

Utility Rates and Demand Charges

Seamus McGrath

Proterra

Manager – Charging Systems

Greenville, SC

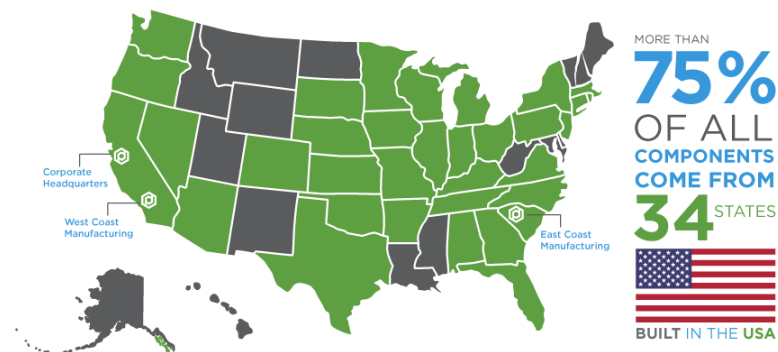
ABOUT PROTERRA



Proterra's Mission

Advancing electric vehicle technology to deliver the world's best-performing transit vehicles

- Founded in 2004
- Offices and manufacturing in CA and SC
- 300+ employees, strong executive management team
- Backed by industry-leading VC and corporate investors
- 40 customers; >400 vehicles sold
- >100 vehicles delivered; >3,300,000 service miles
- >13,700,000 pounds of CO2 emissions avoided



Strong Executive Team

TESLA



SUNPOWER



A123
SYSTEMS



Honeywell



Solid Financial Backing



VENTURES



Key Presentation Take-Aways

- Understanding of the difference between power and energy
- Simplified overview of the utility grid
- Some cost drivers in providing customers electricity
- How tariffs comprehend costs
- Why demand charges are not all bad
- Utilization and technology can minimize costs



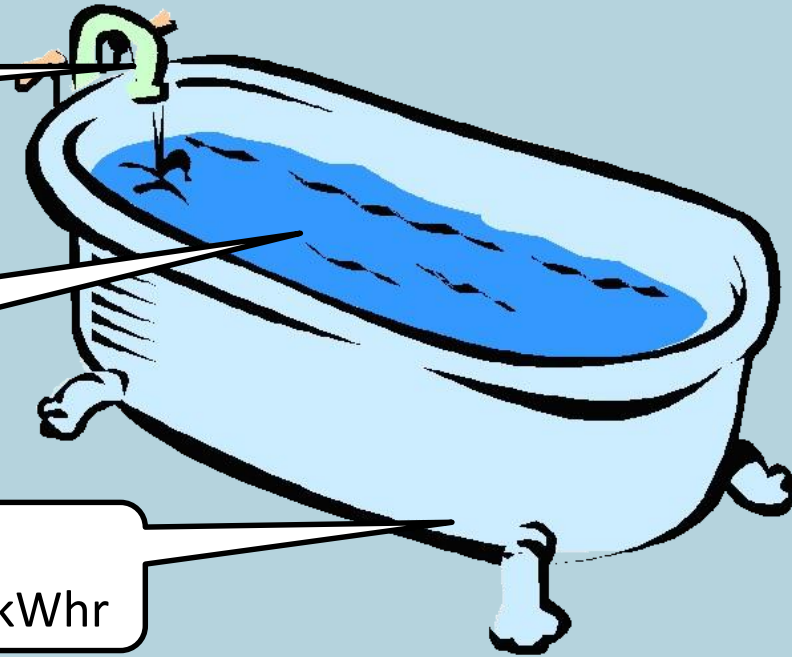
Power and Energy

- Power – rate of energy transfer (like engine size)
- Energy – accumulated power (like fuel tank size)

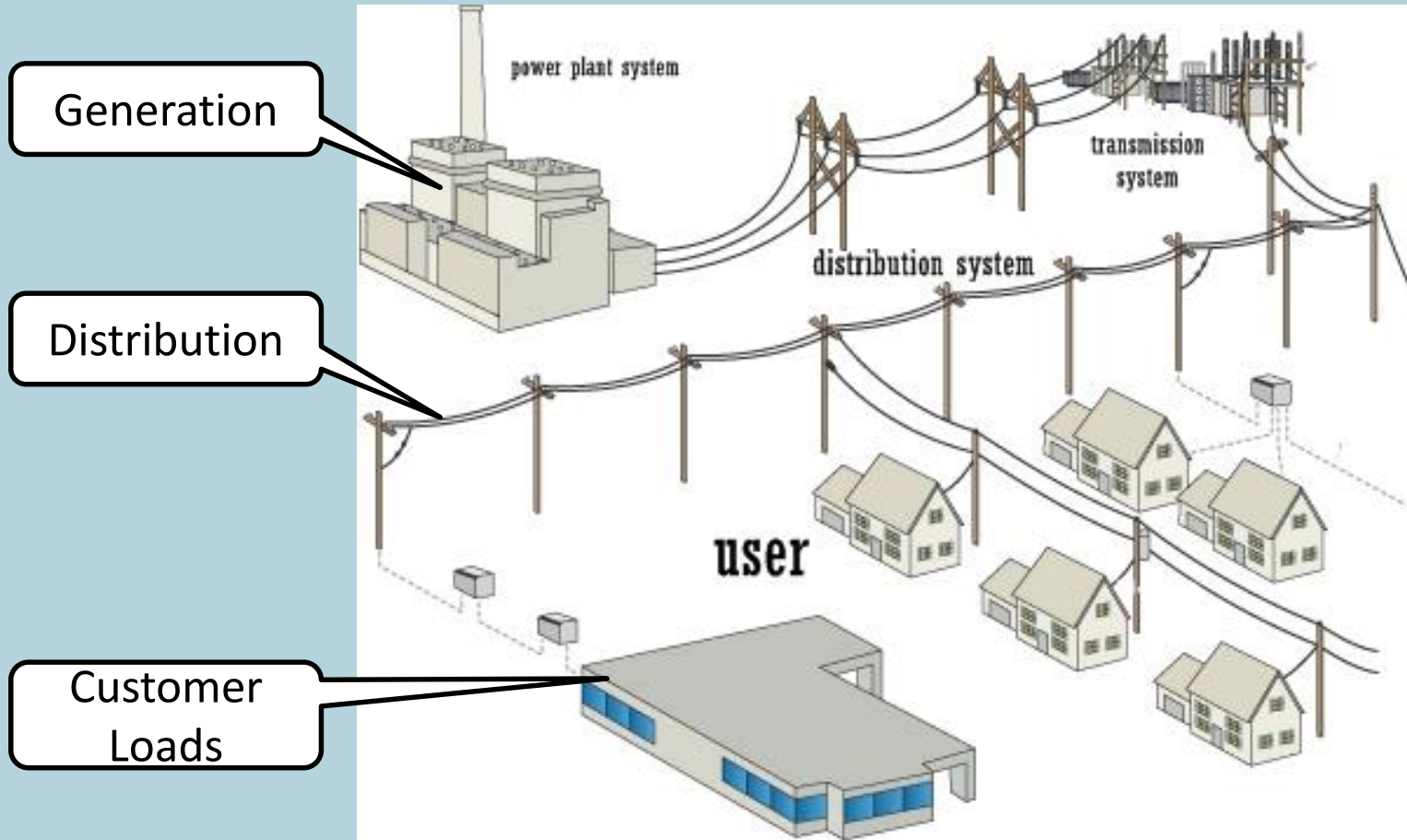
Power is represented by how fast the water comes out of the faucet.

Energy in the battery is represented by amount of water in the tub.
This is analogous to our current SOC.

Max energy capacity is the size of the tub.
This is analogous to our battery capacity ala 440kWhr



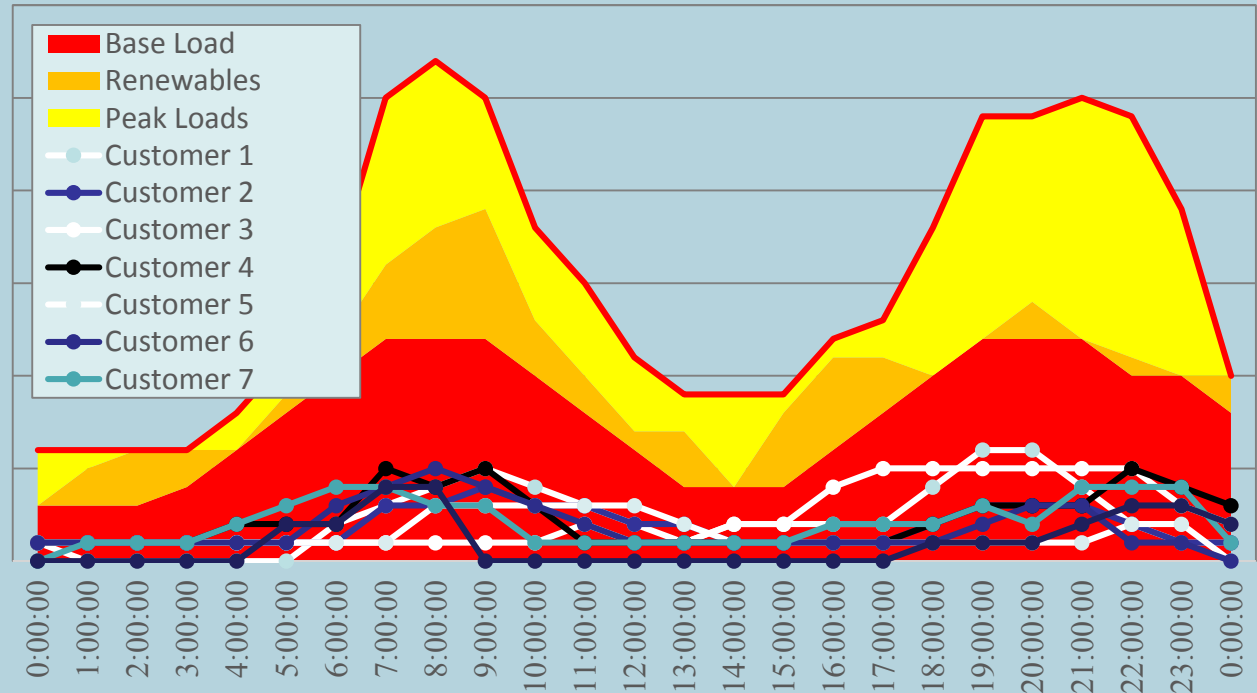
Electricity Grid



Generation

- Base load
 - Slow Responding
 - Coal
 - Nuclear
- Peaker Plants
 - Fast Responding
 - Gas turbines
- Renewable
 - Opportunity
 - Wind
 - Solar

Electricity Load And Generation Example



Every kW used must be provided “just-in-time.”

Distribution



In order to get a lot of power to a customer, the utility has to have a lot of infrastructure in every step upstream. This must be sized for “worst case.”

Tariffs

- Generation component
- Distribution component
- Time-of-Use component
- All categories might have demand component and energy component
- Other special legislative components

Tariff Example Applicability Section

Schedule TOU-8 TIME-OF-USE - GENERAL SERVICE - LARGE

Sheet 1

APPLICABILITY

Applicable to general service including lighting and power, except agricultural water pumping accounts as described in Special Condition 12. This Schedule is applicable to and mandatory for all customers whose monthly maximum demand, in the opinion of SCE, is expected to exceed 500 kW or has exceeded 500 kW in any three months during the preceding 12 months, except that customers served on this Schedule may elect service under any applicable schedules optional hereto. Any existing customer on this Schedule whose monthly maximum demand has registered 500 kW or less for 12 consecutive months is ineligible for service under this Schedule (See Special Condition 11). Service under this Schedule is subject to meter availability. (T)

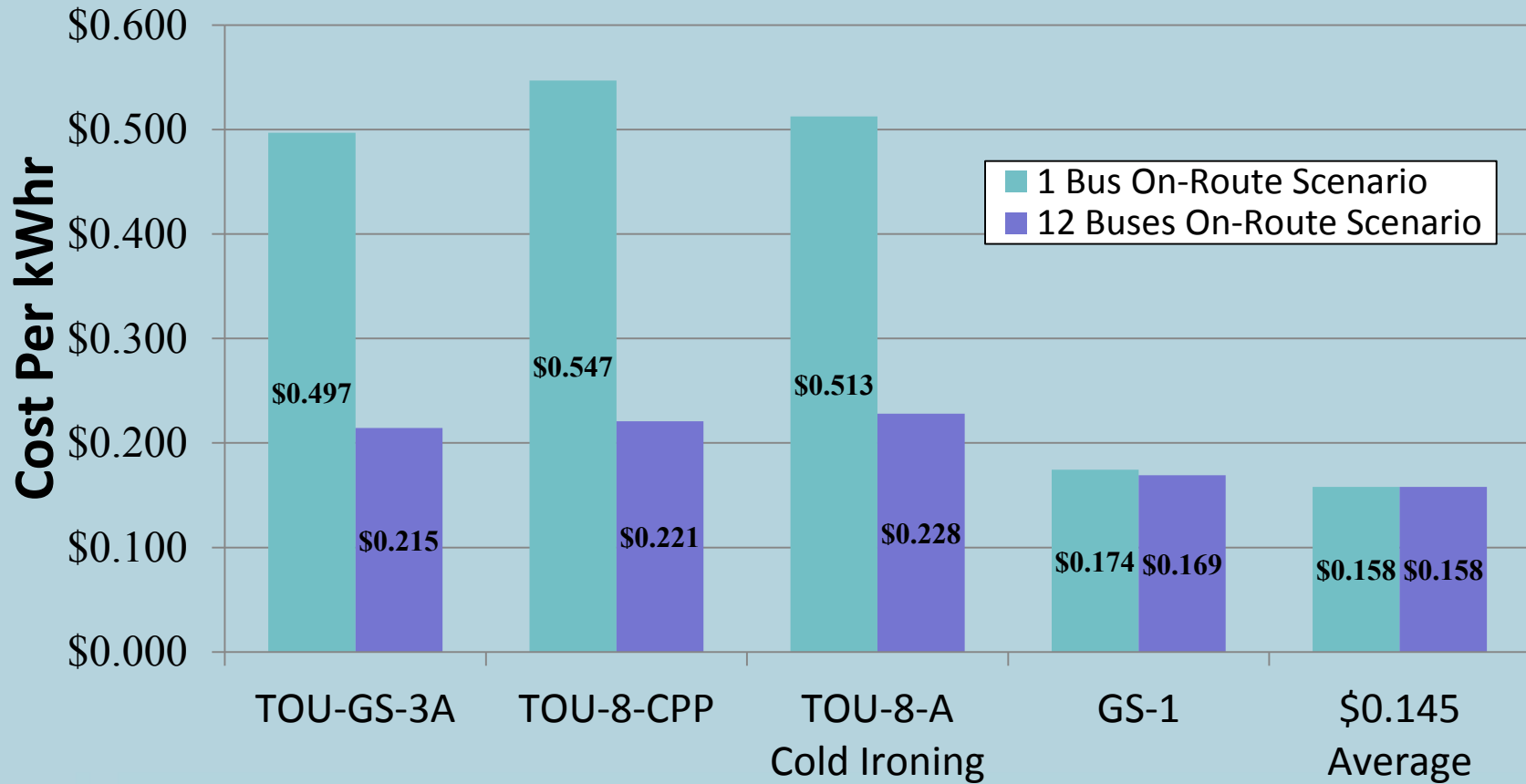
This Schedule contains four rate structures; Critical Peak Pricing (CPP), Option A, Option B, and Option R. (D)

Tariff Example Rate Section

SERVICE METERED AND DELIVERED AT VOLTAGES BELOW 2 KV

[illegible]

Demand Charge Impact As Utilization Increases Across Tariff Schedules



How To Minimize Operating Costs Due To Electricity

- Reduce demand
 - More charge time (on-route, or overnight)
 - Sequenced charging
 - Grid storage
- Reduce energy
 - More efficient buses
 - More efficient charging
 - On site generation – like solar
- Change time that demand is needed
 - Charge when demand bills are lower
 - Grid storage
- Change time that energy is needed
 - Charge when energy billing is lower
 - Grid storage