Draft for Discussion Purposes Only

Distribution Forecast Working Group

Objectives of DER Disaggregation Methodologies and Current Approaches

Meeting 1: April 1th 2018

Impact of Allocation Uncertainty on Distribution Planning

The primary purpose of forecasting is to ensure that distribution deficiencies (i.e. capacity, reliability, hosting capacity, and power quality) are identified and addressed in a timely and efficient manner.

- DERs can both mitigate deficiencies (e.g. by reducing load) or causing them (e.g. by back-feeding too much to the grid)
- A ”good” allocation ensures that planners identify both of these situations if they are expected to occur
    - This ensures we don’t miss a potential reliability issue
- A “good” allocation also doesn’t identify deficiencies where they are not going to occur
    - This ensures planners don’t invest time in unnecessary planning studies
- Distribution planners are used to working with uncertainty (e.g. the 1:10 planning standard is chosen to limit risk). The uncertainty in the DER allocations adds another level of complexity to consider.
- However, we should work to understand and mitigate the uncertainty in the allocations as much as possible

Key Sources of Uncertainty in DER Forecast Allocation

Universal Sources of Uncertainty:

- Uncertainty in the system level forecast propagates down and compounds
- Data availability and quality
- Amount of recorded historical adoption
- Methodology
- Impact profiles/customer dispatch behavior
- Weather
- Adoption not necessarily independent between DERs
- Technical potential uncertain
- …

DER Specific Drivers of Uncertainty in the Allocations:	
PV	• "Lumpy" non-res adoption • Rapidly changing policy/economic landscape • Limited information on roof type/shading
EV	• Location of most EV customers unknown • Driving & charging patterns • Bias toward large battery size adopters
EE	• Impact shape varies by measure adoption • Unknown distribution of "upstream" measures • Customer class definition between CEC and PG&E
DR	• Load consumption variation (significant deviation of actual load may underestimate or overestimate DR projections) • Fluctuating enrollments and engagement
Storage	• Extremely limited historic data • Dispatch behavior not guaranteed

Fundamentally, we are trying to predict human behavior (customer level and policy)

Evaluating & Reducing Uncertainty for Distribution Planning Purposes

Challenges to evaluating uncertainty:

- Model inputs don't have uncertainty measurements → can't propagate uncertainty
- Models designed to forecast cumulative adoption 10 years out but can only validate against past
- Sometimes it's not possible to validate allocations
  - e.g. upstream EE, EE evaluated using average/DEEMED savings, EV
- Unless utility-controlled, can't reliably predict dispatch (DR, EV, storage)

Reducing uncertainty:

- It is possible to reduce uncertainty, **but uncertainty is unavoidable.**
- Some disaggregation uncertainty can be addressed through improved/more data (e.g. more historical data, data that represents different customer mixes and/or contract types, larger sets of data for each technology type, more information on impact/dispatch shapes).
- We can also reduce uncertainty by continuously improving our models as we get more data, more adopters, and more experience using the allocations in distribution planning