Key Accounts Meeting
Summer 2017

Monday, July 31, 2017
Welcome

Jackie Sargent
2016 Resource Plan Update

Khalil Shalabi
Why Do Resource Planning?

- To support the Austin Energy Strategic Plan
- To meet the objectives of the Austin Climate Protection Plan (ACPP) – net zero carbon emissions by 2050 (among other goals)
- To manage cost and risk of energy to our customers – Affordability goals and rate volatility
- Manage customer load with behind the meter programs such as rooftop solar, energy efficiency, demand response and storage
- Other complimentary strategies and objectives such as those related to low income customers
Resource Planning Update Timeline

Nov 2016
• Overview to Austin Energy Utility Oversight Committee

Jan 2017
• Present scenarios & Input assumptions to Committee

Feb 2017
• Present preliminary recommendations to Committee

Mar 2017
• Present 2016 Generation Plan Update to Council
- 55% renewables by 2025 (30%)
- 900 MW Demand Side Management by 2025 (578MW)
  - 700 MW energy efficiency by 2020
  - Demand Response
    - 100 MW by 2020 and additional 100 MW by 2025 (54MW)
- 950 MW solar by 2025
  - 110 MW Local Solar by 2020 and additional 90 MW by 2025 if affordable (74 MW)
  - 750 MW Utility Scale Solar by 2025
    - 275.5 MWs Operational with E. Pecos (Bootleg) of 118 MW Commercial on 4/5/2017
    - 320 MW under contract
- CO₂ emissions
  - 20% reduction from 2005 levels by 2020 (Meeting)
  - Retirement of Fayette Coal Plant beginning in 2023 (in progress)
- Affordability
  - 2% limit per year (met)
  - Rates should be in the lower 50th percentile statewide (slightly above trending lower)
- 10 MW (lithium ion batteries) local storage by 2025 + 20 MW of thermal storage (17MW Thermal/3 MWe in progress)
- Retire Decker steam units by 2019 and replace with 500 MW efficient combined-cycle – subject to a third party study (complete)
EUC Resource Planning Working Group

**EUC**
Karen Hadden – EUC Chair and Working Group Chair  
Brent Heidebrecht – EUC Vice Chair  
Michael Osborne – Member EUC  
Cary Ferchill – Member EUC

**RMC**
Leo Dielmann – RMC Chair  
Cyrus Reed – RMC Vice Chair and Lone Star Sierra Club Representative  
Kaiba White – Member RMC and Public Citizen Representative  
Suzanne Vaughn – Member RMC

**Industrial Customer Representatives**
Todd Davey – NXP, Manager Corporate Services – Global Procurement  
Betty Dunkerley – Hospital/Large Commercial Representative

**Other Community Members and Representatives**
Paul Robbins – Environmentalist and Low Income Advocate  
Bob Batlan – Low Income Representative  
Janee Briesemeister – Low Income Advocate/Residential Customers  
Carlos Castañeda – Attorney/Community Member  
Rebecca Melancon – AIBA/Small and Midsize Commercial Customers  
Richard Halpin – Austin Interfaith Energy Group
Energy forecast follows similar trend with average growth rates of 1% for ERCOT and 0.7% for AE.
DSM and Local PV Goals

- 900 MW DSM by 2025
- 200 MW Local PV by 2025
* 100 MW Rooftop / Commercial

Years: 2016 to 2025

- Local PV
- DSM
Environmental Assumptions – CO₂

Source: ERCOT Analysis of The Impact of The Clean Power Plan
Capital
- 30 year 100% debt financing
- 5% interest rate (near term: 5 years)
- 5.5% interest rate (beyond year 6)
- Applies to CIP for current plants as well

Economic parameters
- General inflation @ 2%
- Discount Rate @ 5% (i.e. AE Weighted Average Cost of Capital)
For Solar assumed PPA through 2022 and ownership afterwards due to PTC/ITC expiration.
Strategies and Scenarios

Five broad Strategies with different themes

- Business as usual
- Increase goals
- Reduce risk & Improve Competitiveness
- AE Carbon Free Generation
- Net Zero Emissions
Scenario Descriptions

- **Strategy 1: Business As Usual**
  - SC1 – Current system, no new additions, PPAs expire per term (Does not meet goals)
  - SC1-A – Current system, no new additions, PPAs expire per term, meet renewable goals using RECs
  - SC1-B – Current Council goals: reduce/retire FPP, retire Decker in 2021, 900 MW DSM, 55% renewable, 200 MW PV (100 MW local) by 2025

- **Strategy 2: Increase Goals**
  - SC2-A – Current goals + 100 MW additional local PV
  - SC2-B – Current goals + 65% renewables by 2027
  - SC2-C – Current goals + 100 MW additional DSM
  - SC2-D – Current goals + 75% renewables by 2027
  - SC2-E – Current goals + 75% renewables by 2027 + 100 MW additional DSM
  - SC2-F – Current goals + 75% renewables by 2027 + double local storage goal to 20 MW
  - SC2-G – Current goals + 300 MW CAES
  - SC2-H – Current goals + 300 MW additional DSM + double local storage goal to 20 MW
  - SC2-I – SC2-E + 75% renewables by 2027
  - SC2-J – SC2-F + 300 MW CAES
  - SC2-K – Current goals + 75% renewables by 2027 + 125 – 175 MW Battery Storage at Decker
  - SC2-L – Current goals + 75% renewables by 2027 + 300 MW Battery Storage at Decker
Scenario Descriptions (Continued)

- **Strategy 3: Reduce Risk & Improve Competitiveness**
  - All additions of gas units occur after Decker retirement in 2021
  - SC3-A – Current goals + 300 MW new natural gas (NG) peakers (GTs)
  - SC3-B – Current goals + 500 MW (new 2x1) NG combined cycle (CC)
  - SC3-C – SC3-A + 65% renewables by 2027
  - SC3-D – SC3-B + 65% renewables by 2027

- **Strategy 4: AE Carbon Free Generation by 2030**
  - SC4-A – Current goals + Retire all Gas units by 2030

- **Strategy 5: Net Zero Carbon Emissions by 2030**
  - SC5-A – Current system, no new additions, PPAs expire per term, **meet 100% renewable goals** using RECs
  - SC5-B – Current system + 75% renewables (100% load through renewables and STP)
Cost of Achieving Council Goals from Current Generation Mix

- Council goals include
  - Ramp down & exit FPP in 2023
  - Retire Decker in 2021
  - Add renewables to meet goals which includes 200 MW local solar
  - Upgrade Austin Energy transmission system to accommodate decker retirement
- The cost of achieving council goals is the delta above the current generation mix (do nothing) scenario and does not factor the FPP debt/Operations & Maintenance (O & M) cost

*This does not include the cost impact of retiring AE assets due to confidentiality reasons*
Other Results

20 Year Net Present Value (NPV) Delta

Net Cost ($195 Million)
Cost to achieve Council Goals ($236 Million*)

- This does not include the cost impact of retiring AE assets due to confidentiality reasons.
Cost Of Adding Battery at Decker from Current Generation Mix

20 Year Net Present Value (NPV) Delta*

*This does not include the cost impact of retiring AE assets due to confidentiality reasons

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<th>Add 137 MW Battery</th>
<th>Add 300 MW Battery</th>
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<td>Net cost for 10 MW Battery</td>
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<td>Decommissioning cost</td>
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<td>$51</td>
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<td>Net cost for 55% renewables</td>
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<tr>
<td>Reduction in Load Zone benefits</td>
<td>$48</td>
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Cost to achieve Council Goals ($236 Million*)
Cost of Increasing DSM and Local Solar from Current Generating Mix

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<td>Net cost of additional Local Solar</td>
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<tr>
<td>Net cost for 10 MW Battery</td>
<td>$12</td>
<td>$12</td>
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<td>Reduction in Load Zone benefits</td>
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<td>Transmission upgrades</td>
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*This does not include the cost impact of retiring AE assets due to confidentiality reasons*
5th, Expected, and 95th Percentile 20-year Net Present Values for Each Scenario (Levelized 2017$)

Without CO₂
5th, Expected, and 95th Percentile 20-year Net Present Values for Each Scenario (Levelized 2017$) With CO₂
Generation

- **Renewable Energy Target:** Commit to 65% renewable energy by the end of 2027, and study the possibility of a 75% and 80% goal for 2027.

- **Decker Power Plant:** Target ceasing operations and beginning retirement of the Decker steam units, assuming ERCOT approval:
  - Steam Unit 1 after summer peak of 2020
  - Steam Unit 2 after summer peak 2021

- **Fayette Coal-Fired Power Plant:** Affirm the previous goal, established in 2014, to begin the retirement of Austin Energy’s portion of the Fayette Power Project (FPP), beginning by the end of 2022.
Local Solar:
- Maintain Existing Local Solar Goals:
  - 110 MW by the end of 2020 (at least 70 MW customer-sited)
  - 200 MW by the end of 2025 (at least 100 MW customer-sited)

- Local Solar Incentive Budgets:
  - Commit to $7.5 million per year for FY18 and FY19
  - Commit to $5 million per year for FY20-FY27

- Additional Local Solar Policies and Programs:
  - Commit to enhanced incentives and/or programs for affordable housing projects by FY2018.
  - Study and possibly pilot a utility managed rooftop solar program that requires no investment from customer participants.
Recommendations (Continued)

Energy Efficiency (EE) and Demand Response (DR):

- Maintain existing goal of achieving at least 800 MW of EE and DR by 2020.

- Commit to 1,000 MW by 2027, subject to any methodology changes pursuant to the measurement and verification (M&V) consultant recommendation, code and manufacturer standards, technology, budgets and analysis of progress to date. The 2027 goal will be reevaluated by Austin Energy upon completion of the (M&V) study. Austin Energy will also assess the potential to reach 1100 MW by 2027.
Energy Efficiency (EE) and Demand Response (DR):

• Austin Energy will:
  – Budget at least 2.5% gross revenues to Demand Side Management. Austin Energy will work with stakeholders to make future goals ‘budget based’ rather than MW based as has been done in the past.
  – Commit to achieving a target of at least 1% of energy savings
  – Commit to directing at least 15% of total DSM budget to existing and potential programs for low income and hard to reach markets in the multifamily and single family areas along with small businesses.
Process Recommendations

Updates:

- Conduct resource plan updates in advance of cost of service studies every five years, unless significant changes in technology or market conditions warrant more frequent updates. Austin Energy will rerun cost analysis for the existing plan and provide an update on progress towards reaching established goals every two years. Reports will be provided to the City Council, the Electric Utility Commission and the Resource Management Commission.

- The plan does not designate the components of the renewable portfolio. Instead, Austin Energy should plan for least-cost and least-risk acquisition of renewable resources. Austin Energy should propose and develop the optimal renewable portfolio to meet this plan’s goals and the utility’s needs given existing generation assets, market conditions and the needs of the utility.
  - Austin Energy should explore both long-term and flexible short-term renewable energy contracts to provide affordable renewable solutions for Austin Energy customers.
  - Specific investment goals are for energy efficiency, demand response, local solar and energy storage.
<table>
<thead>
<tr>
<th>Scenario Description</th>
<th>Delta (w.r.t Current Generation Mix)</th>
<th>Expected NPV$ Cost</th>
<th>2027 Renewable % of Load</th>
<th>* % Change (w.r.t Current Generation Mix)</th>
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<tr>
<td>Current Generation Mix</td>
<td>$0</td>
<td>$8,600</td>
<td>37%</td>
<td>0%</td>
</tr>
<tr>
<td>Current Generation Mix + Meet Renewable Goals Using RECs</td>
<td>$37</td>
<td>$8,637</td>
<td>37%</td>
<td>0%</td>
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<tr>
<td>EUC RPWG Recommendations</td>
<td>$630</td>
<td>$9,230</td>
<td>65%</td>
<td>7%</td>
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<tr>
<td>Council Goals</td>
<td>$588</td>
<td>$9,188</td>
<td>55%</td>
<td>7%</td>
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</table>
Summary

• The recommendation of the 2016 Update are measured and incremental with the exception of the Decker retirement have little increased costs to the present plan.

• The risk presented by retiring Fayette is large and singular in nature. The plan needs to remain flexible to accommodate this risk.

• We are currently making good progress towards our 2025 goals. The cost of renewable energy continues to come down and Austin Energy plans to continue towards these goals in a measured and responsible manner as well as achieving the 2027 recommended goals.

• Austin Energy will have to manage the amount of PPAs in its portfolio as well as the financing required for the potential build of new renewable projects.

• We are far ahead of the rest of the market with our investment in renewable energy and energy efficiency. In the event a federal cost for CO2 becomes a reality over the next decade our customers may be well positioned to benefit.

• Moving towards budget based goals for customer programs lowers the rate risk to our customers over the long term.
Next Steps

• The Austin City Council will have a public hearing regarding the recommendations by the EUC Resource Planning Working Group on August 10th. An Recommendation for Approval (RCA) for City Council to approve the recommendations is on the agenda.
  – The RCA may be accepted in whole or with changes from the dais.

• The Working Group Recommendations were:
  – Voted on unanimously by the working group
  – Approved by the Resource Planning Commission
  – Approved by the Electric Utility Commission
  – Endorsed by Austin Energy Executive management
Questions and Comments
Power Supply Adjustment and Regulatory Charge Outlook for Fiscal Year 2018

Mark Dombroski
What Is the Power Supply Adjustment?

PSA character of service as defined in the City of Austin Electric Tariff, effective November 1, 2016:

• The PSA provides for the recovery of the preceding year’s expenditures for (PSA Costs):
  – Electric Reliability Council of Texas (ERCOT) Settlements – charges and credits from ERCOT, other than the Administrative Fees.
  – Fuel Costs – costs for fuel, fuel transportation, and hedging gains and losses.
  – Net Purchased Power Agreement Costs – costs and offsetting revenues (such as bilateral sales and GreenChoice) associated with short- and long-term purchased power agreements, and costs for distributed generation production.
As part of the City of Austin’s annual budgeting process, which includes a public hearing, the PSA is determined by calculating the sum of all net power supply costs divided by the historical twelve month period service territory sales, plus any existing over- or under-recovery of PSA Costs balance divided by projected service territory sales preceding the effective date of the PSA. This results in an annual uniform system rate per kWh that is adjusted for voltage level and applied to each of the customer classes.
Power Supply Adjustment Costs Components

Twelve Months Ending June 2017
Difference between Load Zone and Power Supply Cost + $1M

- Load Zone Costs: $378
- Owned Assets Net Revenue: $(112)
- Contracted Assets Net Cost: $(100)
- Bilateral & Hedging: $0
- GreenChoice & Value of Solar: $(27)
- Net Power Supply Costs: $379

Revenue

Cost

$ Millions

$500

$400

$300

$200

$100

$0

$(100)

$(200)
Power Supply Adjustment Observations

- Current PSA rate was set below AE’s forecasted power supply cost due to an over collection in FY14 and FY15
- PSA was reduced 29.8% between FY15 and FY17 as a result of the over collection accompanied by low power market prices
- Over collection expected to be fully returned to customers by end of FY17 (pending July results)
- Average power market prices are stable but trending upward slightly
- PSA forecasted to increase by 11.3% in FY18 to align with power market prices and the elimination of over collection
Power Supply Adjustment Drivers

Major Elements Impacting PSA

- Load Zone Costs
- Owned Assets
- Contracted Assets
- Over / Under Balance

Cost Drivers:
- Customer Growth
- Weather
- Generator Availability
- Market Price
- Intermittency
- Location
- PSA Rate to Market Price Spread
- Natural Gas Price
- Transmission Congestion
- Market Price
- Contract Price
- Forward Price Curve

Future power prices are inherently uncertain.
Power Supply Adjustment History

- Rising load zone cost shows need to keep PSA stable
- Drop in load zone costs results in over-collection
- Load zone cost didn’t maintain downward trend; results in under-collection

Load zone cost trending up
Load zone cost trending down
Load zone cost stable

Decreasing load zone costs and over collection caused price volatility
Starting in Nov-16, monthly natural gas prices increased 56%, contract assets Los Vientos IV and Roserock increased MWh production by 30%, and congestion costs increased by 25% due to contracted assets.

Over collection in FY14 and FY15 has been returned to customers.
Increase in PSA for FY18 reflects a stable power market
Balanced ERCOT Market

July 11, 2017 at 8:45am

Price per MWh ranges from $20.14 to $20.59, difference of $0.45

Plenty of supply and no congestion means low, consistent pricing
Uneven ERCOT Market

July 11, 2017 at 9:00am

Price per MWh ranges from $20.00 to -$10.00, difference of $30.00

Plenty of supply but some congestion means low, uneven pricing
Imbalanced ERCOT Market

Supply unable to meet demand means high, volatile, uneven pricing

July 11, 2017 at 9:55am

Price per MWh ranges from $25.24 to -$18.68, difference of $43.72

Hover over points to view details.
LMP values do not include Real-Time price adders.

Supply unable to meet demand means high, volatile, uneven pricing
Price spikes of $200 to over $600 routinely occur for short durations in ERCOT
### Forecasted PSA for FY 18

<table>
<thead>
<tr>
<th>Commercial Service</th>
<th>FY 2017 Annualized</th>
<th>FY 2018 Annualized</th>
<th>% Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>System average</td>
<td>2.755¢</td>
<td>3.067¢</td>
<td>11.3%</td>
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<tr>
<td>Secondary</td>
<td>2.769¢</td>
<td>3.082¢</td>
<td>11.3%</td>
</tr>
<tr>
<td>Primary</td>
<td>2.706¢</td>
<td>3.012¢</td>
<td>11.3%</td>
</tr>
<tr>
<td>Transmission</td>
<td>2.671¢</td>
<td>2.974¢</td>
<td>11.3%</td>
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</tbody>
</table>

The PSA is an annual uniform system rate per kWh that is adjusted for voltage level and applied to each of the customer classes.

FY 2018 rates will be revised and finalized in August and may differ than those presented. Summer and Non-Summer rates for FY 2018 have not been calculated.
Regulatory Charge

• The Regulatory Charge recovers dollar-for-dollar Austin Energy’s share of the statewide costs of managing, using, and maintaining the transmission grid, as well as other regulatory fees and penalties.

• ERCOT charges and fees are based on Austin Energy’s share of the average 4 Coincident Peak (CP) compared to ERCOT’s 4CP (June through September).

• Austin Energy is about 4% of the statewide total.
• The ERCOT Postage Stamp Rate drives wholesale transmission costs which are increasing due to an additional $10 billion in transmission assets throughout Texas by FY 23.

• Austin Energy’s Regulatory Charge is expected to increase mimicking the trend in the ERCOT Postage Stamp Rate.

• Austin Energy manages wholesale transmission costs through load co-op, DSM, district cooling, and other demand response programs and rebates.
Regulatory Charge Proposed for FY18

<table>
<thead>
<tr>
<th>Commercial Service</th>
<th>FY 2017</th>
<th>FY 2018</th>
<th>% Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>Secondary, Non-Demand (¢ / kWh)</td>
<td>1.343¢</td>
<td>1.362¢</td>
<td>1.4%</td>
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<tr>
<td>Secondary, Demand ($ / kW)</td>
<td>$3.75</td>
<td>$3.80</td>
<td>1.3%</td>
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<tr>
<td>Primary 1 &amp; 2 ($ / kW)</td>
<td>$3.67</td>
<td>$3.72</td>
<td>1.4%</td>
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</table>

The Regulatory Charge is applied by system voltage level on either an energy or demand basis and may be adjusted to eliminate any over- or under-recovery on a system basis.
AE has maintained rates at or below 2% CAGR since 2013

Forecasted System Average Rate and 2% Affordability Metric

2% Compound Annual Growth Rate (CAGR)
Questions and Comments
Rate Options

Debbie Kimberly
Today’s Agenda

- Basic Plan
- GreenChoice
- Time of Use Pilots
- Solar + Value of Solar
Pricing Plans Can Help Achieve Goals

- Promote conservation
- Reduce peak load
- Promote load shifting and improve system load factor
- Maintain system reliability
- Produce revenues sufficient to cover costs
- Provide service at affordable rates
- Improve customer experience, e.g.
  - Renewable options
  - Afford choices
Pilot Time-of-Use Rate

- Initial Draft Rate Options
  - On peak, mid-peak, and off peak time periods
  - 3:00 pm to 6:00 pm Monday – Friday

- 3 focus groups
  - Small/Mid-size Commercial
  - Key Accounts
  - Houses of Worship
### Load Zone Austin Real Time Hourly Settles

**Past 12 Months - July 2016 through June 2017**

<table>
<thead>
<tr>
<th>Time</th>
<th>Jan</th>
<th>Feb</th>
<th>Mar</th>
<th>Apr</th>
<th>May</th>
<th>Jun</th>
<th>Jul</th>
<th>Aug</th>
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**Average**

<table>
<thead>
<tr>
<th>Winter</th>
<th>Summer</th>
<th>Off Peak</th>
<th>On Peak</th>
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<td>$0.0272</td>
<td>$0.0238</td>
<td>$0.0272</td>
<td>$0.0238</td>
</tr>
</tbody>
</table>
• Keep it simple
• 3:00 pm peak time period would not work for most, so we changed to 4:00 pm
• Weekend pricing was appealing to the houses of worship
• One size does not fit all, so we designed two options
• Customers need to see comparisons to make decisions
TOU Pilot Rate Options

• Two Commercial TOU pilot rates
  1. Peak Price: weekdays from 4:00pm – 6:00pm
  2. Nights & Weekends
• Pilot is available to all secondary and primary customers < 3 MW
• Each pilot is limited to 100 accounts
• Affects only the Power Supply Adjustment (PSA) component of the bill
Comparative Price Plans – PSA

Standard Peak Pricing Nights & Weekends

On Peak

Off Peak

Rates to be finalized based on PSA

<table>
<thead>
<tr>
<th></th>
<th>Standard</th>
<th>Peak Pricing</th>
<th>Nights &amp; Weekends</th>
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</thead>
<tbody>
<tr>
<td><strong>On Peak</strong></td>
<td>None</td>
<td>Weekdays 4 pm – 6pm</td>
<td>Weekdays 7 am – 10 pm</td>
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<tr>
<td><strong>Off Peak</strong></td>
<td>None</td>
<td>All other</td>
<td>All other</td>
</tr>
</tbody>
</table>

€ / kWh

- Standard
- Peak Pricing
- Nights & Weekends

On Peak

Off Peak

Chart showing comparative pricing plans.
Progress Toward Solar Goal as of June 2017

**2020 Goal:** 110 MW Local Solar (incl. at least 70 MW customer-sited)

**2025 Goal:** 750 MW Utility-scale + 200 MW Local (at least 100 MW customer-sited), subject to affordability

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*Includes systems installed and in process. Numbers may not add up to 950 due to rounding.*
Commercial Performance Based Incentive (PBI)

- Over 440 commercial customers have solar panels in Austin
- Commercial Incentive is $.06 to $.02/kWh depending on capacity, and is credited monthly on the bill for the first 10 years
- Capped at 2.8MW per customer and <1MW per interconnection
- To qualify for the incentive, systems must be installed by an Austin Energy Participating Solar Contractor
Commercial PBI Incentive Levels

- Commercial PBI is ramped down once we reach defined levels of installed capacity
  - Small Commercial < 75 kW-ac and Non-profit < 400 kW-ac
  - Medium Commercial 75 to 400 kW-ac
  - Large Commercial 400 to 1,000 kW-ac

<table>
<thead>
<tr>
<th>Small Commercial &amp; Non-Profit</th>
<th>Medium Commercial</th>
<th>Large Commercial</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Step #</strong></td>
<td><strong>PBI ($/kWh)</strong></td>
<td><strong>Capacity (MW-ac)</strong></td>
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<tr>
<td>3</td>
<td>$0.06</td>
<td>1.5</td>
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<tr>
<td>4</td>
<td>$0.05</td>
<td>2.0</td>
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<tr>
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<tr>
<td>3</td>
<td>$0.02</td>
<td>4.0</td>
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</table>

Current incentive levels are available at [www.austinenergy.com/go/currentsolar](http://www.austinenergy.com/go/currentsolar)

*Subject to change due to budget limitations or market changes that warrant incentive level review.*
How the Value of Solar (VOS) Tariff Works

- Meter both consumption and production
  - PV meter added behind the customer’s net meter
- Customer billed for all consumption
  - = Energy delivered (from grid) + total energy produced by PV – PV sent to grid
- Customer credited for all solar production
  - VOS credits based on solar generation, measured by PV meter
  - Credits applied to electric bill until it zeroes, remaining credits roll forward
Commercial VOS proposed for 2018

- Applies to customers on demand rates, for PV <10 MW
  - Commercial <10 kW receive the Residential Value of Solar rate
- Provides a greater value than net metering for all rate classes
- Customer still saves on demand reductions
- VoS credit applies to all energy produced including energy sent back to the grid
- Rate locked until next cost of service study

<table>
<thead>
<tr>
<th>Value Component</th>
<th>Basis</th>
<th>2018 Value (per kWh)</th>
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<tbody>
<tr>
<td>Energy</td>
<td>Avoided cost of fuel, transmission &amp; distribution losses for electric loads using local solar production profile</td>
<td>$0.032</td>
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<tr>
<td>Transmission</td>
<td>Avoided transmission cost from reduction in peak load by local solar.</td>
<td>$0.020</td>
</tr>
<tr>
<td>Environmental</td>
<td>Societal cost of carbon</td>
<td>$0.015</td>
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2018 Assessment: $0.067
Questions and Comments
Storm Response and Outage Restoration

Elaina Ball
Distribution System Reliability

SAIFI: System Average Interruption Frequency Index

Consistently in the top quartile for reliability when compared to other utilities

SAIDI: System Average Interruption Duration Index

![Graph showing reliability trends over time]
Distribution System Reliability

SAIFI: System Average Interruption Frequency Index

SAIDI: System Average Interruption Duration Index

Consistently in the top quartile for reliability when compared to other utilities
Distribution System Reliability

CAIDI/SAIFI SCATTER

Reliability Survey Results (2.5 beta)

4 of 29 companies are top quartile in all 3
Transmission and Distribution System

- Step Down Substation Transformer
- Distribution Lines
- High Voltage Transmission Lines
- Step Up Transformer
- Transmission Substation
- Power Plant
- Step Down Pole Top Transformer
- House
This tree is analogous of a substation and distribution feeders that serve customers.

- **Leaves**: Houses or Customers
- **Tree Trunk**: Substation
- **Roots**: Power Plants or Power Source
- **Major Limbs**: Distribution Feeder or Main Line Circuit
- **Smaller Limbs**: Tap Lines or Transformers
Loss of a Substation

This represents the distribution system when a substation loses power.

The gray leaves represent customers are without power.
During restoration, we start by restoring the largest element out or closest to the power source.

In this case … the Substation.
After restoring the substation, we work our way to each distribution feeder.

In this case only customers served directly from mainline transformers are restored.

Customers served from tap lines are still out.
After restoring the distribution feeders, crews restore fused tap lines that serve large numbers of customers.

Notice that the customers fed from smaller tap lines and transformers are still out.
After restoring the main taps, crews restore secondary tap lines, transformers, and individual customers restoring power to all customers.
Types of Power Disturbances

- Feeder Breaker Operation – when a feeder breaker opens for to clear a fault.
- Feeder Breaker Recloses – will attempt to reclose two times before the feeder is locked out.
- Voltage Sag – voltage is momentarily reduced, typically due to operations on the transmission system. Similar to when the lights dim when the AC comes on.
- Spike/Surge – not common. Can be caused by lightning
Restoration Objectives

- Preparedness
- Personnel and Public Safety
- Communication (Internal & External)
- Damage Assessment and Situational Awareness
- Prioritize & Assign Restoration Activities/Crews
  1. System Stability
  2. Life Safety, Public Safety, Medical Dependent Customers
  3. Largest # of Customers
  4. Longest Customers Out
- Post Event Analysis and Lessons Learned
- Implement Continuous Improvement
Outage Communication

- For fastest service restoration, contact Key Account Outage Hotline
  - Answered by Key Account team during business hours. Answered by 311 after hours.
  - Outage ticket is placed to AE’s Control Center.
  - Option to have Key Account on call team member paged for follow up.

Note: Outage Hotline is for actual outages. Follow up with Key Account Manager for momentary operations or root cause.
1. Proactive SMS is sent to alert the customer that their premise may be affected by an outage.

2. Customer is notified that a crew has been dispatched to the outage location.

3. Customer is notified of the cause of the outage and ETR update.

EXAMPLE:
blue sky, single account/premise
Customer requests status once during the outage.

Austin Energy: An outage may be affecting 123 MAIN ST. Est. restore time: Jul 12, 2016 10:25 AM. We’ll send updates as available. More info: bit.ly/ATXoutage

Austin Energy: A crew was assigned to outage at 123 MAIN ST. Est. restore time: Jul 12, 2016 10:25 AM. We’ll update as available. Info: bit.ly/324234

Questions and Comments