Pieces of the Puzzle
Equipment and Costs of Battery Storage

July 2021
Presenters Background

Shree Pandey
Sundial Energy
- Master Electrician
- Lead battery system architect
- 6 years in solar design and construction

Nate Broadbridge
Renewable Energy Partners
- Project manager
- Coordinator between utility, design team and facility
- 4 years in solar project management
We’re simulating a neighborhood microgrid

Distributed Energy Generation
Simulation of four properties each with their own energy storage, usage, and/or generation

Microgrid Battery Storage
Each property is designed to utilize their energy storage in a unique way and is programmed to prioritize community energy interactions differently

Community Energy Transfer + Sale
The project goes one step further. Each property in the community continuously buys and sells electricity to each other
Our project integrates four simulated homes

Property 1
Equipped with one Sonnen Eco10 Battery and one Eco 4

Property 2
Has exclusively solar with no battery

Property 3
Equipped with a Sonnen Eco10 Battery and Solar

Property 4
Equipped with a Sonnen Eco10 Battery and Solar
A unique demonstration required planning

In order to understand the project’s equipment and costs:

- Create a core design team
  Sundial | REP | Sonnen Batterie | Werner Electric

- Fully understand the electrical infrastructure
  Solar system’s inverters | Battery inputs | Building service | Utility requirements

- Design, iterate, review, repeat!
  We developed multiple versions of line diagrams, presented to Xcel, and iterated based on their feedback

- Procure materials and plan for construction
  2020 saw major fluctuations in pricing and lead time on equipment
We started with four primary decisions

- **Solar Equipment** (Jinko 400 + Enphase IQ7)
- **Electrical Purpose** (Critical Loads vs. Peak Shaving)
- **Monitoring and comms** (eGuage and Enphase)
- **Battery type and manufacturer** (safety, customizable features, etc.)
Initial draft took dozens of hours

Key Aspect:
Make sure your design team has a thorough working knowledge of utility requirements and equipment specifications
Final design took dozens more

Key Aspect:

Work with the utility in advance so that your interconnection application is not news to them

Gives utility engineers a chance to advise on the intricacies ahead of time

To implement at home:

The best application would be a condo or a multiplex that has a few units with not much distance between addresses.

A neighborhood block is doable but would require a tremendous amount of conduit and material.
In the end, the equipment list grew a lot.

Costly requirements to a community-scale microgrid:

- Utility metering standards
- AC Equipment (switchgear and wire)
- Protected loads panels and rewiring
- Production CTs and transformers
- Design and engineering time
- New sub service panels
- Network protection relays
- Batteries themselves
Project Team

- Green Infrastructure Research
- Engineering and Installation
- Host site and PM
- Utility Partner
- Design and Equipment Supply
- Battery Storage Units