolio 12 with more local solar + storage + DR
- Tests cost/reliability of aggressive mix of DSM + storage only

**16**
- Variation of Portfolio 12 with larger ratio of storage to solar + more DR
- Tests relative performance of different solar + storage mixes
- Maintains Decker/Sand Hill past 2034

**17**
- Identical to Portfolio 12 with Decker/Sand Hill operating past 2034

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## Reference Guide to New Portfolios

| REF # | DESCRIPTION |
|---|---|
| 10 | **395 MW local storage**, 100% DNV projections, 65% RE (1,800 MW wind/solar PPAs), REACH on gas, **Decker/Sand Hill run through 2035** |
| 14 | **125 MW local storage** (100 MW 4-hr, 25 MW 2-hr), **200 MW local peakers**, 100% DNV projections (431 MW local solar, 270 MW demand response), 250 MW import capacity increase, 65% RE (1,800 MW wind/ solar PPAs), REACH on gas, Decker/Sand Hill run through 2035 |
| 12 | **525 MW local storage** (300 MW 12-hr, 200 MW 4-hr, 25 MW 2-hr)**, 700 MW local solar, 300 MW demand response**, 100% RE as % of load (2,500 MW wind/solar PPAs), 100% CF, REACH on gas, retire Decker/Sand Hill 2034 |
| 15 | **625 MW local storage** (350 MW 12-hr, 250 MW 4-hr, 25 MW 2-hr), **960 MW local solar, 325 MW demand response**, 250 MW import capacity increase, 100% CF, 100% RE as % of load (2,500 MW wind/solar PPAs), REACH on gas, retire Decker/Sand Hill in 2034 |
| 16 | **725 MW local storage** (400 MW 12-hr, 300 MW 4-hr, 25 MW 2-hr), **860 MW local solar, 400 MW demand response**, 250 MW import capacity increase, 100% RE as % of load (2,500 MW wind/solar PPAs), REACH on gas, Decker/Sand Hill run through 2035 |
| 17 | Same as 12 except **Decker/Sand Hill run through 2035** |

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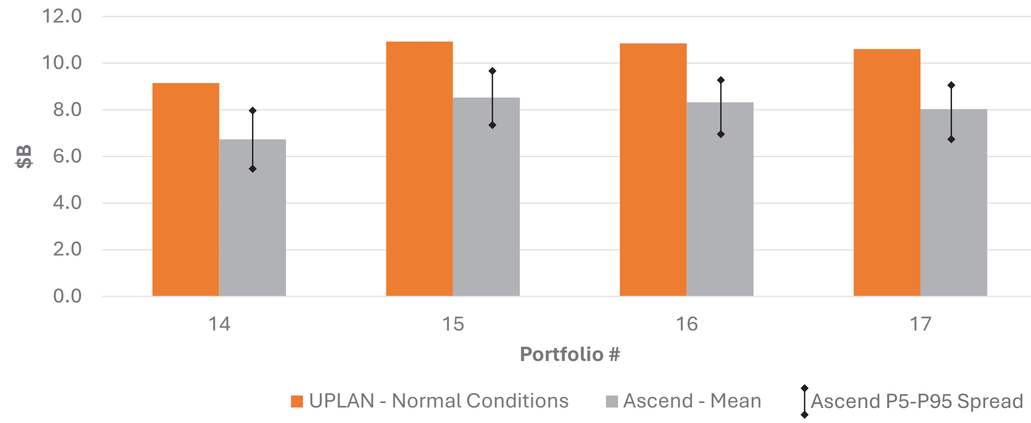
# Net Present Value of 20-Yr Annual Net Costs ($B)

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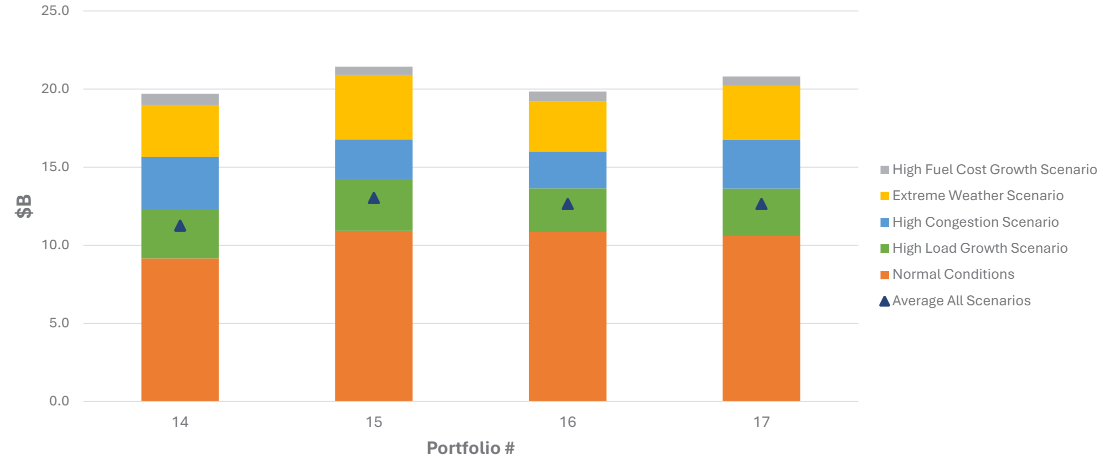
# Net Present Value of 20-Yr Annual Net Costs ($B) – All Scenarios - UPLAN

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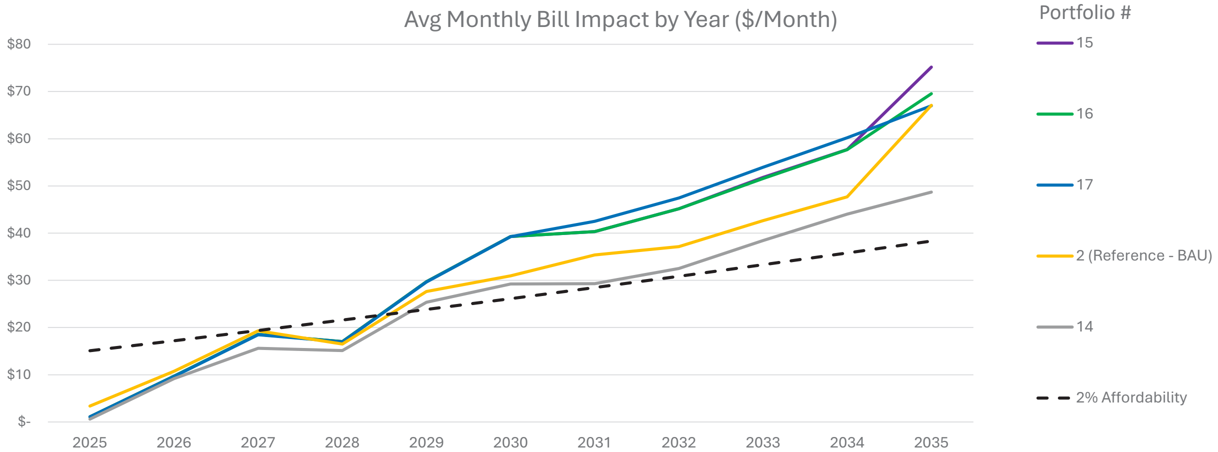
# 2035 Average Monthly Residential Bill Increase

Austin Energy 2% Affordability Target is not adjusted for inflation.
Monthly bill impact data provided in nominal dollars




**DISCLAIMER:** These are representative results based on modeling for the 2035 Resource Generation Plan and are not projections of Austin Energy's future prices. The results are not inclusive of factors beyond the scope of this Resource Generation Plan modeling.

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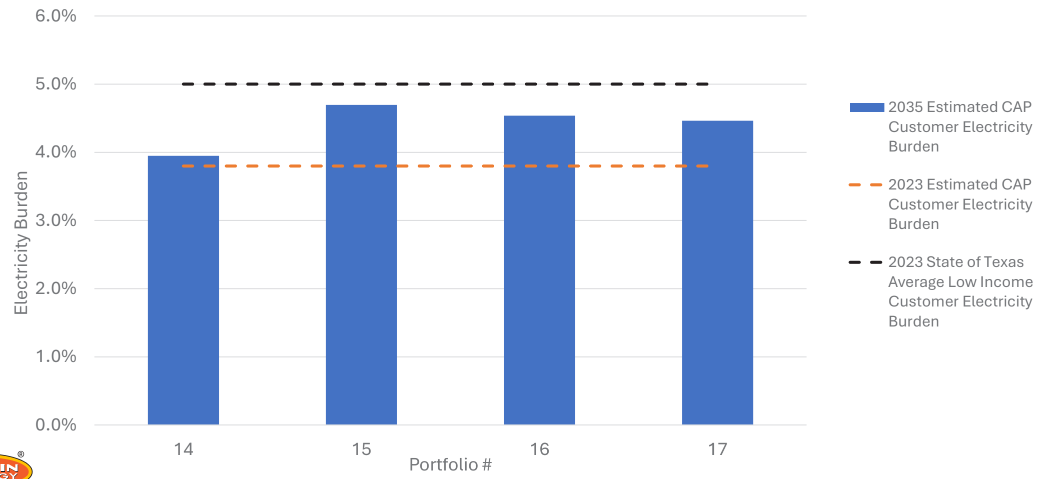
# 2035 Electricity Burden

2035 Estimated Customer Assistance Program (CAP)
Customer Electricity Burden (Avg of Scenarios)

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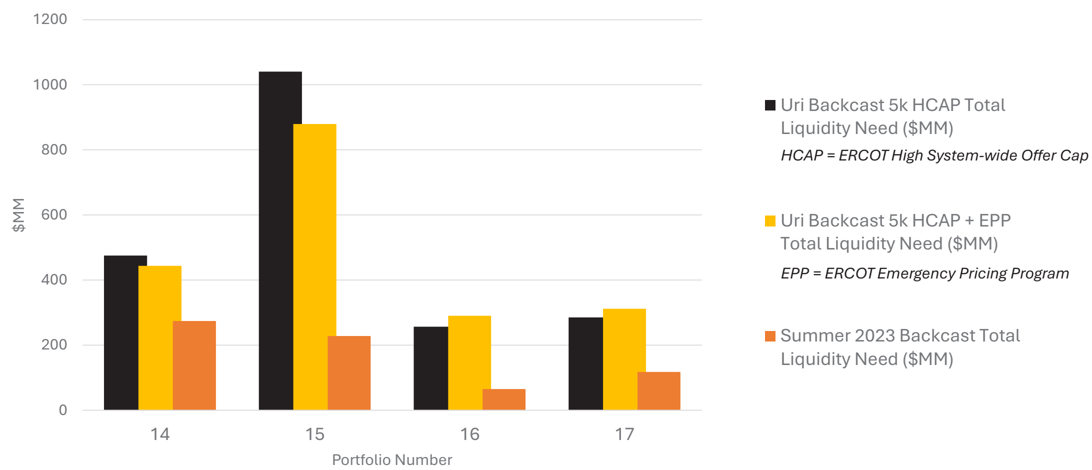
# Stress Test Results – Liquidity Risk

## Based on 2035 portfolio mix

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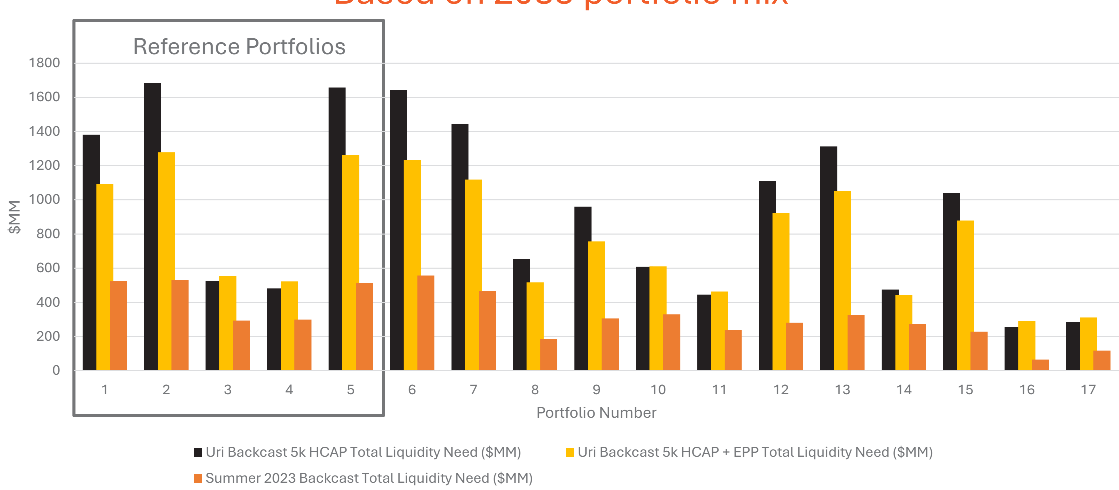
# Stress Test Results – Total Liquidity Risk

## Based on 2035 portfolio mix

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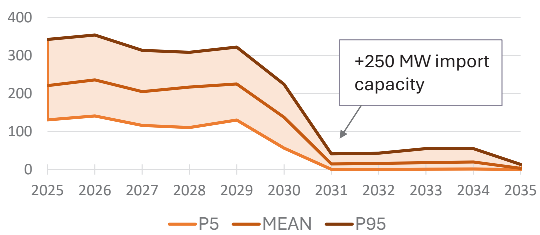
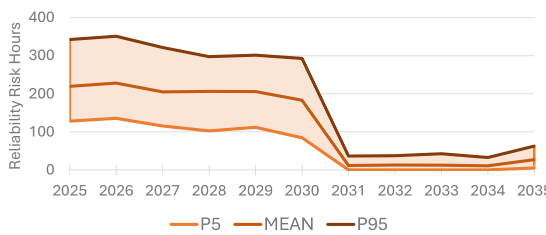
# Reliability Risk Hours – Ascend

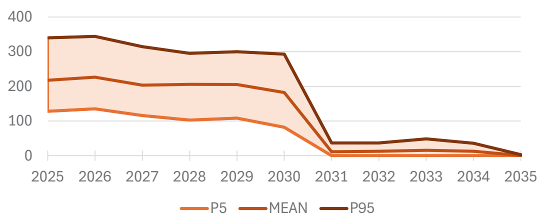
Portfolio 14




Portfolio 15

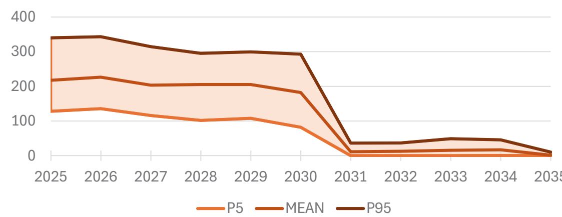



Portfolio 16



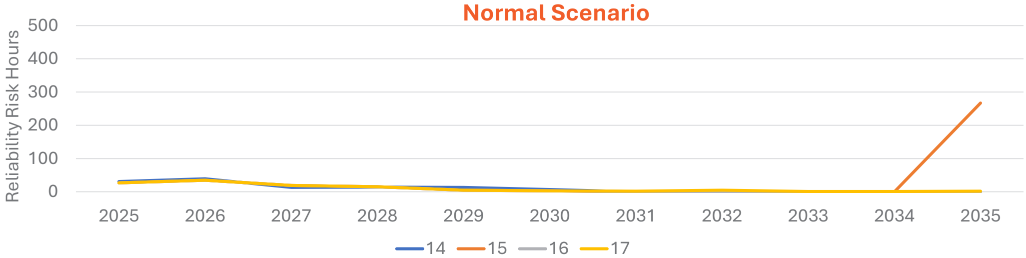

Portfolio 17

*Import capacity increase not included in UPLAN for P17



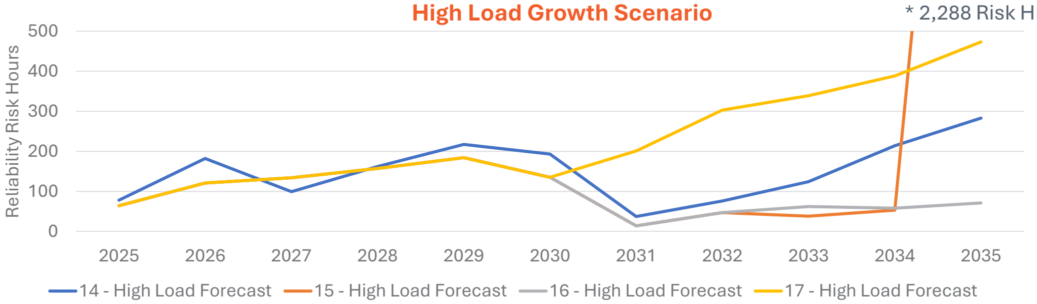

# Reliability Risk Hours – UPLAN

Normal Scenario




High Load Growth Scenario

* 2,288 Risk Hrs (for P15 in 2035)




Peak Load is 21% Higher in 2035 in High Load Growth Scenario

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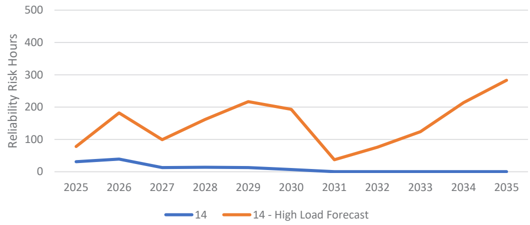
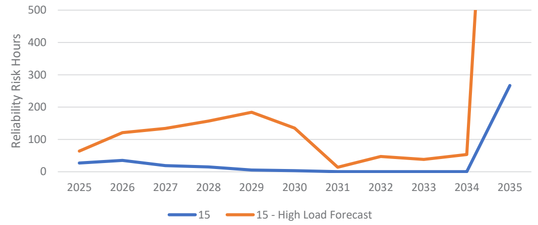
# Normal vs. High Load Growth Reliability Risk

## Portfolio 14

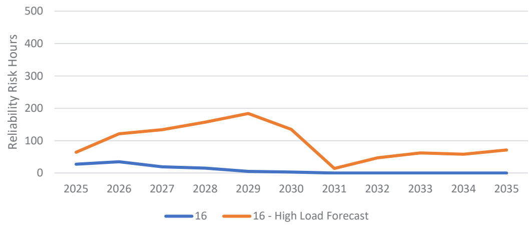



## Portfolio 15

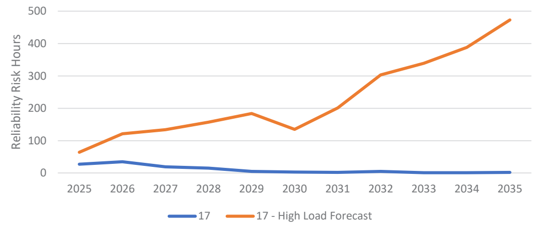
* 2,288 Risk Hrs
(for P15 in 2035)




## Portfolio 16




## Portfolio 17

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# Capacity Factor of Peakers

| Capacity Factor (P14) | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 | 2032 | 2033 | 2034 | 2035 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Sand Hill Peakers | 0% | 1% | 3% | 4% | 4% | 5% | 7% | 9% | 10% | 10% | 10% |
| Decker Peakers | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% |
| New NG Peakers | | | 5% | 6% | 7% | 7% | 9% | 11% | 13% | 12% | 12% |

| Capacity Factor (P15) | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 | 2032 | 2033 | 2034 | 2035 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Sand Hill Peakers | 0% | 1% | 3% | 4% | 4% | 5% | 7% | 9% | 10% | 10% | 0% |
| Decker Peakers | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% |

| Capacity Factor (P16) | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 | 2032 | 2033 | 2034 | 2035 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Sand Hill Peakers | 0% | 1% | 3% | 4% | 4% | 5% | 7% | 9% | 10% | 10% | 9% |
| Decker Peakers | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% |

| Capacity Factor (P17) | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 | 2032 | 2033 | 2034 | 2035 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Sand Hill Peakers | 0% | 1% | 3% | 4% | 4% | 5% | 8% | 9% | 11% | 11% | 10% |
| Decker Peakers | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% |

Decker peakers cover Ancillary Services obligations
more often which results in low capacity factor

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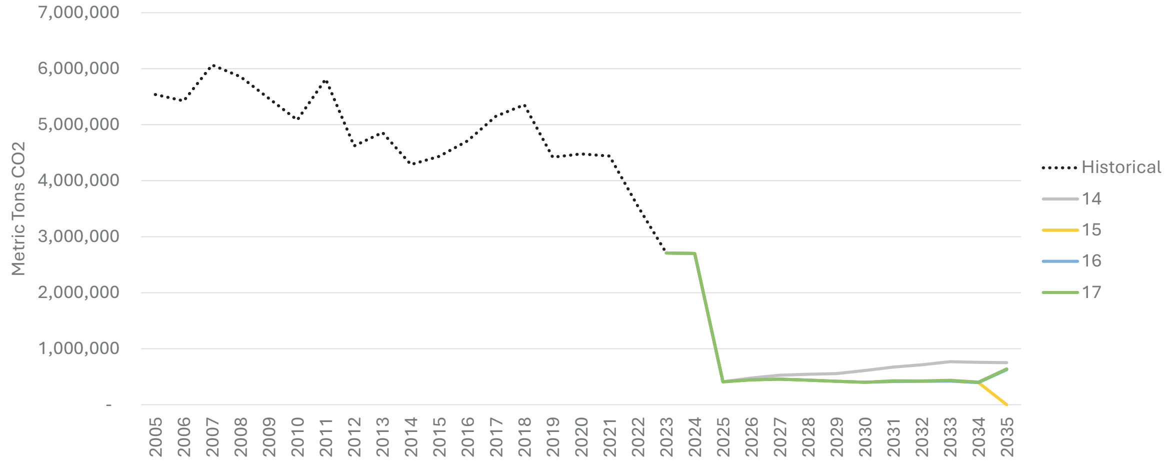
## Modeled Austin Energy Stack $CO_2$ Emissions

### By Year vs. Historical

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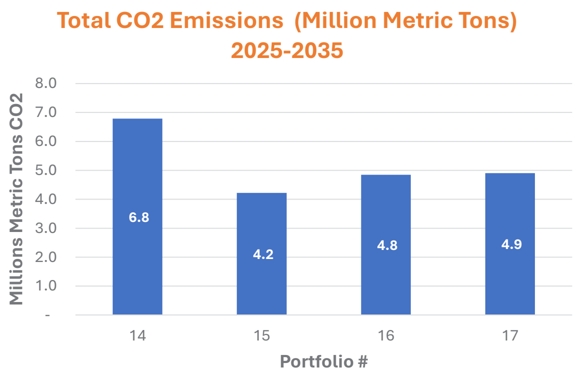
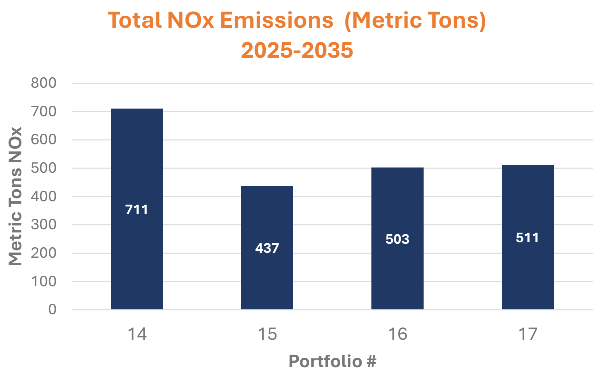
## Modeled Austin Energy Stack Emissions

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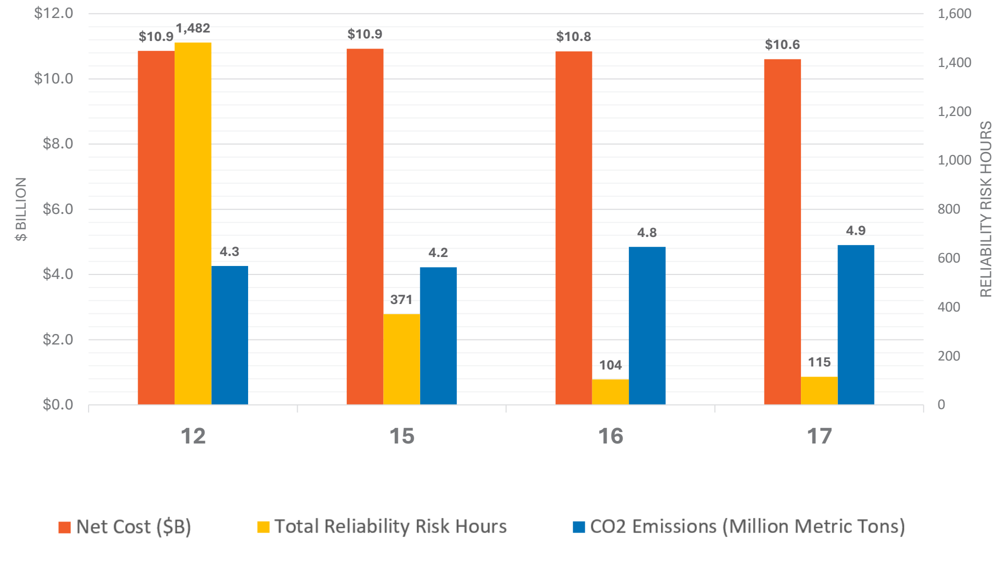
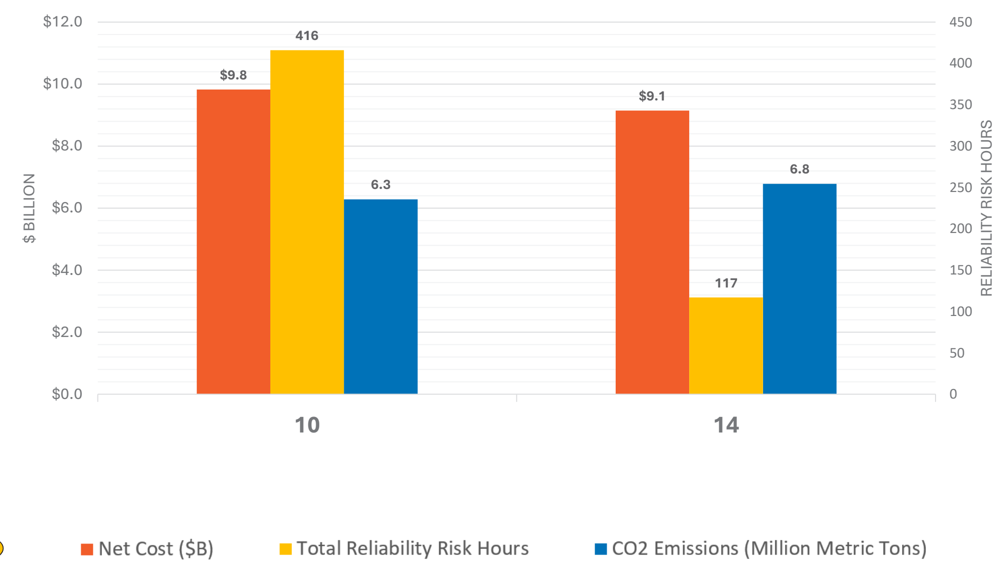
# P12 vs. P15-17 (2025-2035)




17

# P10 vs. P14 (2025-2035)

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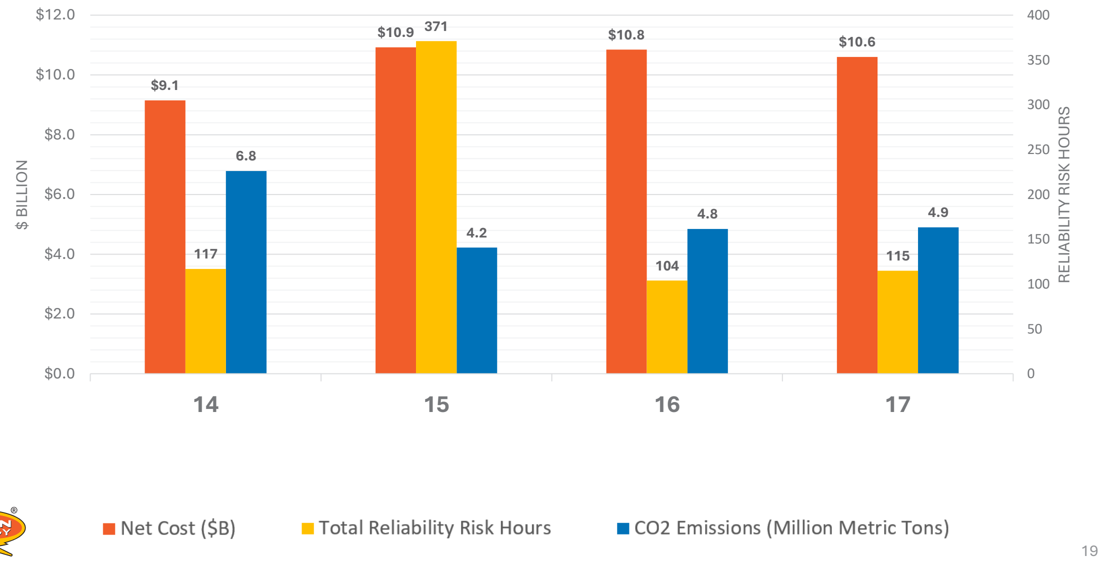
# P14-17 (2025-2035)

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**Customer Driven.**
**Community Focused.**SM

# Appendices

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| REF # | PORTFOLIO | DESCRIPTION |
|---|---|---|
| 1 | No New Commitments | Existing DSM commitments, no new generation |
| 2 | 2030 Current Plan | 100% Carbon-Free by 2035, 65% Renewables by 2027, existing DSM commitments, REACH on gas |
| 3 | Local Gen/Storage + Margin | **575 MW new local peakers and combined cycle starting 2027, 275 MW local storage,** 100% DNV projections*, replace PPAs, Decker/SHEC run through 2035 |
| 4 | Local Dispatchable + Margin | **1,100 MW new local peakers & combined cycle starting 2027**, 50% DNV projections, REACH on FPP, Decker/SHEC run through 2035 |
| 5 | Meet Env Goals + Expand DSM | **Retire Decker in 2027**, 100% DNV projections, 100% CF, 65% RE, REACH on gas, retire SHEC 2034 |
| 6 | Aggressive DSM + Storage + Keep PPAs | **Aggressive DNV projections, replace PPAs,**100% CF, REACH on gas, retire Decker/SHEC 2034 |
| 7 | Aggressive DSM + Storage + 65% RE Goal | **Aggressive DNV projections, 65% RE**, 100% CF, REACH on gas, retire Decker/SHEC 2034 |
| 8 | Hydrogen-Capable Local Plant | **1,100 MW local hydrogen-capable peakers starting in 2030**, 100% DNV projections, 100% CF, 65% RE, REACH on gas, retire Decker/SHEC 2034 |
| 9 | Hydrogen + Local Storage | **550 MW local hydrogen peakers, 395 MW local storage**, 100% DNV projections, 100% CF, 65% RE, REACH on gas, retire Decker/SHEC 2034 |
| 10 | Keep Existing Gas + Local Storage | **Decker/SHEC run past 2035, 395 MW local storage**, 100% DNV projections, 65% RE, REACH on gas |
| 11 | Replace FPP in 2028 w/Gas | **FPP retire end of 2028, 575 MW new local peakers and combined cycle**, 100% DNV projections, 65% RE, REACH on FPP and gas |
| 12 | EUC – 1 (Working Group Recs) | **525 MW local storage, 700 MW local solar, 540 MW new EE, 300 MW DR, 100% RE as % of load,** 100% CF, REACH on gas, retire Decker/SHEC 2034 |
| 13 | EUC – 2 | **925 MW local storage**, aggressive DNV projections,100% RE as % of load, 100% CF, REACH on gas, retire Decker/SHEC 2034 |

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# 2035 Modeled Installed Capacity

| Portfolio | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| RESOURCES | | | | | | | | | | | | | | | | | |
| Non-Local Solar (New) | | 700 | 118 | | 700 | 118 | 700 | 700 | 700 | 700 | 700 | 1000 | 1000 | 700 | 1,000 | 1000 | 1000 |
| Non-Local Wind (New) | | 1100 | 932 | | 1100 | 932 | 1100 | 1100 | 1100 | 1100 | 1100 | 1500 | 1500 | 1100 | 1,500 | 1500 | 1500 |
| NG CC | | | 225 | 600 | | | | | | | 225 | | | | | | |
| NG CT | | | 350 | 500 | | | | | | | 350 | | | 200 | | | |
| NG-H2 CT | | | | | | | | 1100 | 550 | | | | | | | | |
| Local 2-hr | | | 25 | | | 25 | 25 | | 25 | 25 | | 25 | 25 | 25 | 25 | 25 | 25 |
| Local 4-hr | | | 100 | | | 100 | 100 | | 100 | 100 | | 200 | 360 | 100 | 250 | 300 | 200 |
| Local 12-hr | | | 150 | | | 150 | 150 | | 150 | 150 | | 300 | 540 | | 350 | 400 | 300 |
| Local 100-hr | | | | | | 120 | 120 | | 120 | 120 | | | | | | | |
| Import Capacity Improvement | | | | | | | | | | | | | | 250 | 250 | 250 | |
| Decker CT | 200 | | 200 | 200 | | | | | | 200 | 200 | | | 200 | | 200 | 200 |
| Sand Hill CC | 315 | | 315 | 315 | | | | | | 315 | 315 | | | 315 | | 315 | 315 |
| Sand Hill CT | 280 | | 280 | 280 | | | | | | 280 | 280 | | | 280 | | 280 | 280 |
| FPP Coal | | | | | | | | | | | | | | | | | |
| STP Nuke | 430 | 430 | 430 | 430 | 430 | 430 | 430 | 430 | 430 | 430 | 430 | 430 | 430 | 430 | 430 | 430 | 430 |
| NAC Biomass | 105 | 105 | 105 | 105 | 105 | 105 | 105 | 105 | 105 | 105 | 105 | 105 | 105 | 105 | 105 | 105 | 105 |
| Non-Local Wind | 864 | 864 | 864 | 864 | 864 | 864 | 864 | 864 | 864 | 864 | 864 | 864 | 864 | 864 | 864 | 864 | 864 |
| Non-Local Solar | 826 | 826 | 826 | 826 | 826 | 826 | 826 | 826 | 826 | 826 | 826 | 826 | 826 | 826 | 826 | 826 | 826 |
| Customer-Sited Solar | 290 | 290 | 371 | 330 | 371 | 439 | 439 | 371 | 371 | 371 | 371 | 640 | 371 | 371 | 900 | 800 | 640 |
| Community Solar | 42 | 42 | 60 | 51 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 |
| Demand Response | 120 | 120 | 270 | 195 | 270 | 325 | 325 | 270 | 270 | 270 | 270 | 300 | 270 | 270 | 325 | 400 | 300 |
| Energy Efficiency (additional) | 360 | 360 | 360 | 360 | 360 | 360 | 360 | 360 | 360 | 360 | 360 | 540 | 360 | 360 | 540 | 540 | 540 |

# Summary UPLAN results Round II Portfolio

| | 20-yr NPV ($B) | 2035 Bill Impact ($/Month) | 2035 Electricity Burden (%) | Total Liquidity Need - Winter Event ($MM) | Total Liquidity Need - Summer Event ($MM) | Total Reliability Risk Hours (Hours) | Total 3+ Hour Reliability Risk Events (Count) | Total CO2 Emissions (Million Metric Tons) | Total NOx Emissions (Metric Tons) | Total SOx Emissions (Metric Tons) | Total PM Emissions (Metric Tons) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **14** | $9.1 | $49 | 3.9% | $444 | $274 | 117 | 20 | 6.8 | 711 | 2 | 184 |
| **15** | $10.9 | $75 | 4.7% | $879 | $228 | 371 | 56 | 4.2 | 437 | <1 | 113 |
| **16** | $10.8 | $70 | 4.5% | $290 | $65 | 104 | 19 | 4.8 | 503 | <1 | 130 |
| **17** | $10.6 | $67 | 4.5% | $312 | $118 | 115 | 20 | 4.9 | 511 | <1 | 132 |

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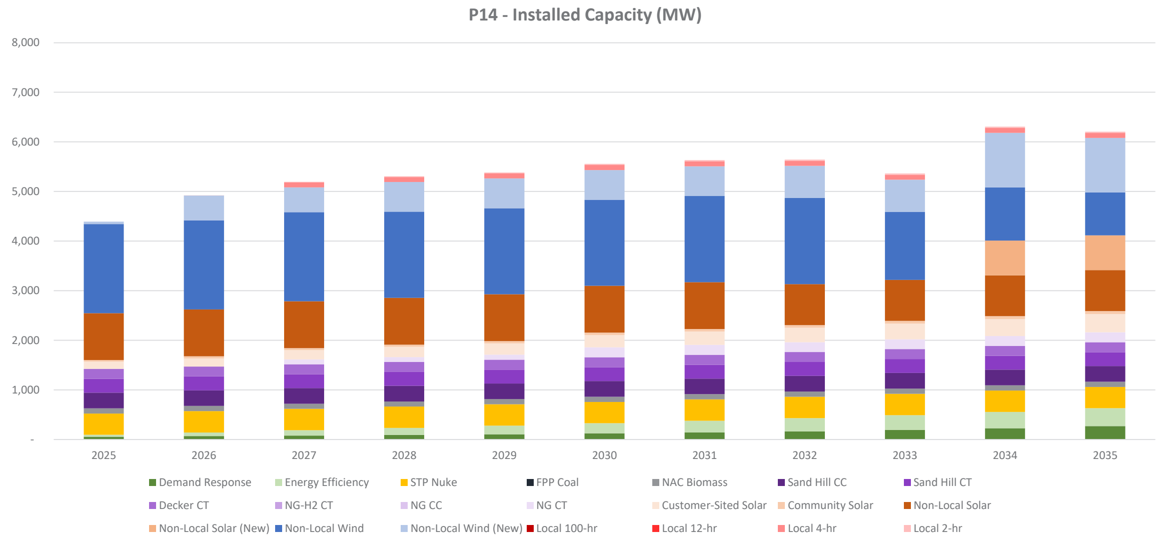
P14 - Installed Capacity (MW)
8,000
7,000
6,000
5,000
4,000
3,000
2,000
1,000
-
2025
2026
2027
2028
2029
2030
2031
2032
2033
2034
2035
Demand Response
Energy Efficiency
STP Nuke
FPP Coal
NAC Biomass
Sand Hill CC
Sand Hill CT
Decker CT
NG-H2 CT
NG CC
NG CT
Customer-Sited Solar
Community Solar
Non-Local Solar
Non-Local Solar (New)
Non-Local Wind
Non-Local Wind (New)
Local 100-hr
Local 12-hr
Local 4-hr
Local 2-hr

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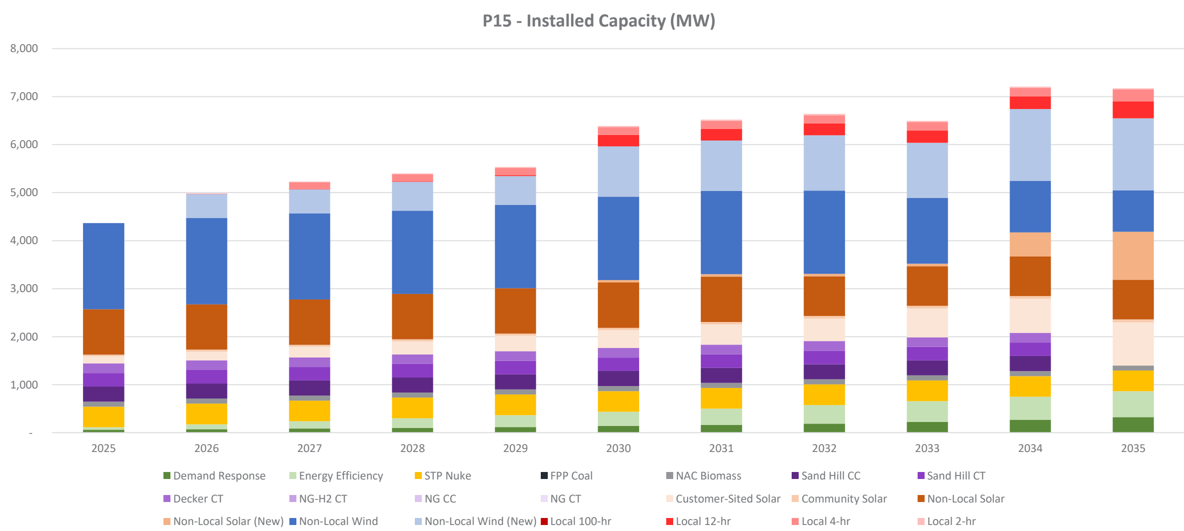
P15 - Installed Capacity (MW)
8,000
7,000
6,000
5,000
4,000
3,000
2,000
1,000
-
2025
2026
2027
2028
2029
2030
2031
2032
2033
2034
2035
Demand Response
Energy Efficiency
STP Nuke
FPP Coal
NAC Biomass
Sand Hill CC
Sand Hill CT
Decker CT
NG-H2 CT
NG CC
NG CT
Customer-Sited Solar
Community Solar
Non-Local Solar
Non-Local Solar (New)
Non-Local Wind
Non-Local Wind (New)
Local 100-hr
Local 12-hr
Local 4-hr
Local 2-hr

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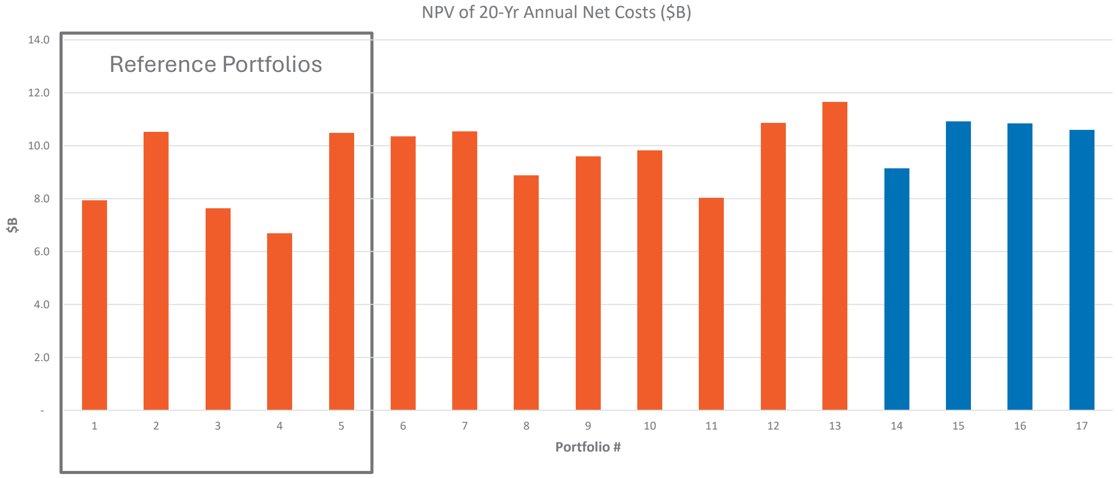
# 20-year NPV of Net Cost – All Portfolios

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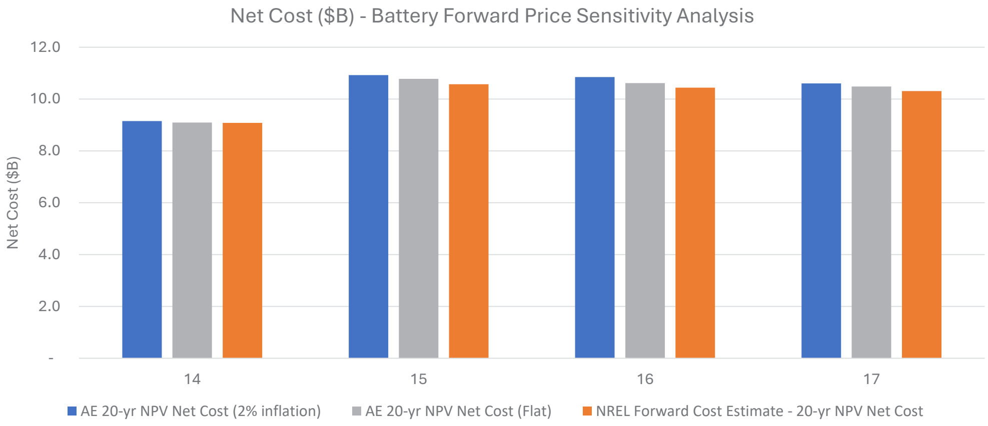


Average difference between AE 20-year NPV (with 2% inflation)
and NREL forward cost curve = $352M or 3%

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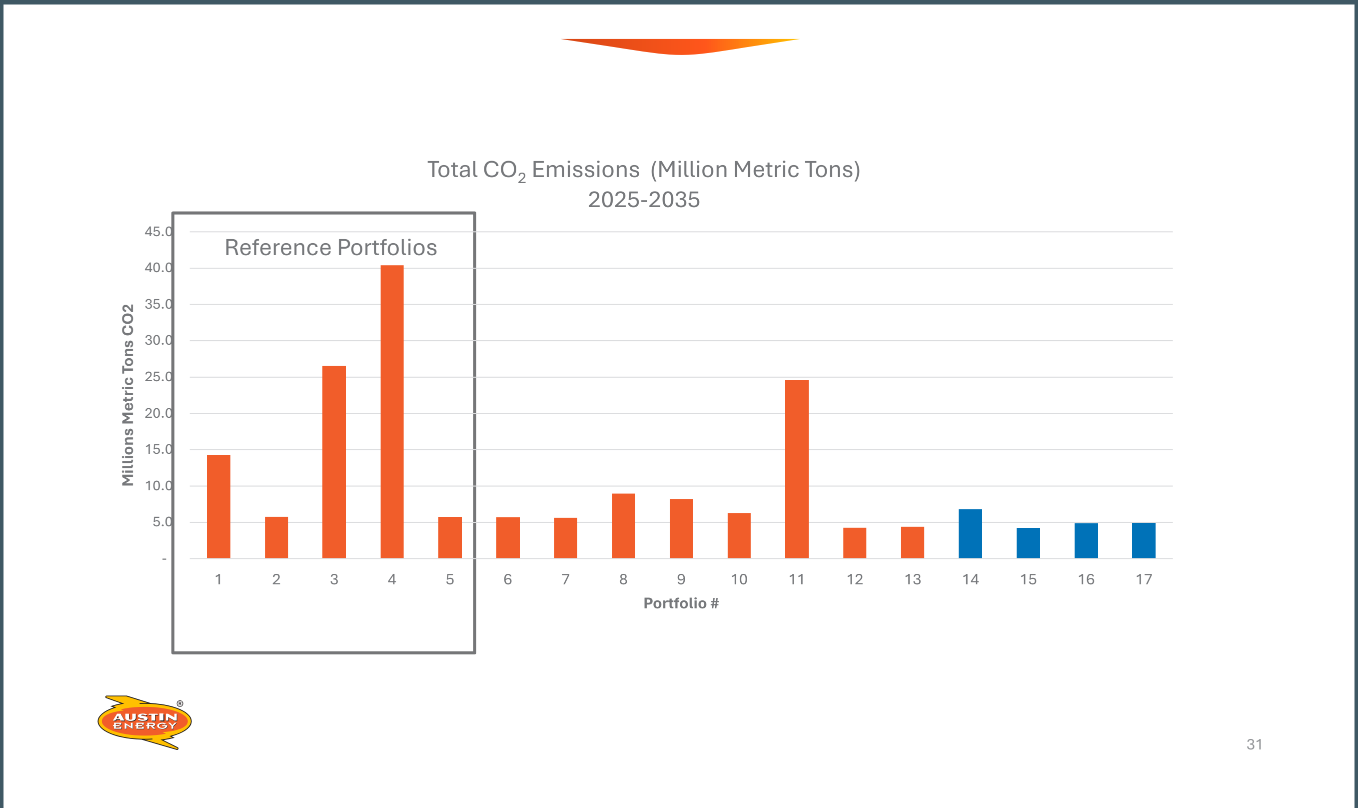

Total $CO_2$ Emissions (Million Metric Tons)
2025-2035
Reference Portfolios
Millions Metric Tons CO2
45.0
40.0
35.0
30.0
25.0
20.0
15.0
10.0
5.0
-
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17
Portfolio #
AUSTIN ENERGY
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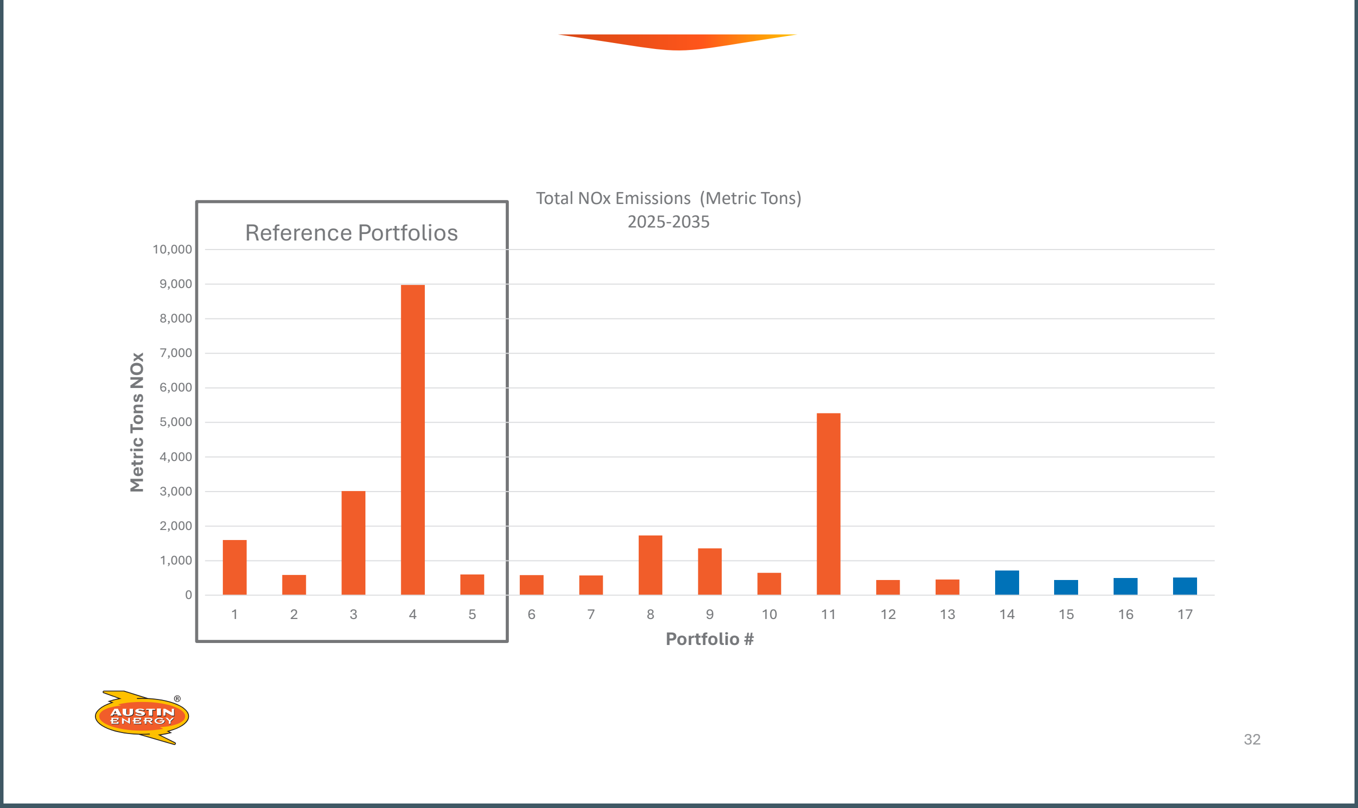

Total NOx Emissions (Metric Tons)
2025-2035
Reference Portfolios
Metric Tons NOx
10,000
9,000
8,000
7,000
6,000
5,000
4,000
3,000
2,000
1,000
0
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17
Portfolio #
AUSTIN ENERGY
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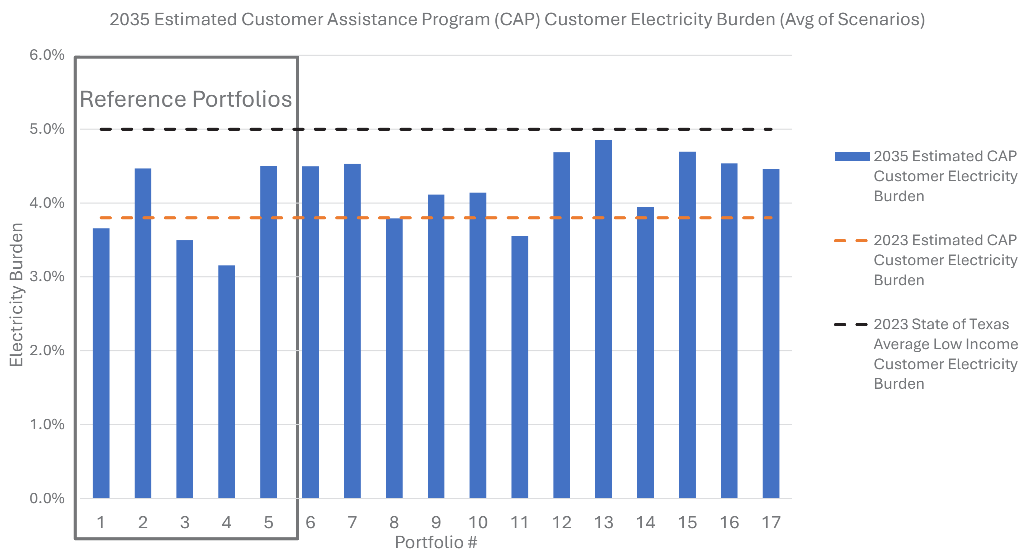


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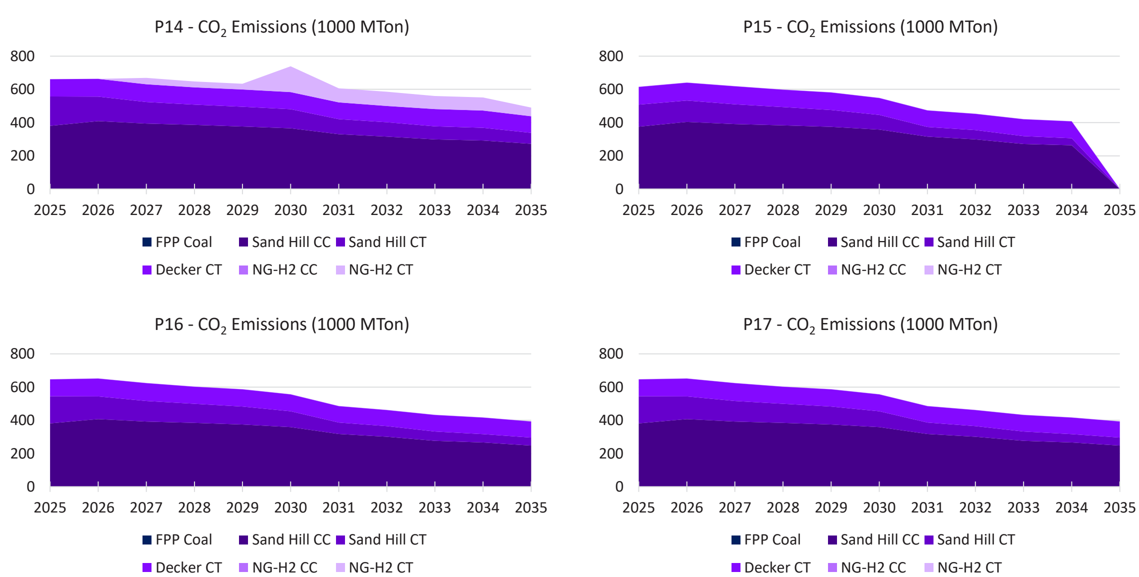
# Ascend Emissions Trends

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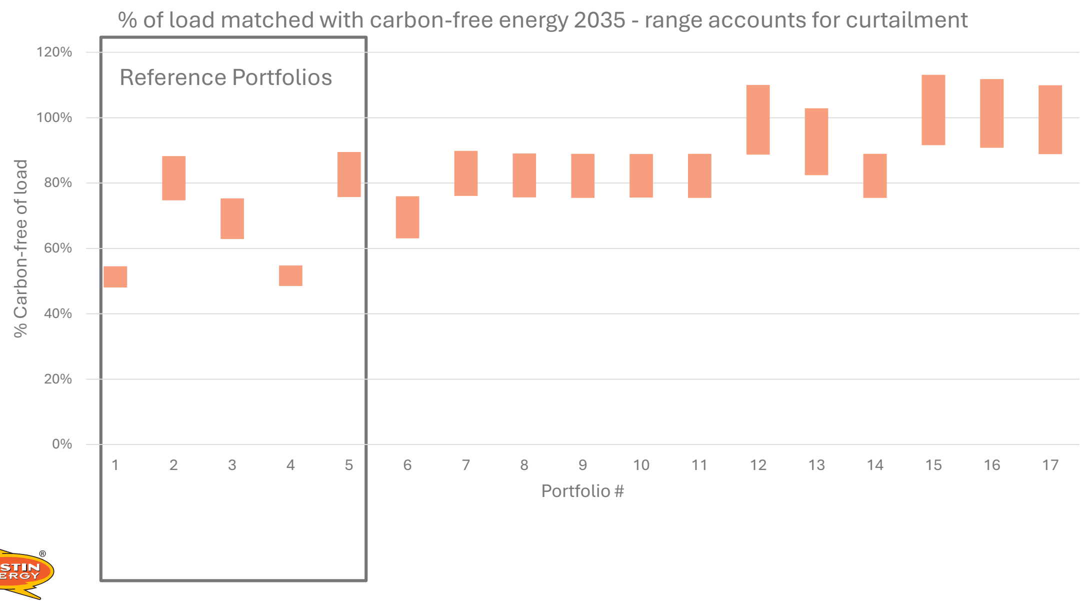

% of load matched with carbon-free energy 2035 - range accounts for curtailment
Reference Portfolios
120%
100%
80%
60%
40%
20%
0%
% Carbon-free of load
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
Portfolio #
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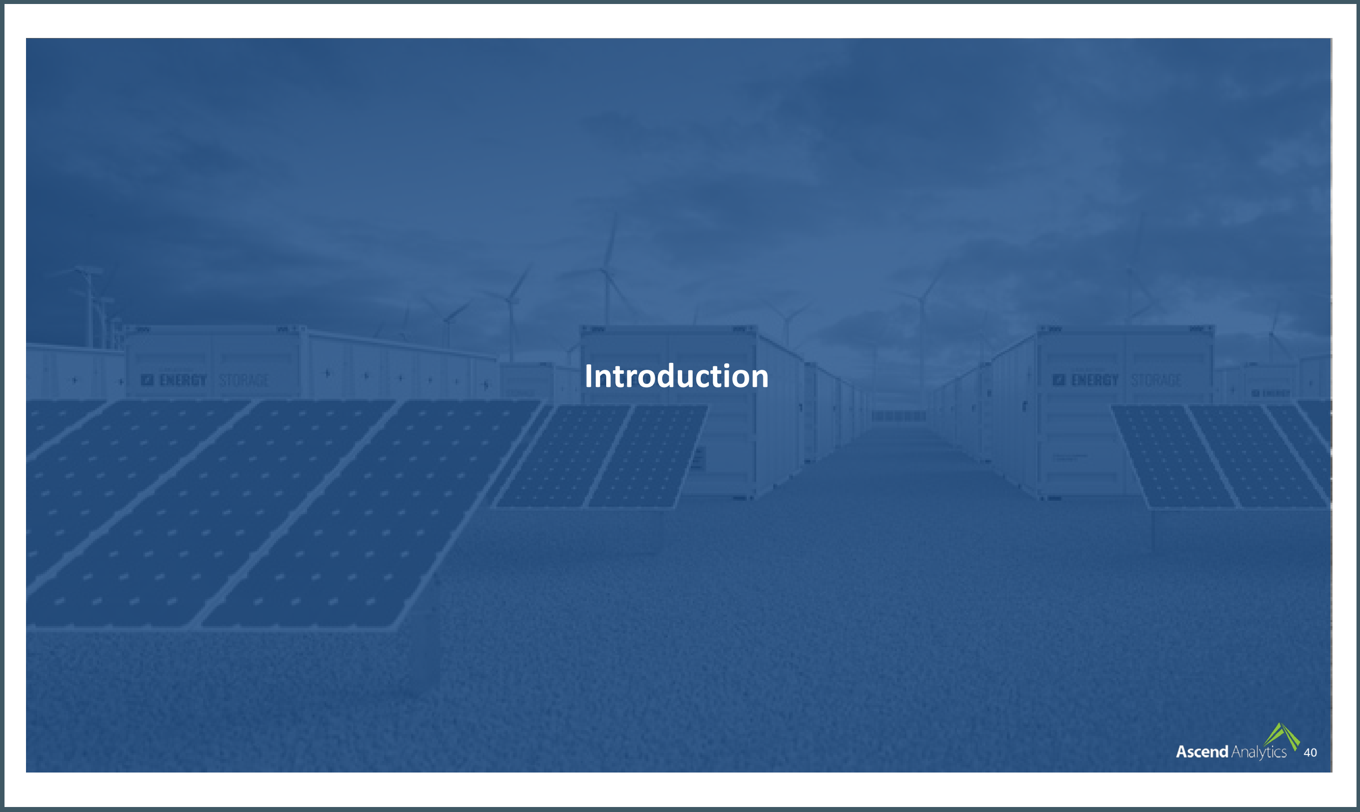
Ascend Analytics
EVALUATING OPTIONS FOR AUSTIN ENERGY'S PORTFOLIO THROUGH 2035
Benjamin Anderson
Manager of Resource Planning
September 2024


Introduction
Ascend Analytics
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Ascend Analytics

## Introduction: Austin Energy's Resource, Generation and Climate Protection Plan to 2035

**Analysis Goal**:
Evaluate four generation portfolios that illustrate the tradeoffs between costs, emissions and reliability during the period of 2025-2035.

### Purpose

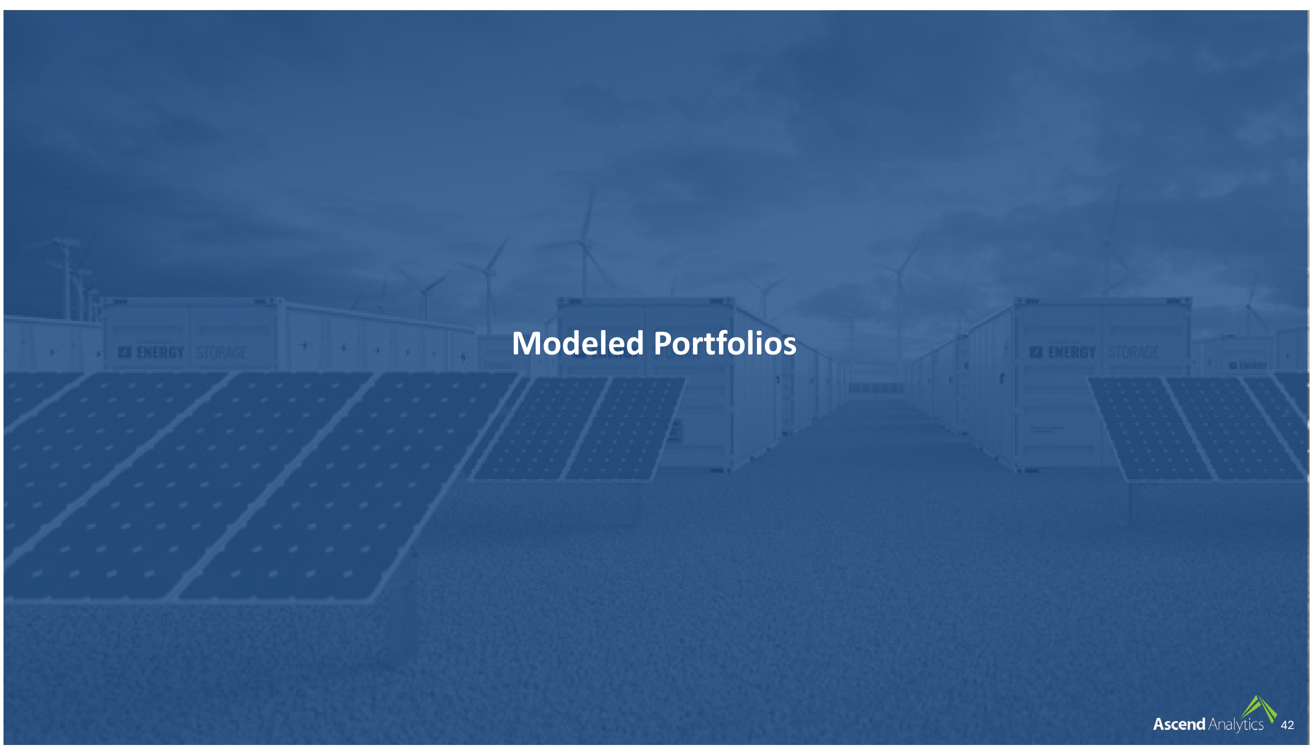
Austin Energy commissioned Ascend Analytics to conduct this resource planning study. Results will supplement Austin Energy's Uplan analysis, to inform which portfolios are down-selected for further study. Ascend used the same cost and load assumptions as Austin Energy's Uplan analysis.

### Methodology

Using its flagship PowerSIMM software, Ascend ran a capacity expansion model with different constraint sets to create four portfolios and ran these portfolios through production cost model to evaluate their costs, emissions, and reliability.





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## Overview of the Portfolios

### Portfolio A (Baseline)
- Meets emissions and renewable energy targets
- Builds sufficient local firm capacity to cover peak loads
- Least-cost path to meet the constraints

### Portfolio B
- Meets same emissions, renewable, and local firm capacity targets as Portfolio A, but without any new gas or hydrogen-burning plants
- Provides a path to zero emissions not dependent on clean hydrogen availability

### Portfolio C
- No emissions or renewable targets
- Builds sufficient local firm capacity to cover peak loads

### Portfolio D
- Meets the same emissions and renewable targets as Portfolio A
- Builds sufficient local firm capacity to cover peak loads plus a 15% margin

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Portfolios A, B, & D are carbon-free by 2035 and achieve 65% renewable energy from 2027 onwards.

The Portfolios must build local storage or gas/hydrogen-fueled power plants to satisfy the local firm capacity constraint.

All portfolios include max assumptions about demand-side management buildouts from the DNV study, including the following by 2035:

- 360 MW of energy efficiency
- 270 MW of demand response
- 371 MW of customer-sited solar
- 60 MW of community solar (Portfolio B builds additional)



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## Portfolio Constraints

| | A | B | C | D |
|---|---|---|---|---|
| **Coal-Free Portfolio:** FPP is not included in the portfolio (assumes retirement 12/31/2024) | ☑ | ☑ | | ☑ |
| **Carbon-Free (annual emissions requirement):** Starting with 2023 carbon emissions, ramp down linearly to zero in 2035 | ☑ | ☑ | | ☑ |
| **65% Renewable (annual renewable energy requirement):** Ensure renewable energy production is at least 65% of load in 2027 and beyond | ☑ | ☑ | | ☑ |
| **Green Hydrogen (conversion requirement):** All new and existing natural gas plants convert to green hydrogen fuel in the 2030s | ☑ | | | ☑ |
| **Local Reliability:** Ensure local firm capacity (ELCC adjusted) plus import capacity exceeds annual peak load | ☑ | ☑ | ☑ | |
| **Enhanced Local Reliability:** Ensure local firm capacity (ELCC adjusted) plus import capacity exceeds annual peak load with 15% margin | | | | ☑ |
| **No New Natural Gas or Hydrogen:** Prevents new natural gas or hydrogen units from satisfying local reliability requirement | | ☑ | | |
| **Reduced Natural Gas Dispatch (REACH requirement):** Applies a REACH adder to existing natural gas plants and retires the units at the end of 2034 | | ☑ | | |
| **No Fuel Restrictions:** Allows continued operation of natural gas plants without hydrogen conversion | | | ☑ | |

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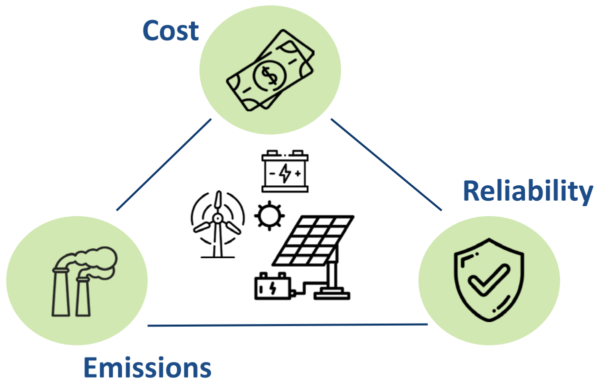
## Ascend's Capacity Expansion Model

**Ascend's capacity expansion model takes forecasts of load, weather, and market prices as inputs. It receives a set of technologies that can be built, and constraints that it must meet (including emissions, renewables, and reliability targets). It finds the cost-optimal resource buildout that satisfies these constraints.**



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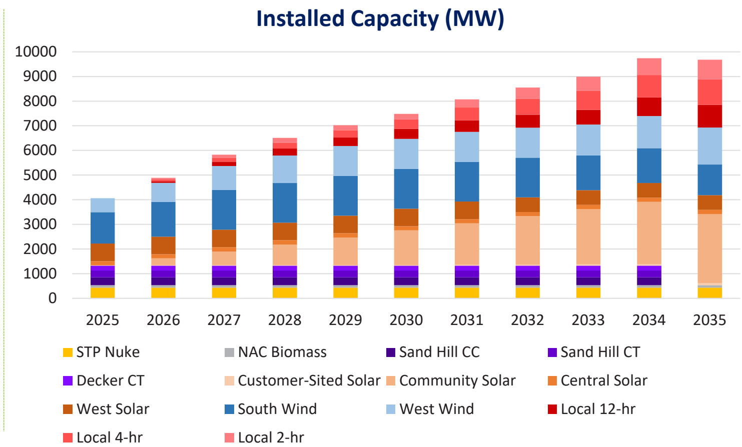
## Portfolio B: Reaching Zero Emissions with Renewables and Batteries

**Buildouts: Wind PPA procurements, local solar and storage buildouts, and the retirement of all gas-fired units provide a way to reach zero emissions without green hydrogen**

- 1885 MW of wind PPAs are procured to satisfy the 65% renewable energy target
- 2750 MW of local storage, charged by 2800 MW of community solar, provides local energy and capacity
- REACH adders were added to Sand Hill and Decker. They reduce runtime, leading to lower emissions, and retire in 2034.



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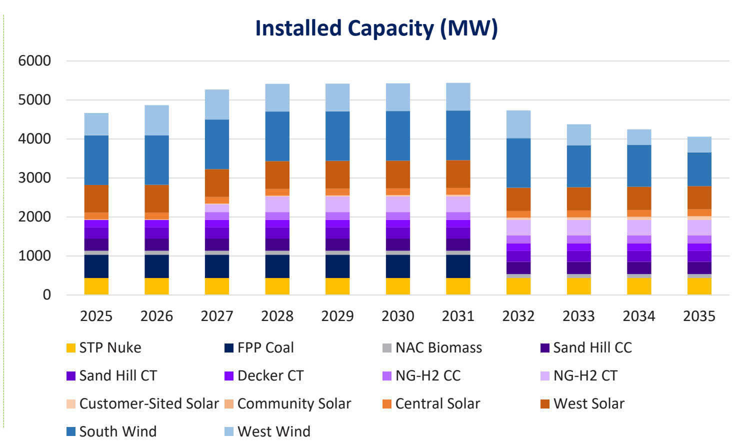
## Portfolio C: Economical and Reliable, but with High Emissions

**Buildouts: Only economic wind PPAs are procured. A local CC and several peakers are built for reliability. Sand Hill and Decker don't retire or convert.**

- 400 MW of economic wind PPAs are procured
- 400 MW of local peakers are built for reliability. A 200-MW, local CC is built for reliability.
- Sand Hill and Decker run on gas and don't retire
- FPP runs until end of 2031



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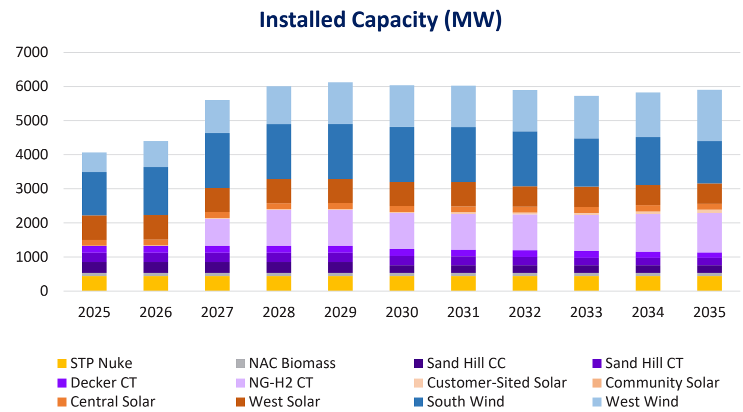
## Portfolio D: Enhanced Reliability

**Buildouts: Wind PPA procurements, increased new gas buildouts, and conversion of both existing and new gas to hydrogen provide a clean portfolio with enhanced reliability**

- 1885 MW of wind PPAs are procured to satisfy the 65% renewable energy target
- 1,155 MW of new, local, hydrogen-capable peakers built for enhanced reliability
- Sand Hill, Decker, and new peakers are converted to burn hydrogen in the 2030s and achieve zero carbon emissions by 2035





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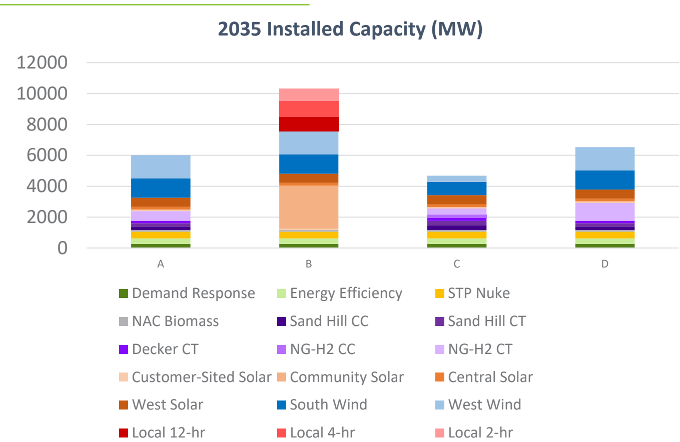
## Portfolio Buildouts

- In Portfolios A, B, & D, wind and solar provide most of the energy by 2035
- West and South wind are the primary renewables selected due to their lower net costs.
- Portfolios A, C, & D build local peakers and CCs to provide reliability, whereas Portfolio B uses local storage and solar
- Portfolio A has 1,330 MW of local generation, whereas Portfolio B has 5,631 MW.
- Numbers for this graph are in a table in the Appendix




**Portfolios A, B & D have more buildouts than Portfolio C to achieve the renewable energy target**





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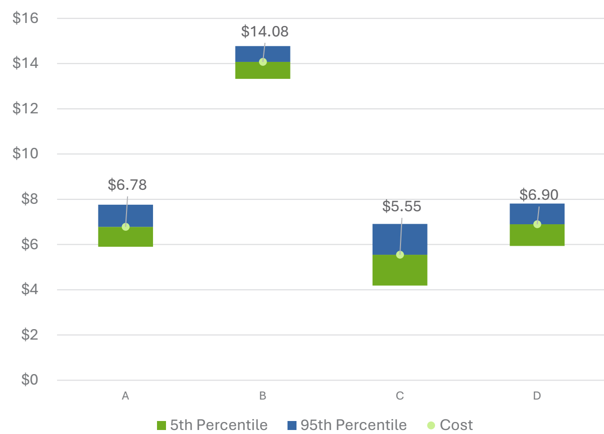
## Portfolio Costs

- **Portfolio A**: A steady increase in net costs from building new peakers, converting peakers and CCs to hydrogen, and procuring wind PPAs
- **Portfolio B:** Most expensive option, with most costs coming from battery tolls and community solar
- **Portfolio C:** Having plants burn gas and only procuring economical PPAs yields the lowest-cost portfolio, but is the only one with carbon and SO2 emissions in 2035
- **Portfolio D:** Similar to Portfolio A. Increased peaker buildout has roughly equal cost and revenue.

**Rates* increase marginally from 9.5c/kWh in 2025 to 12-13c/kWh in 2035, for Portfolios A, C, & D. Portfolio B has much higher rates: 20c/kWh in 2035.**

**Net Portfolio Cost NPV, 2025-2045 ($B)**




*DISCLAIMER: these are representative results based on modeling for the 2035 Resource Generation Plan and are not projections of AE's future prices. The results are not inclusive of factors beyond the scope of this modeling. These rates are not comparable to bill impact for Uplan analysis.



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## Portfolio Costs Continued

| Cost Metric | Portfolio A | Portfolio B | Portfolio C | Portfolio D |
|---|---|---|---|---|
| 2035 Rates ($/kWh) | 0.132 | 0.202 | 0.121 | 0.133 |
| **2025-2045 NPV ($B)** | | | | |
| Net Costs Mean | $6.78 | $14.08 | $5.55 | $6.90 |
| Net Costs P5 | $5.90 | $13.33 | $4.18 | $5.94 |
| Net Costs P95 | $7.76 | $14.77 | $6.91 | $7.81 |
| Load Costs | $6.70 | $6.70 | $6.70 | $6.70 |
| Levelized Capital Costs | $0.36 | $4.37 | $0.34 | $0.61 |
| O&M costs | $6.15 | $10.55 | $4.07 | $6.25 |
| Revenue | $6.43 | $7.55 | $5.56 | $6.66 |



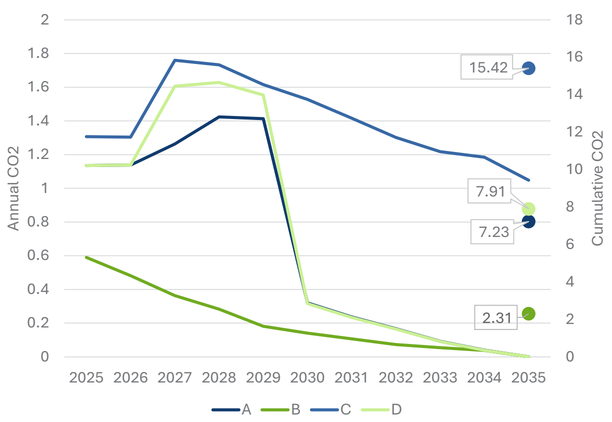


## Portfolio Emissions

- Emissions are significantly reduced by 2030 in Portfolios A, B, & D, as gas plants convert to hydrogen or operate at low capacity factors
- Compared to Portfolio A, cumulative emissions decrease 68% in B, more than double in C, and increase 9% in D
- In 2035, only Portfolio C has carbon emissions
- Portfolio B is the only portfolio that does not emit NOx in 2035, because it retires all its thermal assets in 2034

**Zero carbon emissions can be achieved either by converting gas-burning plants to hydrogen, or by retiring & replacing them with local solar and storage.**

**Annual and Cumulative CO2 Emissions (Million Tons)**





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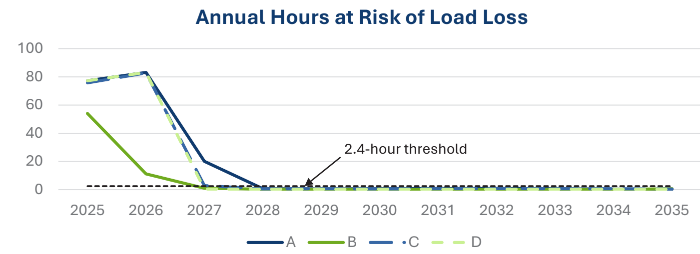
## Portfolio Reliability

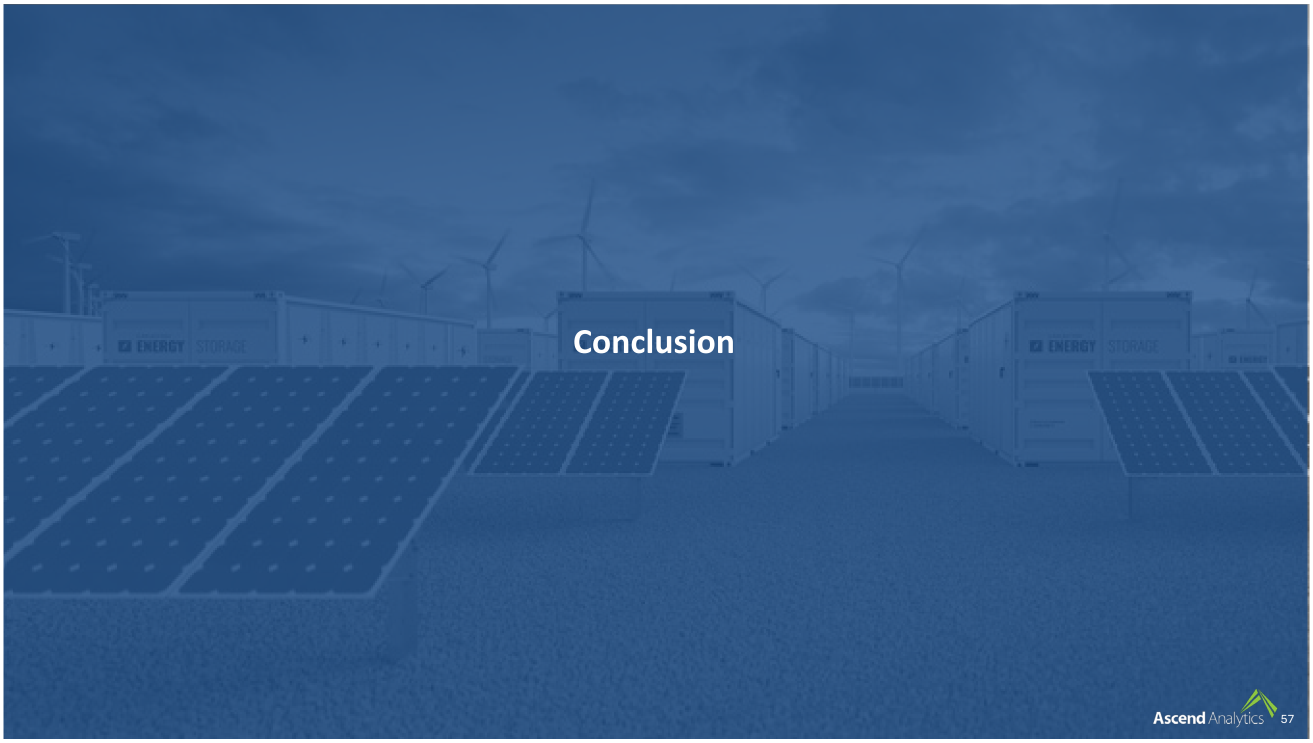
- Reliability improves over time, with all portfolios far more reliable in 2035 than in 2025 as more local resources are built to serve high load periods. All are below a typical 2.4-hour threshold used in reliability analysis.
- Portfolios start with ~70 hours at risk of load loss, decreasing to under one hour by 2035
- Extra local, firm peaker capacity enables Portfolio D to handle extreme load events and contingencies
- Reliant solely on transmission, local solar, & local storage for energy and capacity in 2035, Portfolio B has the highest risk of load loss




| 2035 Hours at Risk of Load Loss | Portfolio A | Portfolio B | Portfolio C | Portfolio D |
|---|---|---|---|---|
| P5 | 0.16 | 0 | 0.14 | 0.15 |
| MEAN | 0.28 | 0.63 | 0.44 | 0.25 |
| P95 | 0.63 | 4.76 | 0.89 | 0.40 |







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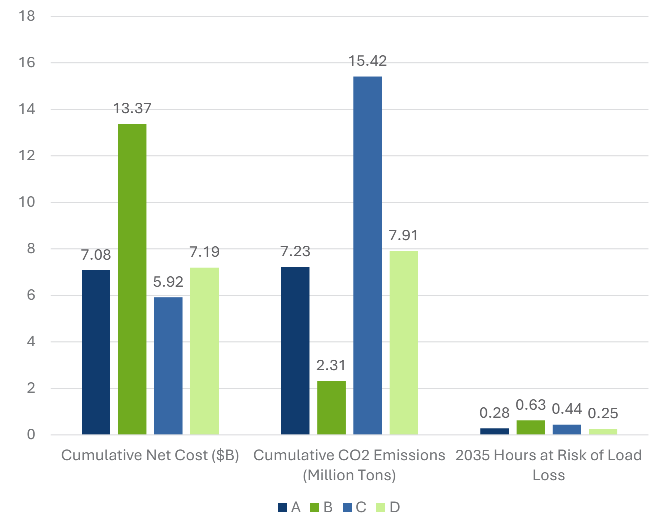
## Key Takeaways

- **Using renewables and storage instead of peakers is very expensive:** In Portfolio B, costs nearly double and 28,000 acres in Austin are required to site solar and storage (10% of Austin Energy's service area). However, B is the only Portfolio with no NOx emissions in 2035.
- **There is increasing marginal cost to remove emissions:** Reducing cumulative carbon emissions from 15 to 7 Million tons increases total net costs by $1 Billion. Further reducing emissions from 7 to 2 million tons increases costs by $6 Billion.
- **All Portfolios are reliable by 2035:** Portfolio D adds 525 MW more local peakers than A does. This improves reliability and increases emissions by about 10% each and has a negligible cost impact.





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## Moving Forward...

There is more than one way to get to zero supply stack emissions by 2035

In finding a balance between cost and emissions over the next decade, there is increasing marginal cost to remove emissions

To achieve zero carbon and local reliability, limiting which dispatchable technologies can be chosen has the potential to greatly increase cost and siting needs.

Building local peakers increases reliability with a negligible increase in cost and a marginal increase in emissions.





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## Increased Cost from Removing Thermal Generation (A vs B)

- Portfolio A serves as a baseline because it meets carbon emissions, renewables, and reliability targets at the lowest cost
- Portfolio B cannot build new peakers and retires existing gas-burning peakers in 2034. To maintain a reliable system, it must build out 2800 MW of community solar and 2750 MW of local storage by 2035.
- This buildout needs about 28,000 acres of land
- B is the only Portfolio with no NOx emissions in 2035
- Cumulative CO2 emissions are the lowest, down 68% from Portfolio A, due to a REACH adder on gas-burning plants and no new gas plants built
- **If renewables and storage are used instead of new peakers, costs double and massive amounts of land are required to maintain a reliable system**

| | Portfolio A | Portfolio B | Difference (B-A) |
|---|---|---|---|
| Net Cost NPV ($B) | $6.8 | $14.1 | $7.3 |
| Cumulative CO2 emissions (Million Tons) | 7.2 | 2.3 | -4.9 |
| 2035 NOx Emissions (Ton) | 120 | 0 | -120 |





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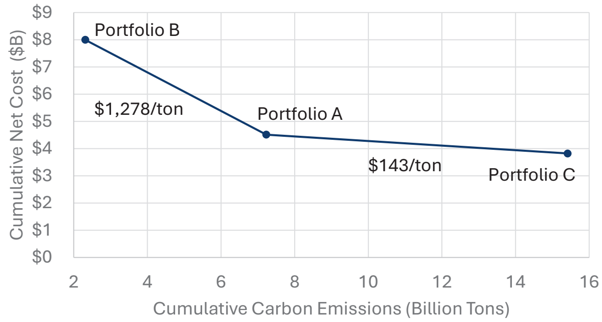
## The Cost of Reducing Cumulative Emissions through 2035

- Portfolio A converts all gas to hydrogen by 2035, achieving zero emissions
- Portfolio B retires all gas and builds solar + storage by 2035, achieving zero emissions
- Portfolio C keeps gas plants online through 2035
- B has only 1/3 the cumulative carbon emissions, but double the cost, of A
- C has over double the cumulative emissions, but 18% lower cost, than A
- Comparing A and C's cumulative costs and emissions: from 2025-2035, it costs $143/ton CO2 saved
- This cost is similar to an estimated levelized cost to add 95% carbon capture and sequestration to the Sand Hill CC. ($138/ton), and on the lower end of an estimated cost range for direct air capture ($100-340/ton).
- Comparing A and B's cumulative costs and emissions: from 2025-2035, it costs $1,278/ton CO2 saved
- Comparing A and C's 2035 cost and emissions: it costs $174/ton CO2 saved

**There is increasing marginal cost to remove cumulative emissions beyond Portfolio A's levels**

| | Portfolio A | Portfolio B | Portfolio C |
|---|---|---|---|
| Cumulative Net Cost ($B) | $7.1 | $14.1 | $5.9 |
| Cumulative CO2 emissions (Million Tons) | 7.2 | 2.3 | 15.4 |
| 2035 Net Cost ($M) | 767 | 2,050 | 584 |
| 2035 CO2 Emissions | 0 | 0 | 1,048 |





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## Building Local Peakers for Reliability (A vs D)

- Portfolio D is identical to Portfolio A, but with increased local peaker buildout
- In both portfolios, new local peakers switch from gas to hydrogen in 2030
- Both portfolios are reliable, but D will be more resilient in the face of extreme weather events and contingencies, with less price separation
- Portfolio D has 9% more cumulative emissions (occurring before 2030)
- The revenue and costs of the peakers are roughly equal
- **Local peakers increase reliability with minimal emissions or cost penalties**

| | Portfolio A | Portfolio D | Difference (D-A) |
|---|---|---|---|
| 2035 peakers (MW) | 630 | 1,155 | 525 |
| 2035 HatR P5 | 0.16 | 0.15 | -0.01 |
| 2035 HatR Mean | 0.28 | 0.25 | -0.03 |
| 2035 HatR P95 | 0.63 | 0.40 | -0.23 |
| Net Cost NPV ($B) | $6.78 | $6.90 | $0.11 |
| Cumulative CO2 emissions (Million Tons) | 7.2 | 7.9 | 0.68 |

HatR: Hours at Risk





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## High Level Comparison

| 2035 Electric Rates ($/kWh) | Portfolio A | Portfolio B | Portfolio C | Portfolio D |
|---|---|---|---|---|
| P5 | 0.126 | 0.198 | 0.112 | 0.127 |
| MEAN | 0.132 | 0.202 | 0.121 | 0.133 |
| P95 | 0.137 | 0.206 | 0.132 | 0.138 |

| Cumulative CO2 Emissions (Million Tons) | Portfolio A | Portfolio B | Portfolio C | Portfolio D |
|---|---|---|---|---|
| P5 | 5.9 | 1.4 | 11.3 | 6.2 |
| MEAN | 7.2 | 23.1 | 15.4 | 7.9 |
| P95 | 8.8 | 3.8 | 22.6 | 10.1 |

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## 2035 Installed Capacity (MW)

| 2035 Installed capacity (MW) | A | B | C | D |
|---|---|---|---|---|
| STP Nuclear | 435 | 435 | 435 | 435 |
| NAC Biomass | 100 | 100 | 100 | 100 |
| Sand Hill CC | 220 | 0 | 314 | 220 |
| Sand Hill peaker | 226 | 0 | 282 | 226 |
| Decker peaker | 156 | 0 | 195 | 156 |
| NG-H2 CC | 0 | 0 | 200 | 0 |
| NG-H2 peaker | 630 | 0 | 400 | 1155 |
| Customer-Sited Solar | 81 | 81 | 81 | 81 |
| Community Solar | 18 | 2800 | 18 | 18 |
| Central Solar | 173 | 173 | 173 | 173 |
| West Solar | 595 | 595 | 595 | 595 |
| South Wind | 1244 | 1244 | 864 | 1244 |
| West Wind | 1505 | 1505 | 400 | 1505 |
| Local 12-hr | 0 | 915 | 0 | 0 |
| Local 4-hr | 0 | 1040 | 0 | 0 |
| Local 2-hr | 0 | 795 | 0 | 0 |
| Demand Response | 270 | 270 | 270 | 270 |
| Energy Efficiency | 360 | 360 | 360 | 360 |





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**Questions from EUC Commissioners White and Reed**
**on DNV Market Potential Study Values Used in Modeling**
**October 25, 2024**

1. What were the assumptions and methodology used in reaching the economic potential and technical potential and market potential numbers for energy efficiency, demand response and local solar?
2. What programs were assumed to exist and start dates for any new programs?
3. What types for community outreach was assumed for various programs at what funding levels? Was door-to-door outreach included?
4. Was a battery tariff assumed? If so, starting when and at what rate(s)?
5. Was a battery incentive assumed? If so, starting when and how much?
6. For all demand response programs, was it assumed customers would be paid for participating in each event? If so, starting when and how much?
7. Which appliances were assumed to be able to participate in demand response? What were the start dates for any new additions?
8. Were the SECO HOMES and HEAR programs assumed to exist?
9. What staffing increases were assumed?
10. What budgets were assumed for each program?
11. What electric rate increases were assumed?
12. What types of partnerships and external contracts were assumed?
13. What other data points were factored into determining growth projections?
14. In terms of the economic potential levels for Demand Response (269 MWs), and Energy Efficiency (360 MWs), did DNV calculate those totals based on summer peak only? Did DNV also look at winter programs and if so what levels of demand reduction were found to meet the Economic Market Potential?
15. IN terms of EE, DR and Local Solar, what technical potential did DNV identify by 2035 beyond the economic market potential?
16. Did the Local Solar economic potential level take into account the $31 million received in federal funds for the Solar for All program? If so, what level of MWs was assumed to be achieved through this program by 2035?
17. Did the Local Solar economic potential level take into account the new standard offer program expected to be adopted by City Council today? If so, how many MWs were assumed to be generated by this program by 2035?
18. The EUC has asked for several portfolios to be developed that involve higher levels of EE, DR and local solar. As an example, one of those portfolios assumes that 540 MWs of EE could be achieved by 2035, or about 180 MWs higher than the DNV market potential, 300 MWs of DR, so about 21 MWs of additional DR, and 700 MWs of local solar, that is about 269 MWs higher than the DNV market potential identified. What is DNVs opinion if any about achieving these higher levels of EE, DR and local solar within the 10-year time frame?





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**1. Q. What were the assumptions and methodology used in reaching the economic potential and technical potential and market potential numbers for energy efficiency, demand response and local solar?**

**R.** The DNV team provides deep capabilities in the full range of technology, market, economic, and regulatory analytics for DSM and DERs, along with extensive experience in shaping and supporting technology and policy-oriented stakeholder processes. With decades of experience providing these services, DNV has developed analytical methodologies and computer-based tools that estimate savings potential and customer adoption. In addition to DNV's support of Austin Energy's previous studies as referenced in the Resource & Generation Plan in 2012, 2015 and 2021, other recent projects completed by the DNV team include:

- A programmatic potential study for the Tennessee Valley Authority (TVA) region including energy efficiency and demand response. The study will be used to support planning initiatives (both integrated resource plans and impact assessments) and program design efforts.
- Using the data from the Phase One 2021-2023 Industrial Stock Study (also performed by DNV), DNV estimated technical, economic, and achievable potential over a 3-year, 8-year, 15-year, and 20-year period from 2023-2042 for decarbonization of the industrial sector in New York.
- DNV is currently assessing the potential for electric energy (kWh) savings in the residential and commercial sectors from company-sponsored demand side management (DSM) programs over a 10-year horizon from 2024 to 2034 in Dominion Energy's Virginia and North Carolina service territories. This is the fourth Market Potential Study that DNV has conducted for Dominion Energy in the past decade.
- DNV prepared a Long-Term Private Generation (PG) Resource Assessment for PacifiCorp covering the service territories in Utah, Oregon, Idaho, Wyoming, California, and Washington to support PacifiCorp's 2023 Integrated Resource Plan (IRP). This study evaluated the expected adoption of behind-the-meter distributed energy resources (BTM DERs), including photovoltaic solar (PV only), photovoltaic solar coupled with battery storage (PV + Battery), wind, small hydro, reciprocating engines, and microturbines for a 20-year forecast horizon (2023-2042).

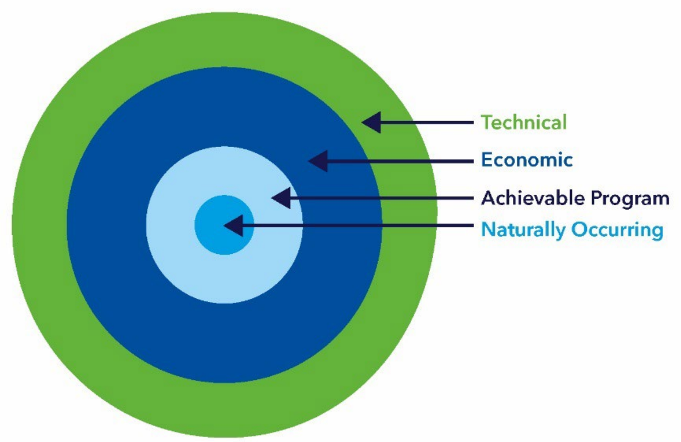
For this study DNV leveraged our fully vetted model, DSM Assyst™. DSM Assyst™ is an industry-recognized, spreadsheet-based model, that uses a bottom-up approach. The tool builds up potential estimates from underlying assumptions about measure costs, savings, and applicability grounded in data provided by Austin Energy or from industry secondary sources.

At its core, this study represents a modeling exercise that is intended to support the development of future goals that can help drive program achievements based on our estimates of potential. These estimates can be used by Austin Energy to develop realistic implementation plans and achievable targets for MW reductions.

Within this study DNV defines several *types* of *potential*, namely technical, economic, achievable program, and naturally occurring. These types of potential are conceptualized in Figure 1 and described below:

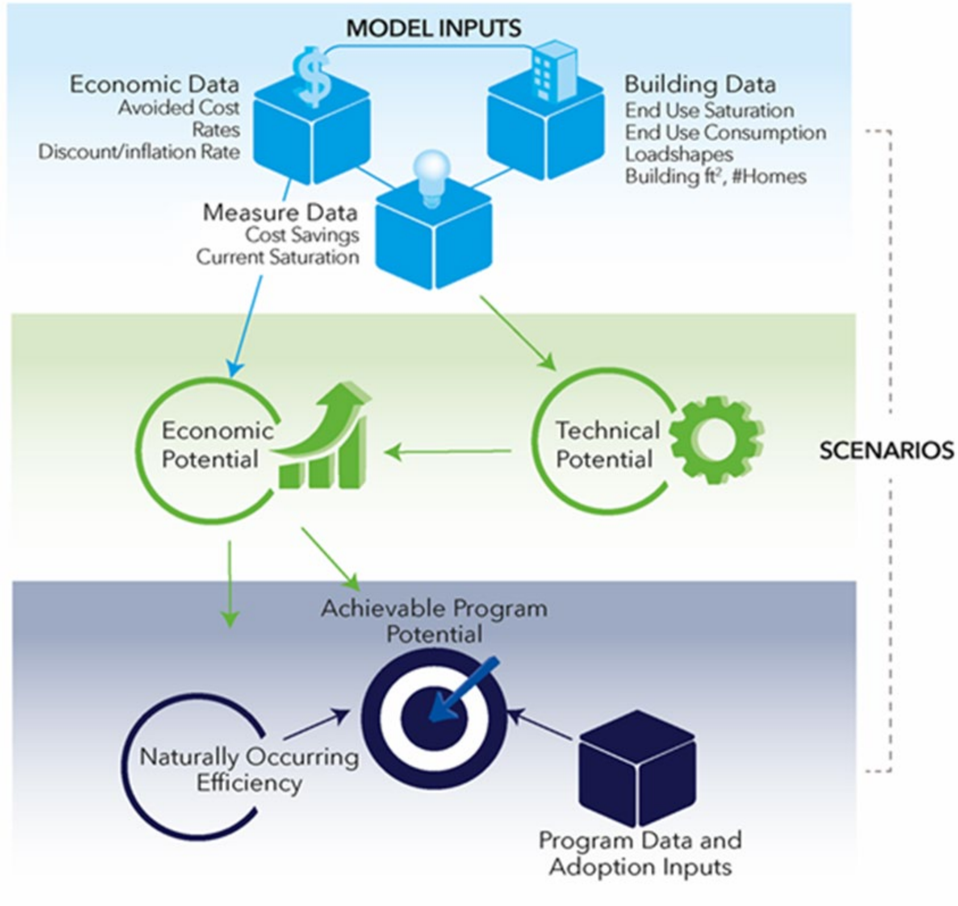
- Technical potential is defined in this study as the complete penetration of all measures analyzed in applications where they were deemed technically feasible from an engineering perspective.
- Economic potential refers to the technical potential of those energy conservation measures that are cost-effective when compared to supply-side alternatives.
- Achievable program potential refers to the amount of savings that would occur in response to various measure incentive levels. Savings associated with program potential are savings that are projected beyond those that would occur naturally in the absence of any market intervention.
- Naturally occurring potential refers to the amount of savings estimated to occur as a result of normal market forces; that is, in the absence of any utility or governmental intervention.
- **Market Potential,** which was also provided in this study, includes both achievable potential and naturally occurring potential. Note that for demand response, naturally occurring potential is zero.

**Figure 1. Conceptual relationship among potential definitions**




The crux of DNV's analysis involved carrying out several basic analytical steps to produce estimates of the potentials introduced above. The basic analytical steps for this study are shown in relation to one another in Figure 2. The bulk of the analytical process is carried out in the DSM ASSYST model.

**Figure 2. Conceptual overview of study process**




The key steps implemented in this study are:

1. Develop Initial Input Data
    a) Measure data:
        a. Energy Efficiency: Develop a list of energy efficiency measure opportunities to include in scope based on the measure list developed for the 2020 study with adjustments to reflect current program designs and codes and standards.
        b. Solar and Storage: A list of solar and storage options that aligns with Austin Energy's current programs was developed in consultation with the Austin Energy Team.
        c. Demand Response: A list of program options and controllable technologies was developed in consultation with the Austin Energy Team.
    b) Gather and develop technical data (costs and savings) on measures and opportunities. Data on measures were gathered from a variety of sources including:
        a. ENERGY STAR Calculators

b. U.S. Energy Information Administration (EIA) Commercial Buildings Energy Consumption Survey (CBECS)
c. EIA Residential Energy Consumption Survey (RECS)
d. Texas Technical Reference Manual (TRM)
e. Austin Energy program tracking data and program reports
f. Professional judgment of DNV engineers with experience in Austin Energy's service territory
g. Northwest Power and Conservation Council 2021 Power Plan technical resources for demand Response in the state of Utah
h. DNV's internal DER cost database, developed from data sources including NREL Annual Technology Baseline (ATB), LBL's Tracking the Sun Database, and actual project cost reviews

c) Gather, analyze, and develop information on building characteristics, including total square footage or total number of households, average available rooftop space and technically viable customers by customer segment, energy consumption and intensity by end use, market shares of key electric consuming equipment, and market shares of energy efficiency technologies and practices.
   a. U.S. Energy Information Administration (EIA) Commercial Buildings Energy Consumption Survey (CBECS)
   b. EIA Residential Energy Consumption Survey (RECS)
   c. Billing data to identify consumption residential and commercial customers
   d. System load data
   e. Other secondary studies for specific end-uses

d) Collect data on economic parameters: avoided costs, electricity rates, discount rates, and inflation rate as provided by Austin Energy.

2. Estimate Technical Potential

   a) Match and integrate data on energy saving measures and opportunities to data on existing building characteristics to produce estimates of technical potential.

3. Estimate Economic Potential

   a) Match and integrate measure and building data with economic assumptions to produce indicators of costs from different viewpoints (e.g., societal and consumer).
   b) Estimate total economic potential.

4. Estimate Achievable Program and Naturally Occurring Potentials

   a) Screen initial measures for inclusion in the program analysis. This screening may take into account factors such as cost-effectiveness, potential market size, non-energy benefits, market barriers, and potentially adverse effects associated with a measure. For this study, measures were screened using the total-resource-cost test.
   b) Gather and develop estimates of program costs (e.g., for incentives, administration, and marketing) and historic program savings.
   c) Develop estimates of customer adoption of energy efficiency measures as a function of the economic attractiveness of the measures, barriers to their adoption, and the effects of program intervention. This process utilized Austin's past program performance metrics to calibrate the model's adoption curves.



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d) Estimate achievable program and naturally occurring potentials and associated program costs.

**2. Q. What programs were assumed to exist and start dates for any new programs?**

**R.** The Energy Efficiency analysis reflects the inclusion of all existing programs except the school kits program which was not included in the 2020 analysis. The school-based education program, as determined in consultation with Austin Energy, was expected to have very small savings potential and was thus not added to the EE analysis.

The Solar analysis includes all existing programs plus the addition of the following new programs: Solar Standard Offer, and Solar for All. Potential for new programs was estimated beginning in 2025.

The demand response analysis includes all existing programs plus the addition of new programs targeting the following end-uses and segments: Water Heaters and Battery Storage. Potential for new programs was estimated beginning in 2025.

**3. Q. What types for community outreach was assumed for various programs at what funding levels? Was door-to-door outreach included?**

**R.** Funding levels, or program costs, were determined based on historical spending. The potential modeling occurs at a high level and does not incorporate granular assumptions around specific types of outreach.

**4. Q. Was a battery tariff assumed? If so, starting when and at what rate(s)?**

**R.** No, a battery tariff was not modeled as part of the analysis.

**5. Q. Was a battery incentive assumed? If so, starting when and how much?**

**R.** Yes, a battery incentive was assumed within the solar and storage and demand response analyses.

The solar and storage incentives were both rebate and performance-based incentives (PBI) applied to relevant residential and non-residential customer segments beginning at the time of install. These were based on existing Austin Energy solar incentives and expected future changes. Additionally, the "Solar for All" incentives were applied in the adoption modeling for low-income customers.

The demand response incentive for battery storage was $50/kW annually for participation in DR events beginning at the time of enrollment.

**6. Q. For all demand response programs, was it assumed customers would be paid for participating in each event? If so, starting when and how much?**



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R. No, for all demand response programs participant incentives were assumed to be paid annually with an event frequency of 15-20 events per year. The annual incentives were based on Austin Energy's current incentives where possible and on incentives being offered by similar programs in the industry where not available. Incentives would commence in 2025 upon enrollment and are as follows:

a. Smart Thermostats $85/year
b. Batteries $50/kW/year
c. EV Charging $50/year
d. Water Heaters $20/year
e. Behavioral DR $0/year
f. Pool Pumps $300 one time incentive on variable speed pool pump
g. The C&I DR programs are incentivized based on the average response across all events at a range of $50 to $80/kW aligning with the current commercial demand response program.

**7. Q: Which appliances were assumed to be able to participate in demand response? What were the start dates for any new additions?**

**R.** The demand response analysis includes programs targeting the following end-uses and segments:

a. Water heaters
b. Batteries
c. EV Chargers
d. Pool pumps
e. Smart Thermostats in the residential and small / medium C&I sector

Potential for new programs was estimated beginning in 2025 ramping up to full participation over several years.

**8. Q: We're the SECO HOMES and HEAR programs assumed to exist?**

**R.** For energy efficiency and solar we looked at different scenarios that cover different percentages of the incremental cost – baseline (meaning current incentive levels), 75% and 100%. The more of the incremental cost is covered, the higher the uptake. Meaning, if 100% of a measure like attic insulation was covered through incentives, uptake would be maximized. Those values were available for information purposes, and the utility may choose to use them depending on how those programs manifest in your territory.

The 75% and 100% scenarios are intended to represent what savings could likely be achieved if the cost to the customer is reduced through additional incentive dollars. While the 75% and 100% do not explicitly assume funding is coming from HOMES and HEAR, Austin Energy could evaluate the budget and savings impact of these scenarios to assume some of the incentive dollars will be provided by SECO.

**9. Q: What staffing increases were assumed?**

**R.** The DNV analysis does not make explicit assumptions about staffing increases, however each program does make assumptions around administrative costs, from a high level, that are needed to support the programs.

**10. Q: What budgets were assumed for each program?**

**R.** Program costs, including incentives, administration, and marketing are developed based on historic program information and/or secondary data and include an inflation rate of 2.5%.

**11. Q: What electric rate increases were assumed?**

**R.** For solar and battery storage adoption the following electric rate assumptions were included:

- Current rate class tariff data used based on city of Austin utility rates and fees schedule (both energy and demand)
- Electric rate forecast by customer segment from EIA Annual Energy Outlook (AEO) 2024 for Texas applied to current rates
- Value of Solar (VoS) rates and forecast provided by AE for all scenarios

For Energy Efficiency DNV did not update the electric rates from the 2020 study in order to meet the study's July 31 deadline. The 2020 retail rates were developed by applying the 2.5% inflation rate provided by Austin Energy to the 2018 EIA average energy rate.

Changes in rates are usually not significant enough difference to move the needle. These are not super elastic, and rates would need to be significantly different to change the results. DNV does these types of analyses all over the country and between places with high rates (California) vs. low rates (Oklahoma), the results are very consistent.

For the demand response analysis, the current rate class tariff structure was assumed for all customers. Electric rate increases are not explicitly modeled; however, overall achievable participation rates account for general industry trends including increasing electricity rates and a desire to seek out additional bill savings.

**12. Q: What types of partnerships and external contracts were assumed?**

**R.** Partnerships and external contracts are not addressed in the scope of the potential study but could be considered in an implementation plan.

**13. Q: What other data points were factored into determining growth projections?**

**R**. Customer adoption, or participation, is an important element when determining growth projections. To forecast adoption DNV's study relies on our broad industry expertise, Austin Energy's implementation experience, and the development of adoption curves as follows.

- Adoption is estimated based on the annual percentage of available customers (those eligible for the technology in a given year) and customer behavior. We refer to this as availability.
- Availability is based on the building stock (developed using counts of Austin Energy customers and building growth rates based on Austin construction permits), existing measure saturations, and effective useful life of the existing technology.
- Customer behavior is reflected in a base diffusion curve which is designed to estimate how many available customers will adopt a technology at a given benefit-cost rate, which is influenced by incentive amounts. DNV has been developing these curves for over two

decades based on measure and program performance data and calibrated them to reflect Austin Energy's past program performance metrics.

**14. Q: In terms of the economic potential levels for Demand Response (269 MWs), and Energy Efficiency (360 MWs), did DNV calculate those totals based on summer peak only? Did DNV also look at winter programs and if so what levels of demand reduction were found to meet the Economic Market Potential?**

**R.** Yes, the MW are in terms of summer peak. Unfortunately, winter peak estimates were outside of our scope.

**15. Q: In terms of EE, DR and Local Solar, what technical potential did DNV identify by 2035 beyond the economic market potential?**

**R.** Technical potential is intended to quantify the upper limit of technical feasibility and assumes that 100% of all customers that can adopt a technology do adopt a technology regardless of cost effectiveness or other barriers.

- For Energy Efficiency DNV identified a total technical potential of 3,949 MW or an incremental 3,589 MW over market potential.
- For local solar + storage DNV identified a total technical potential of 1,597 MW or an incremental 1,166 MW over market potential.
- For Demand response DNV identified a total technical potential of 1,889 MW or an incremental 896 MW over market potential.

**16. Q: Did the Local Solar economic potential level take into account the $31 million received in federal funds for the Solar for All program? If so, what level of MWs was assumed to be achieved through this program by 2035?**

**R.** Yes, the adoption modeling included "Solar for All" incentives that were applied to low-income customers that could receive paired solar plus battery systems as part of 15-year Power Purchase Agreements (PPA). These economic achievable results are included in the scenario adoption results and were broken out separately. Modeling results indicate ~18 MW of solar PV and ~14.9 MW of battery storage adopted through the "Solar for All" program by 2035.

**17. Q: Did the Local Solar economic potential level take into account the new standard offer program expected to be adopted by City Council today? If so, how many MWs were assumed to be generated by this program by 2035?**

**R.** Community solar was modeled separately compared to individual customer-sited or "local" adoption. Two different community solar scenarios were modeled: one current incentive scenario and one scenario that included updated "Standard Offer" assumptions. The current incentive scenario resulted in ~7.5 MW of economic achievable potential by 2035, and the 'Standard Offer" scenario resulted in ~34.9 MW of potential by 2035.

**18. Q: The EUC has asked for several portfolios to be developed that involve higher levels of EE, DR and local solar. As an example, one of those portfolios assumes that 540 MWs of EE could be achieved by 2035, or about 180 MWs higher than the DNV market potential, 300 MWs of DR, so about 21 MWs of additional DR, and 700 MWs of local solar, that is about**


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**269 MWs higher than the DNV market potential identified. What is DNVs opinion if any about achieving these higher levels of EE, DR and local solar within the 10-year time frame?**

**R.** In general, market potential is seen as an estimate of what could be achieved under ideal conditions, subject to our assumptions around incentives, and program costs, while conforming to industry best practices. As such, in order to achieve higher levels of potential, additional funds and resources would need to be committed, as well as substantial effort expended to break down barriers to adoption and participation. Additional thoughts for each area are presented below:

- For energy efficiency, increasing savings by 50% would be challenging under the time horizon, requiring increased program spending, program staff, and implementation staff. It would also assume the availability of the equipment and workforce to facilitate installations which we know to be a barrier industry-wide.
- For local solar, a 62% increase in the savings that results in capturing 43% of the total technical potential would likely be extremely challenging. Here, the biggest barrier is cost of the systems and would require a significant investment in incentives in order to make the decision to purchase equipment cost effective for consumers. In addition, there are also supply chain concerns and interconnection barriers that would limit the amount of solar that could be realistically installed over a 10-year time horizon.
- For Demand Response an increase of approximately 11% would be most challenging in terms of participation. The participation rates that were used in the analysis are at the upper end of what is currently considered achievable within the industry. Significant increases in incentives that could render the programs not cost effective may be required to push past those upper limits.

Some additional research on barriers to adoption completed by DNV can be found here: https://www.energy.nh.gov/sites/g/files/ehbemt551/files/inline-documents/sonh/24-market-barriers-nh-energy-efficiency.pdf

## Summary of Presentations by the Electric Power Research Institute (EPRI) Related to the Clean Energy Transition

In March and May of 2024, EPRI[1] executives visited with Austin Energy executive team members to discuss the clean energy transition facing the electric utility sector with an emphasis on technology solutions and their expected timelines for adoption. In support of the current Resource Generation Plan work, Austin Energy reviewed two presentations provided by EPRI, highlighted key EPRI points (**in bold text below**) and included additional comments (in blue text below) relating the material to the ongoing Resource Generation Plan. While EPRI's view is nation-wide, many of their points are applicable in the ERCOT region.

- **The on-going clean energy transition provides new opportunities for utilities, but will be progressively more challenging.**
  - Based on our experience over the last two decades being a leading utility in transitioning our energy supply to cleaner resources, Austin Energy agrees with EPRI's core conclusion. We are now among the leading utilities facing challenges in attaining greater carbon-free supply while ensuring affordability and reliability for customers.
- **2030 Strategic Imperatives for the utility sector include:**

  **Accelerate Energy Supply Innovation**
  **Maximize Existing Resource Utilization**
  **Advance Load Forecasting, System Operations, Integrated Planning**
  **Enhance Grid Climate Adaptability and Resilience**
  **Reimagine Shared Customer Resource**

  - Austin Energy aims to incorporate these imperatives into our Resource Generation Plan and/or related operational plans. We agree with EPRI's statements that solutions to address all the imperatives may not yet be viable, and their successful commercialization will require contributions from other sectors such as government, manufacturing, and research/academia.
- **Emerging low-carbon dispatchable technologies will be required to manage intermittency associated with bulk renewables. Most of those technologies are not yet commercially available.**
  - Austin Energy agrees and notes that the intermittency of resources in ERCOT is resulting in financial and reliability risk. Addressing intermittency will be a focus of our Resource Generation Plan efforts. Further clean energy transition will require consideration of

[1] Electric Power Research Institute. "EPRI is a research organization that follows the science to help power society toward a reliable, affordable, and resilient energy future. Rigorously objective in our role and our research, we do not advocate for any specific company, sector, or technology. With a foundational mission to benefit society, EPRI delivers independent, objective thought leadership and industry expertise through a highly collaborative approach." (https://www.epri.com/about)



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emerging and innovative technologies, and greater focus on understanding the risks vs benefits of those investments.

- **Balancing supply and demand with increasing amounts of distributed energy resources requires advances in grid planning and operational technologies.**
    - Austin Energy invests in advanced applications and technologies needed to meet current and future goals for demand side management (DSM) and distributed energy resources (DER), and we expect continued investment in the future.
- **Utilities need to increase resources dedicated to grid hardening and community resilience in anticipation of more extreme weather: 1-in-100-year events are now 1-in-10.**
    - Austin Energy has historically not included grid hardening goals/actions as part of its Resource Generation Plan but addresses those areas in its strategic and other operational plans. We are open to considering where these tie to the Resource Generation Plan to the extent they address values and priorities heard from our stakeholders.
- **A 2030 future could see significant new, controllable load behind the meter, depending on the extent of electrification.**
    - Austin Energy has been an industry leader in promoting electric vehicles, rooftop solar, demand response (DR) and other DSM programs. We have incorporated aggressive goals in previous Resource Generation Plans and will continue to position ourselves to accommodate the growth of customer-sited resources in a way that provides value to our customers.
- **Significant and rapid changes to load such as interconnection of high-MW data centers and shift of peaks to winter due to electrification will challenge the ability to maintain a reliable grid.**
    - Austin Energy agrees and will formally incorporate load pattern uncertainties into the resource planning process via scenarios and sensitivity analyses. Furthermore, the current resource planning effort will quantify the impacts of these load changes on reliability, affordability, and environmental sustainability. Austin Energy is partnering with third parties including EPRI to understand how to account for future load uncertainty.
- **Done right, the energy transition should improve energy affordability.**
    - EPRI's conclusions are based on a nationwide analysis of cost savings associated primarily with transition to electric vehicles. We note that EPRI's slides indicate the analysis does not factor in capital costs of new electrified equipment. Austin Energy agrees that a clean energy future has the potential to be more affordable for many customers, but this depends on many utility- and region-specific factors. Cost-to-customers is an important output and decision criterion used in this Resource Generation Planning effort.

# AUSTIN ENERGY RESOURCE, GENERATION AND CLIMATE PROTECTION PLAN TO 2035

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