Distributed Energy Resource (DER) Integration

EPRI Solar Hosting Capacity & Austin SHINES

Lisa Martin
Program Manager
Smart Grid & System Operations
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Austin Energy 2025 Goals

- 55% renewable energy
- 900 MW of savings from energy efficiency and demand response
- Solar includes 200 MW local; 100 MW customer-sited; 10 MW local storage
- All City of Austin facilities, operations and fleet carbon neutral

Subject to Affordability Goals
### DER Integration

... one of four initiatives supporting AE’s strategic planning goal for Grid Modernization

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<th>Initiative</th>
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**Blue-shaded** initiatives represent existing work  
**Green-shaded** initiatives represent new work

Sustainable and Holistic Integration of Energy Storage and Solar PV – SHINES  
Electric Power Research Institute – EPRI
Solar Hosting Capacity
Amount of DER that can be accommodated on a given feeder without impacting reliability or power quality.

After observing all issues and locations on a feeder, how much DER that can be accommodated is different based on many factors including location.
Impacts Considered for Hosting Capacity

**Impacts Considered**

- **Voltage**
  - Primary overvoltage
  - Primary voltage change
  - LTC/Regulator tapping

- **Thermal**
  - Ratings for generating power
  - Ratings for demanding power

- **Protection**
  - Element fault current
  - Breaker relay reduction of reach
  - Sympathetic breaker relay tripping
  - Reverse power flow
  - Unintentional islanding
Hosting Capacity Example

Feeder View of Node-Level Hosting Capacity
Feeder 0.6 MW
Centralized Large DER, Min

- Issue: Primary Over-Voltage
  Hosting Capacity: 0.6
- Issue: Thermal for Discharging DER
  Hosting Capacity: 1.65
- Issue: Breaker Relay Reduction of Reach
  Hosting Capacity: 3.03
Hosting Capacity Example (con’t.)

Feeder View of Node-Level Hosting Capacity
Feeder 0.6 MW
Centralized Large DER, Min

Issue                               Feeder  Selected
Primary Over-Voltage                0.6      1.4
Thermal for Discharging DER          1.55     10.0
Breaker Relay Reduction of Reach    3.03     3.03

'DH3936891' 1.4 MW limited by Primary Over-Voltage
Hosting Capacity Example (con’t.)
Solar Hosting Capacity Analysis

1. Validated the process
2. Analyzed 15 feeders
3. Analyze remaining feeders

A phased approach

Incorporate Hosting Capacity into ADMS
Austin SHINES
The projects will work to dramatically increase solar-generated electricity that can be dispatched at any time – day or night – to meet consumer electricity needs while ensuring the reliability of the nation’s electricity grid.
What is SHINES?

**Sustainable and Holistic Integration of Energy Storage and Solar PV**

A DOE funding opportunity
Austin Energy received largest, of six nationwide SHINES awards, from the U.S. Department of Energy $4.3 million

- Commonwealth Edison Company (Chicago, IL) $4 million
- Fraunhofer USA Center for Sustainable Energy Systems (Boston, MA) $3.5 million
- The Electric Power Research Institute (Knoxville, TN) $3.1 million
- The Hawaiian Electric Company (Honolulu, HI) $2.4 million
- Carnegie Mellon University (Pittsburgh, PA) $1 million
Austin SHINES Concept

Utility Scale Energy Storage + PV
Commercial Energy Storage + PV
Residential Energy Storage + PV
DER Management Platform

Illustrative
• Advance utility’s **local storage and solar goals**

• **Strategic approach** leverages existing and planned work to obtain external funding
  – Ultimately reducing the overall cost for the customer

• Discover best way to **maximize Distributed Energy Resource (DER) value** for AE and the customer

• Distributed Energy Resource (DER) management platform based on **open standards**

• Project designed to **engage customers** to develop new programs and consumer options

• Includes **affordability targets** and captures holistic benefits via System Levelized Cost of Energy metrics
Project Timeline and Funding

**Feb - Jun**  
Contract/Design

**Jul - Mar**  
Deploy

**Apr - Apr**  
Demonstrate

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**2017**

- **AE funding**  
  $6.2 million

- **External funding**  
  $5.36 million

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**2018**

- **Dept of Energy**  
  $4.3 million

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**2019**

- **TCEQ**  
  $1 million

- **Ideal Power**  
  $60,000

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Feb 1, 2016

Apr 30, 2019
Austin SHINES will provide information/learnings to assist AE with its future solar and battery storage roadmap.