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Vehicle-to-Building / Grid Integration

Workstream 1: "[T]o investigate and support utilities' use of DERs they do not own as alternatives to traditional wires solutions to meet distribution needs."

Relevant near term activity: "Developing a number of high-value, non-utility-owned DER use cases as non-wires alternatives to meet distribution system needs"

Distribution need(s)/problem(s)

- The primary need/problem driver would likely be a forecast distribution system capacity deficit that would otherwise require an infrastructure upgrade.

- However, other secondary needs/problems would also be addressed (e.g. reliability) as discussed below.

Proposed solution using third party DER as a non-traditional solution

Umbrella use case: using vehicle batteries to reduce load or provide supply at the peak and provide secondary/ancillary benefits

Examples of specific solutions implemented by a third party:

1. One-directional smart chargers

- Key elements:
    - Optional opt-in EV rate structure that strongly incentivizes charging at off-peak times;
    - Potentially encourage participation by providing an $X discount on a smart charger for those who opt-into the EV rate structure (although most vehicles can do simple smart charging without special equipment).
- Estimates of load reductions modelled in similar fashion to how CDM programs are accounted for in load forecasts
- Costs are low, but the program only offsets EV charging loads, not other loads

2. Vehicle-to-building

- Key elements:
    - $X discount on a high-speed bi-directional charger that can offset building loads
    - Charger is customer controlled, but is pre-set in a way that meets distribution needs
    - Requirement to opt-into a EV rate structure that strongly incentivizes sticking with the pre-set parameters (may not be necessary for commercial customers already charged based on their peak demand)
- Estimates of load reductions modelled in similar fashion to how CDM programs are accounted for in load forecasts

- Potential to offset a great deal of load, much more than the EV charging load

3. Vehicle-to-grid

- Contract with a third party to provide the program
- Key elements:
    - Example 1: Same as the vehicle-to-building option but with export capabilities
    - Example 2: Contract with a fleet owner (e.g. school busses) for specific MW of capacity and ancillary services
    - Example 3: Contract with a third-party to install, own, and operate bi-directional chargers for on-street parking or in municipal parking lots
- Potential to provide grid supply

Note: EVs will also create a stream of second-hand car batteries that can be part of a variety of cost-effective storage-based use cases.

Distribution value proposition

	Smart charging & EV rates	**Vehicle-to-building**	**Vehicle-to-grid**
Capacity	High potential to: (1) Reduce *charging* load and avoid *EV-driven* infrastructure (2) Lower distribution rates by (a) avoiding infrastructure and (b) increasing non-peak consumption over which fixed distribution costs are spread	High potential to: (1) Reduce load and avoid any infrastructure (2) Lower distribution rates by (a) avoiding infrastructure and (b) increasing non-peak consumption over which fixed distribution costs are spread	High potential to: (1) Provide peak supply and avoid any infrastructure (2) Lower distribution rates by (a) avoiding infrastructure and (b) increasing non-peak consumption over which fixed distribution costs are spread
Voltage support	To be discussed	To be discussed	To be discussed
Reliability	Minor reliability benefits	Major reliability benefits through backup power (the new F150 can power a home for 10 days with conservation)	Major reliability benefits through backup power (the new F150 can power a home for 10 days with conservation)
Resiliency	Minor resiliency benefits	Minor resiliency benefits	Resiliency benefits, including temporary microgrid