PENINSULA CLEAN ENERGY

Distributed Energy Resource Framework and Future Programs

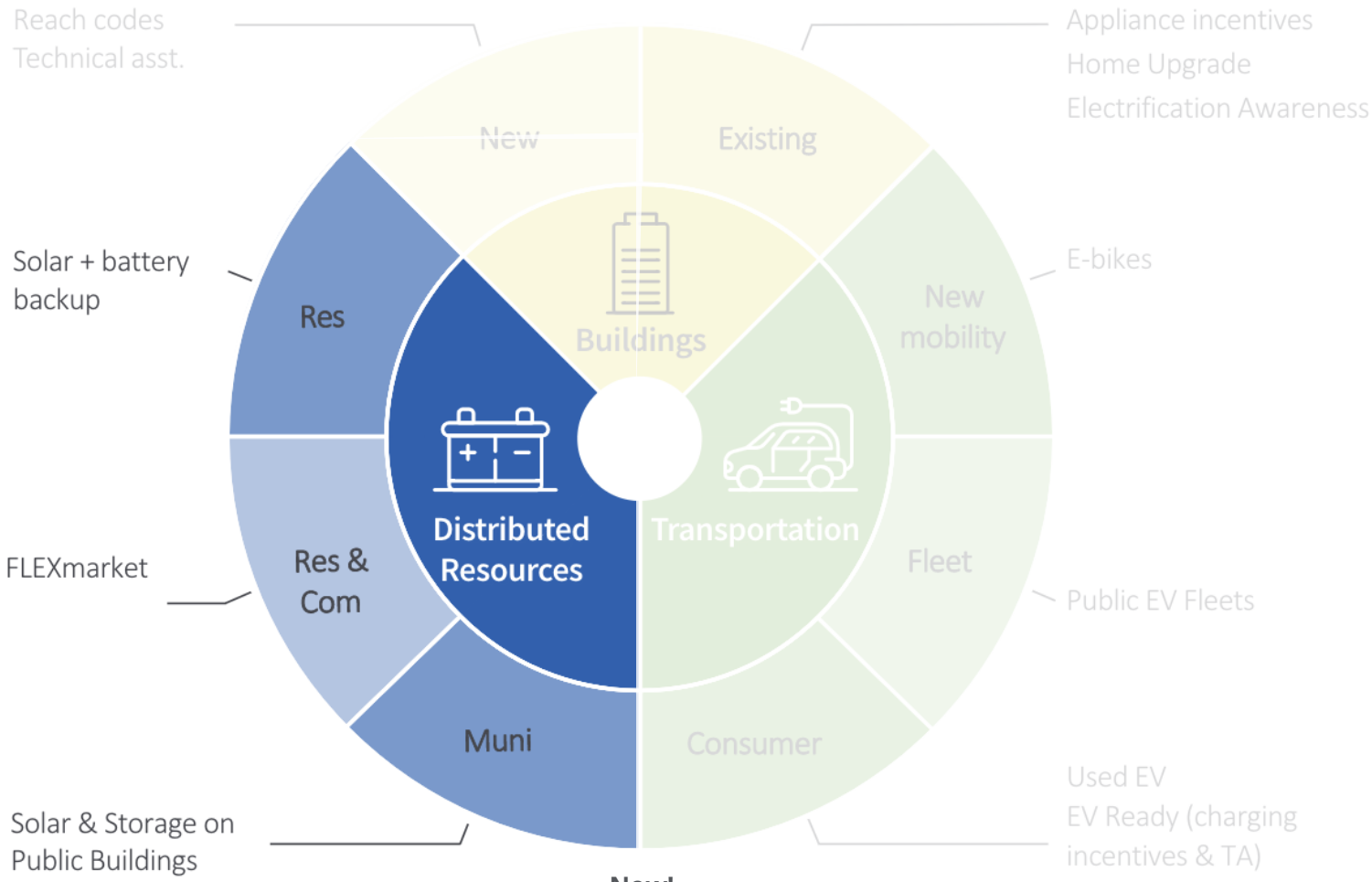
Community Advisory Committee
October 12, 2023

Agenda

1. DERs in PCE Programs
2. Definition of Distributed Energy Resources & Objectives
3. Scale Comparisons
4. Virtual Power Plants (VPP)
5. Outages
6. PCE's Portfolio & Next Steps

Context: Distributed Energy Resources Framework

Programs Overview



New!
EV Managed Charging (Res)

Definition

Distributed Energy Resources (DERs) are assets on the distribution grid, typically close to load, and usually behind the meter, which can be used individually or in aggregate to provide value to the grid and individual customers.

PCE DER Objectives

- Provide **grid benefits**, especially peak shaving to reduce wholesale costs and carbon intensity, aiding further penetration of renewables
- Provide **resilience**
- **Lower operating costs** for customers
- Make **electrification** more economically beneficial
- Deepen PCE-customer **relationships** and foster retention
- Reduce PCE costs and support self-sufficient business model

Scale Comparison: Typical Residential

Capacity/day: 13 kWh
Shift potential/day: 9 kWh*
Deployed: 3,600+

Capacity/day: 7 kWh**
Shift potential/day: 7 kWh
Deployed: 45,000+

Capacity/day (HPWH): 0.45 kWh***
Shift potential/day: 0.225 kWh
Deployed: 1,300+

* 30% reserve
** 25 miles/day / 3.5 mi/kWh
*** 240V HPWH, more potential with HVAC if actively heating or cooling

Commercial Scale Systems

- GovPV program – scoped battery sizes
  - GovPV1: 200-400 kWh
  - GovPV2: up to 4.5 MWh

- Microgrid: Arcata Airport and US Coast Guard Station in Humboldt Co.
  - 2.2 MW PV array DC-coupled to 2.2 MW/8.8 MWh battery storage
  - CAISO wholesale market participation
  - $11M in ~2021

Virtual Power Plants

Virtual Power Plant (VPP): Definition

Network of distributed energy resources dispatchable for grid services

DER VPP Supply Chain (BTM)

Asset

Control mechanism

Ex: Direct or Behavioral

Manager

Ex: Sunrun or PCE

Programs

Market-based, contractual, direct control

Rates & Costs

Rates

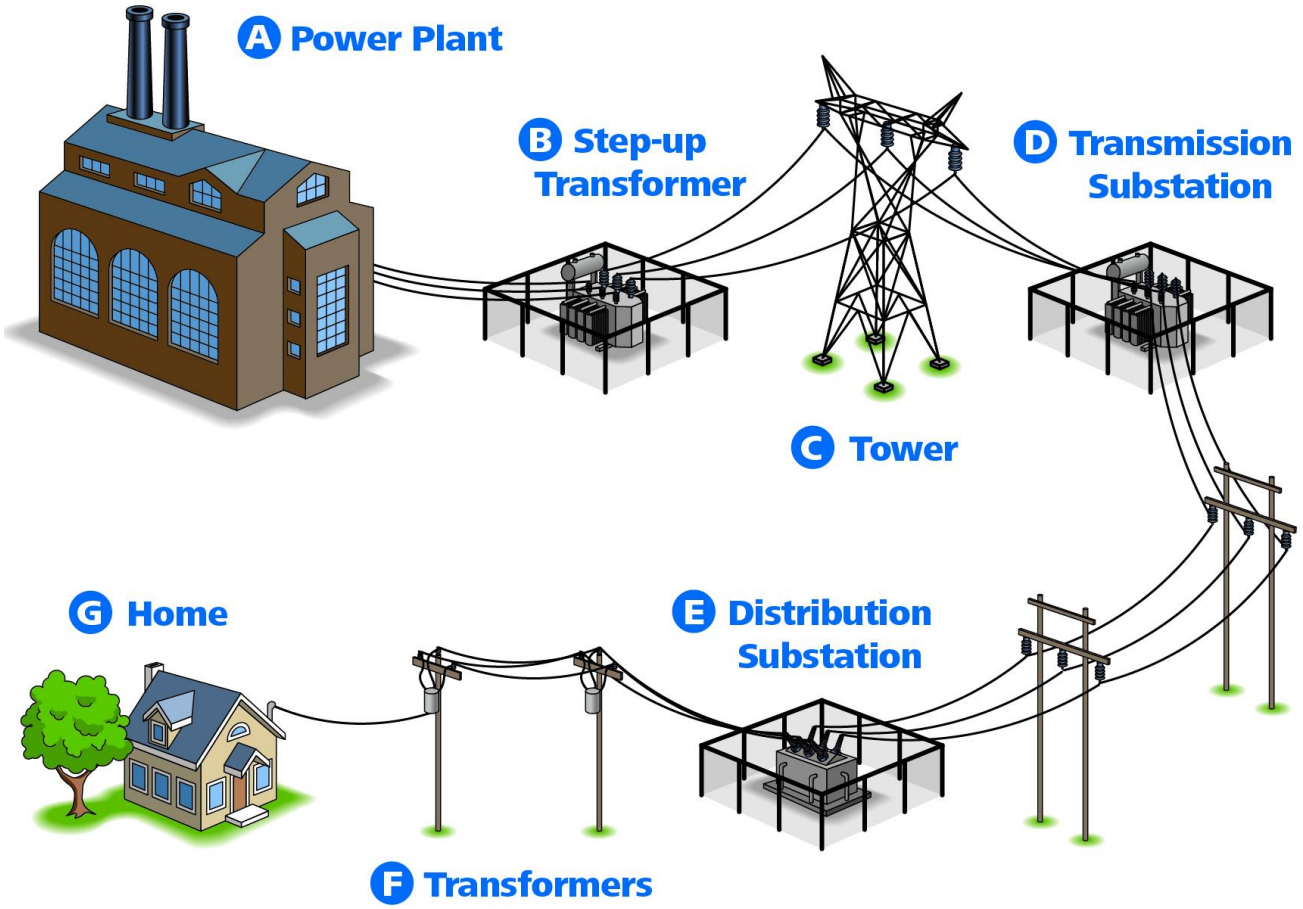
Value capture pathways

Ex: CPUC or Wholesale market

Outages

Outage classes

- Extreme heat > extreme demand or fire
  - Generation or transmission
  - Local distribution
  - Rolling blackouts
- Extreme heat > preventative shutoff (PSPS)
- High wind accidents
- Site failures
- Planned maintenance



Preliminary Outage Findings – 2021 & 2022 in SMC

- Total outages: 6,210
  - Accounts: 76% outage events < 100; 10% > 900 accounts
  - Duration: 22% < 1 hr; 62% < 5 hrs; 4% > 1 day
- 50% of outages are unplanned (locations & times vary widely)
- Hotspots circuits in Belmont, Daly City, HMB, Menlo Pk, Woodside

Class	Typical Customer Impact	Possible Resolution
Low/None	No outages or very short	None required
Medium	One 5-hour outage*	Site level
High (Hotspot)	Frequent &/or long duration	Distribution level (and possibly site level)

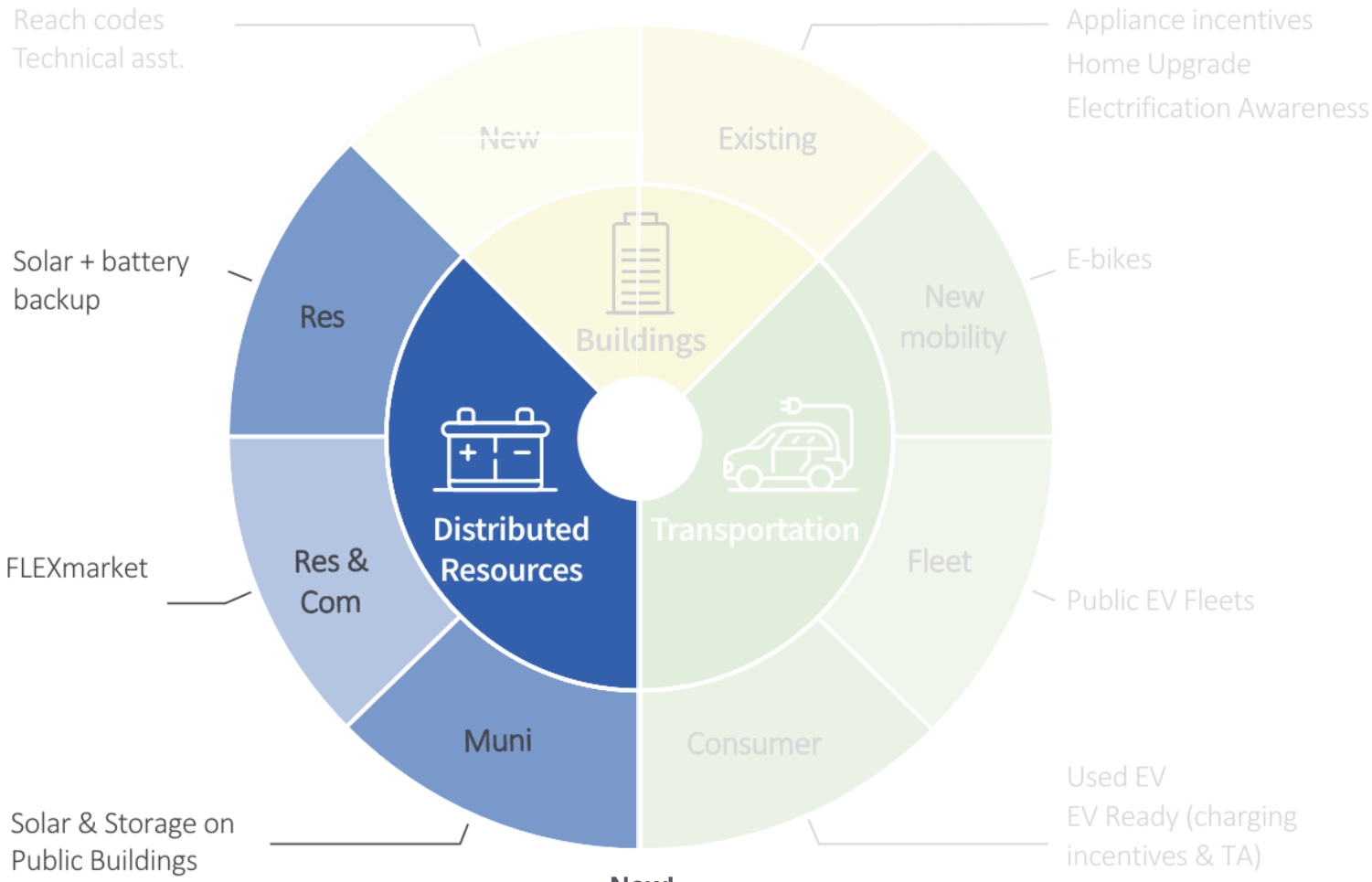
*Not all customers were affected. An outage on a circuit does not mean all customers on the circuit are affected

Resilience Tactics (PCE could deliver)

- Grid support: VPPs/RA/Local Generation
- Microgrid – circuit/neighborhood(?)
- Microgrid – campus
- Commercial site battery (& generators)
- Residential site battery
- End use storage

PCE's Portfolio & Next Steps

Programs Overview



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DER Next Steps

1. Execute on GovPV including adding storage
2. Develop new residential solar and storage program
3. Scaling EV managed charging and FLEXmarket
4. Develop end use storage approach