



Hosting Capacity Approach Implications

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Overview of the Presentation

- Introduction
- Understanding Tradeoffs
- System Modeling
- Approach Implications
- Conclusions

Introduction

- Generation hosting capacity
- Importance of Operational Flexibility (OpFlex)
- Paper highlights
 - Industry practice with OpFlex hosting capacity
 - Worst-case, low probability scenario approach to hosting capacity
 - Annual profile vs. flat hosting capacity approach
 - Actual vs. proxy (OpFlex) load transfer hosting capacity analysis
 - Implications of choices - case studies at different PV and EV penetration

Understanding Tradeoffs

1. Uniform Value vs. Profile
2. Extreme vs. Expected Outcome
3. Actual vs. Approximated Operational Flexibility
4. General vs. Location Specific Reverse Flow Limit
5. Model with vs. without Inverter Setting

System Modeling

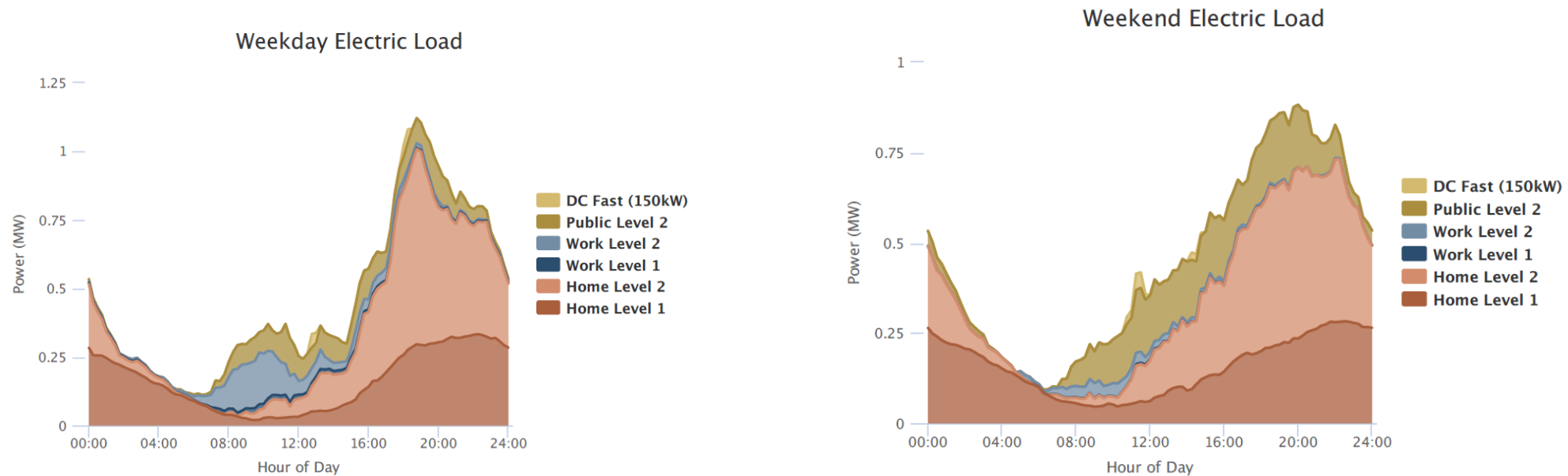
- F1 – 1376 sections, 11.3/5.6 MW peak/min demand MW peak load, 62.2 conductor miles long(miles), and 1306 connected customers.
- F2 – 825 sections, 9.4/1.2 MW peak/min demand MW peak load, 48.7 conductor miles long(miles), and 1382 connected customers.
- Modeled scenarios of photovoltaics (PVs) and electric Vehicles (EVs).

	PV 0%	PV 20%	PV 40%
EV 0%	x	x	x
EV 20%	x	x	x
EV 40%	x	x	x

- PVs profiles were obtained by using the PVWatts Calculator developed by NREL.

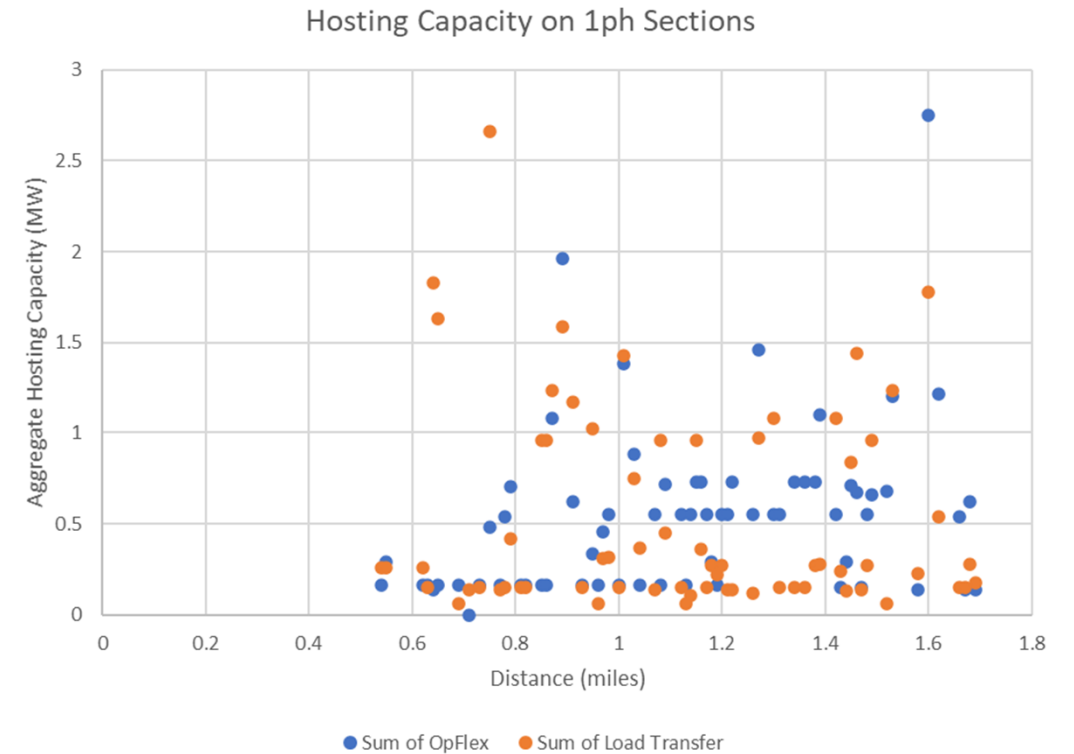
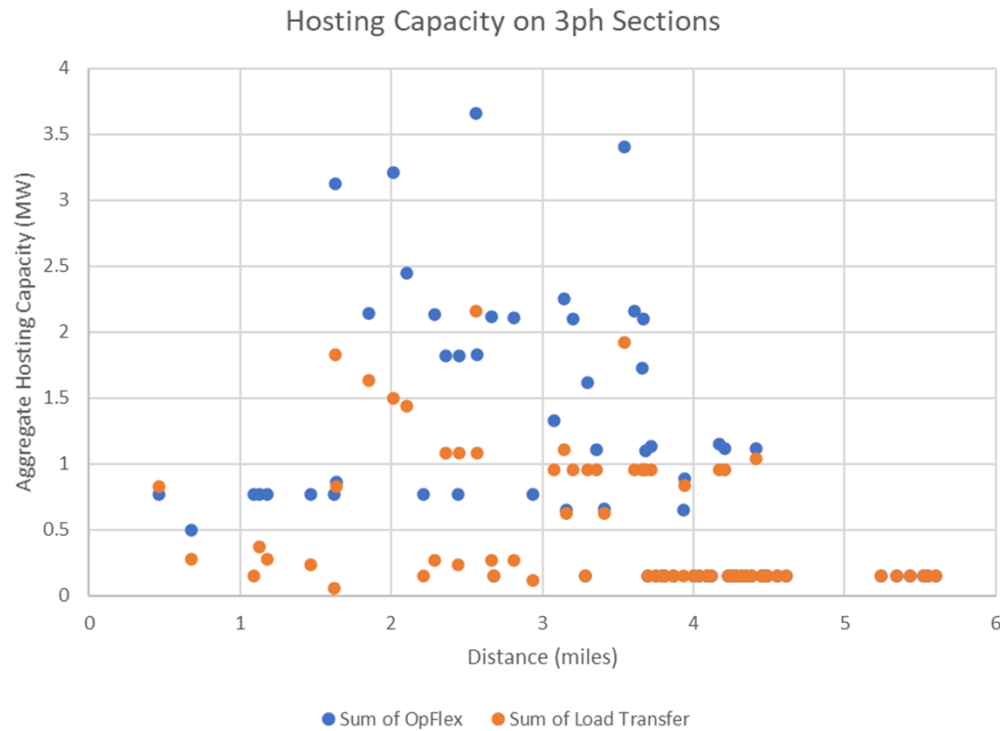
System Modeling: Modeling of Light-duty EVs

- Light-duty EV charging was modelled using outputs of the Electric Vehicle Infrastructure Projection Tool (EVI-Pro) Lite developed by NREL.
- Weekday and Weekend Electric Vehicles Charging Profile in Raleigh, North Carolina are as shown.



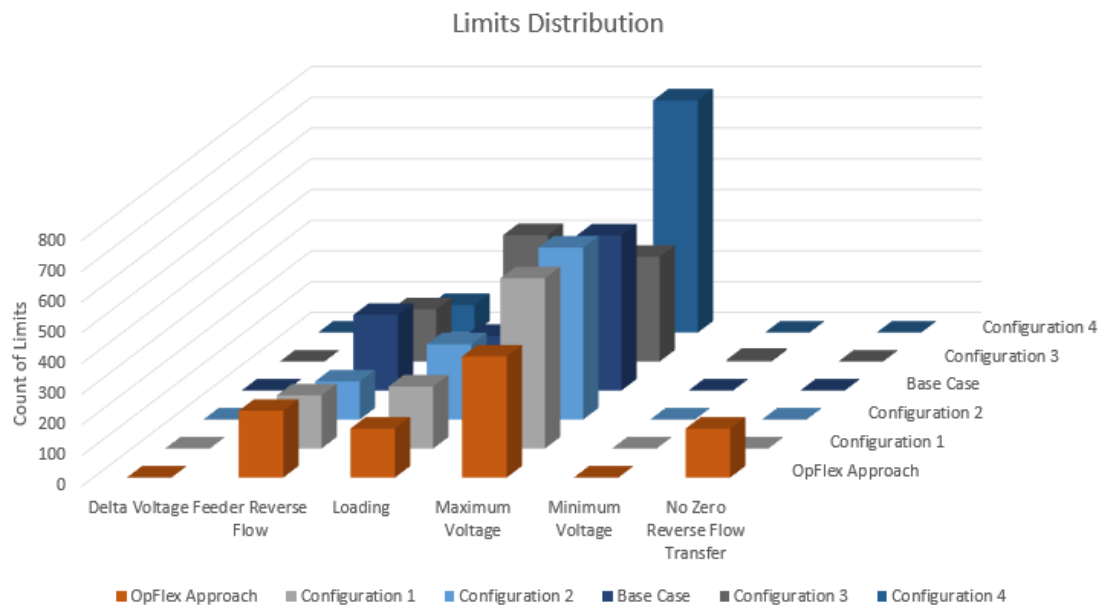
Approach Implication: Operational Flexibility

- Generation hosting capacity results aggregated by distance from substation for 3 and 1&2 phase sections
- OpFlex fails to capture actual operational flexibility obtained by load transfer hosting capacity analysis

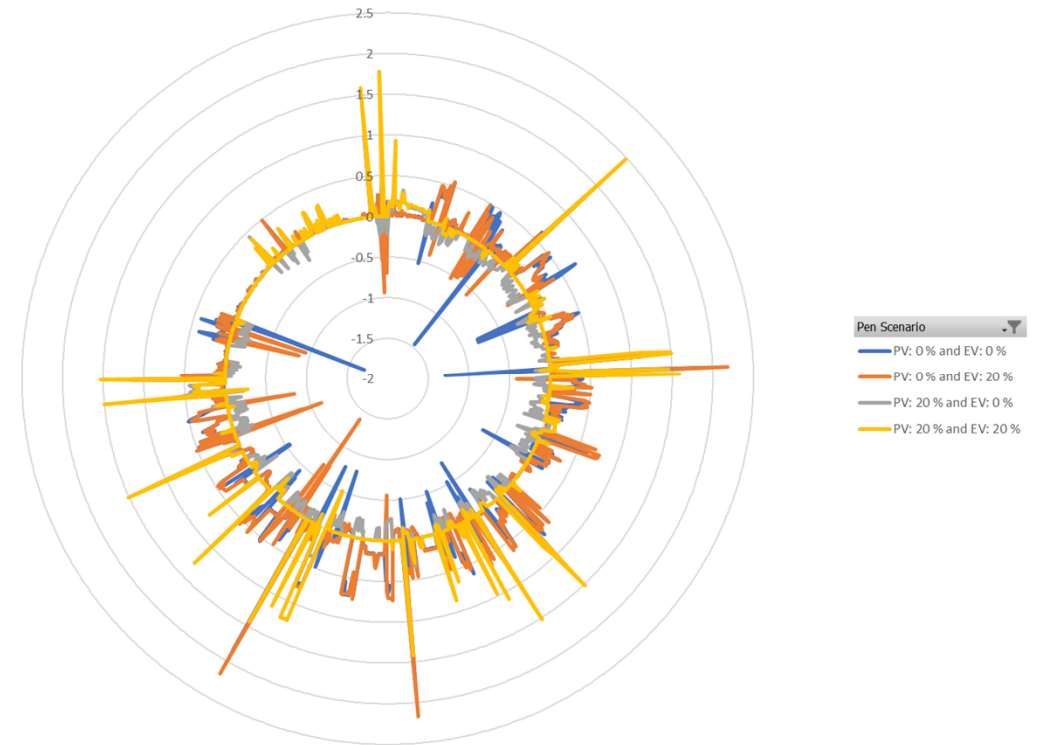


Approach Implication: Operational Flexibility (Cont.)

- Different constraining limits distribution under OpFlex and actual load transfer approaches

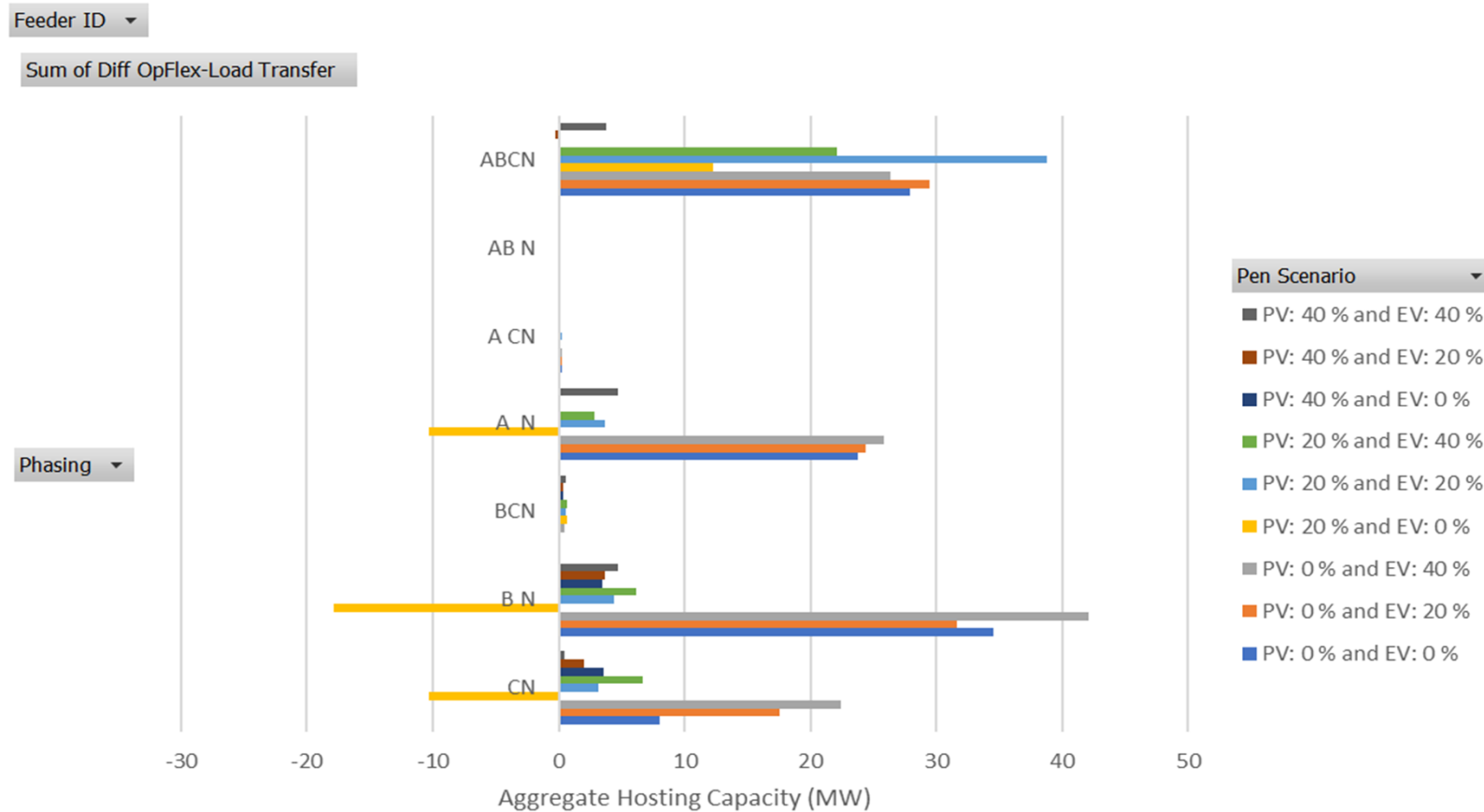


- Figure shows difference in results between OpFlex and actual load transfer analysis generation hosting capacity
- Difference varies across sections and EV/PV penetration levels



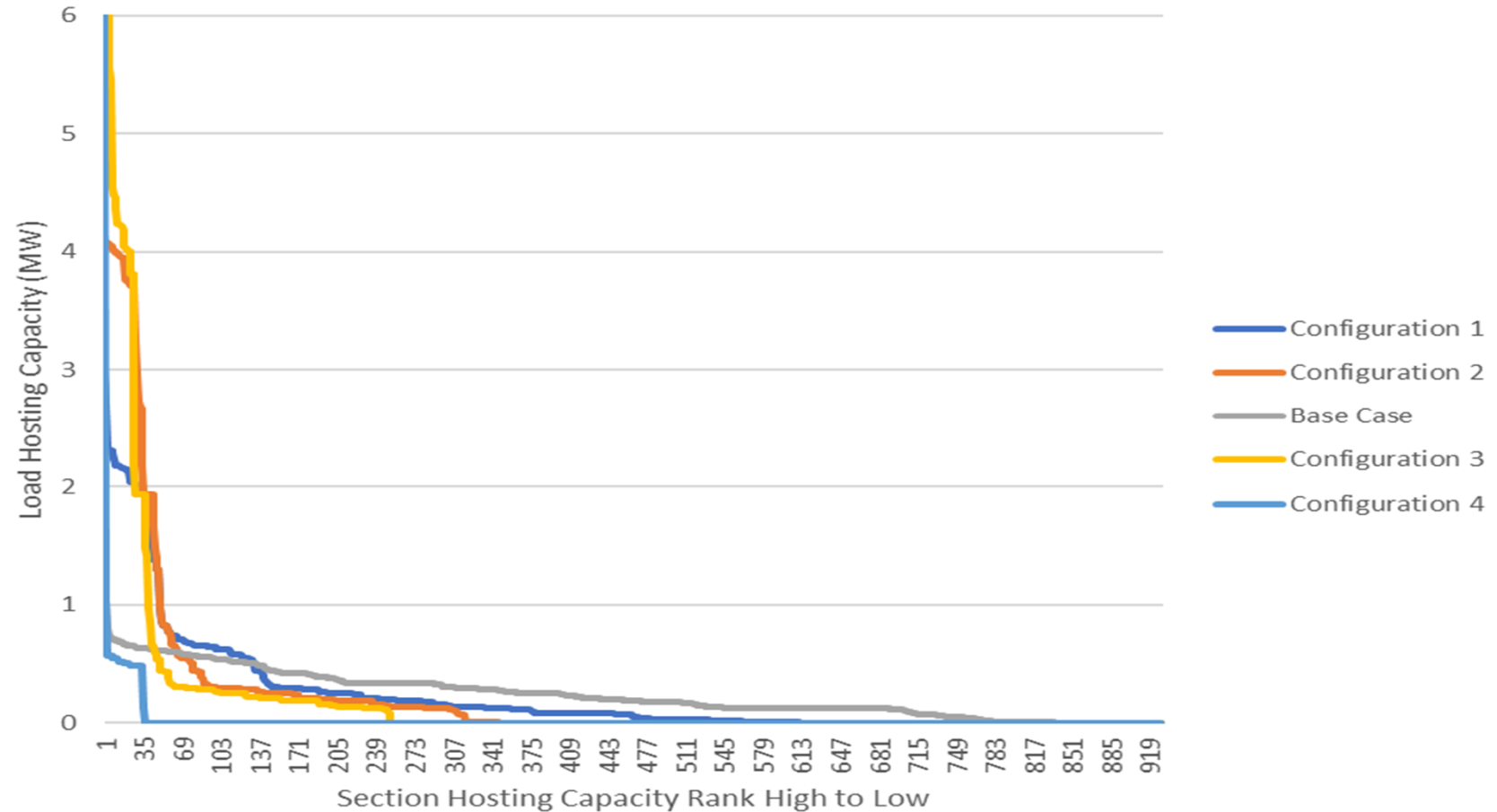
Approach Implication: Operational Flexibility (Contd..)

- Difference in Aggregate Generation HC between OpFlex and Load Transfer Approaches.



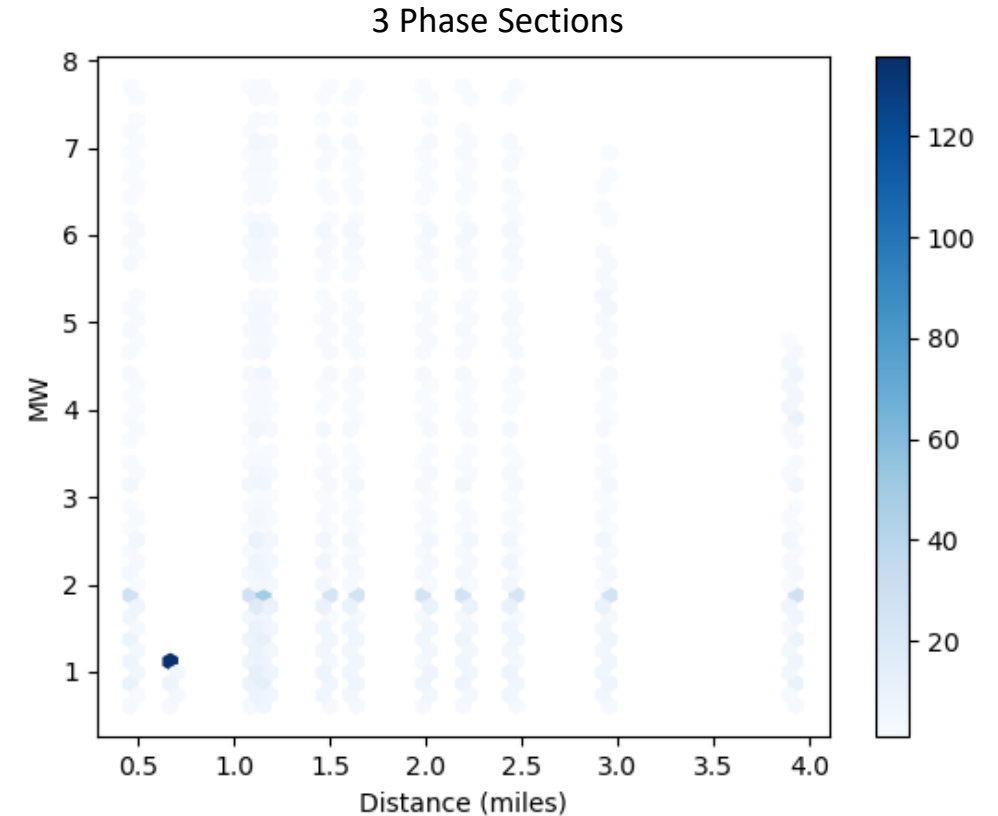
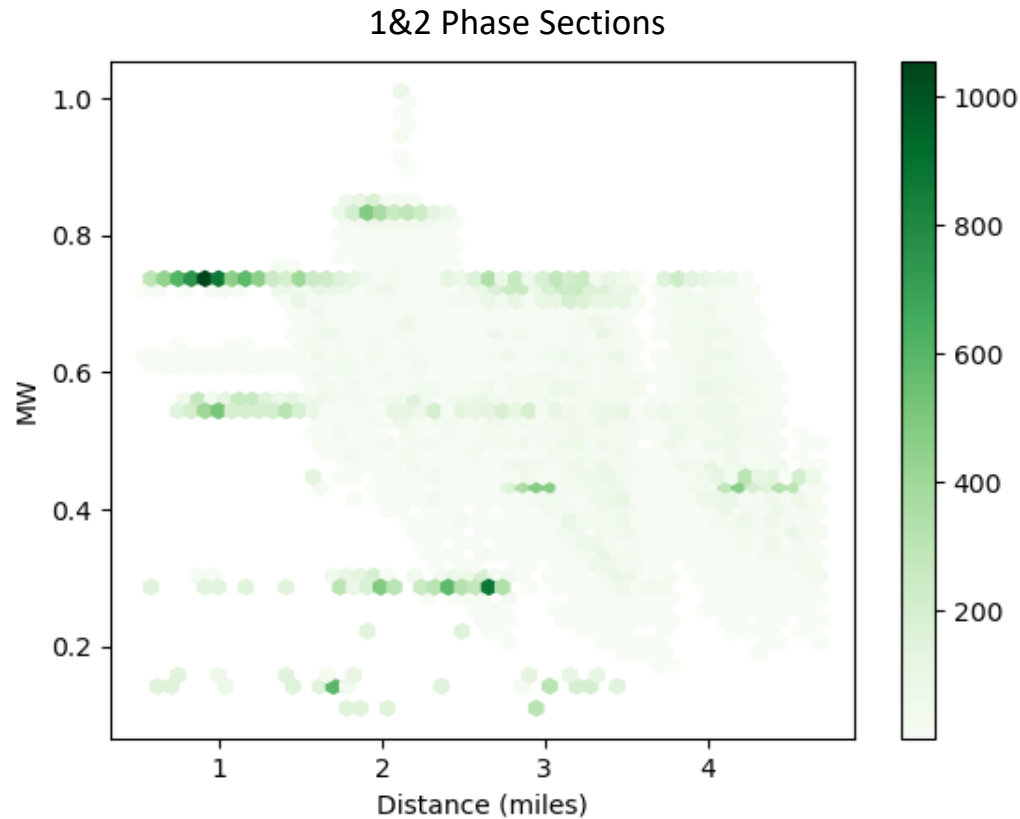
Approach Implication: Operational Flexibility (Contd..)

- Load HC Results for Different System Configurations: EV 0% PV 0% Penetration



Approach Implication: Hosting Capacity Profile

- Generation hosting capacity results are likely to differ across different hour of day and months
- Figures show generation hosting capacity results individual intervals (between 6 AM and 6 PM for each month in a year)
- What can be done to unlock value of DER in intervals when hosting capacity is available?



Conclusion

- Existing implementations of operational flexibility calculations in California fail to capture actual operational flexibility, which is likely even more DER constraining than OpFlex.
- If operational flexibility is to be considered, actual load transfer analysis rather than an approximation should be practiced as part of the hosting capacity process.
- With operational flexibility in place, shift towards hosting capacity profiles rather than flat value is unavoidable, unless system upgrades are preferred.
- Utilities should standardize approach across all activities: planning, DER interconnection, and hosting capacity. Operational flexibility should apply to all.
- When crafting hosting capacity approach, probability of considered outcomes should be taken into account rather than defaulting on worst-case outcome.
- A key long-term solution in overcoming HC constraints is use of utility-scale and grid-edge energy storage.

Thank You

