

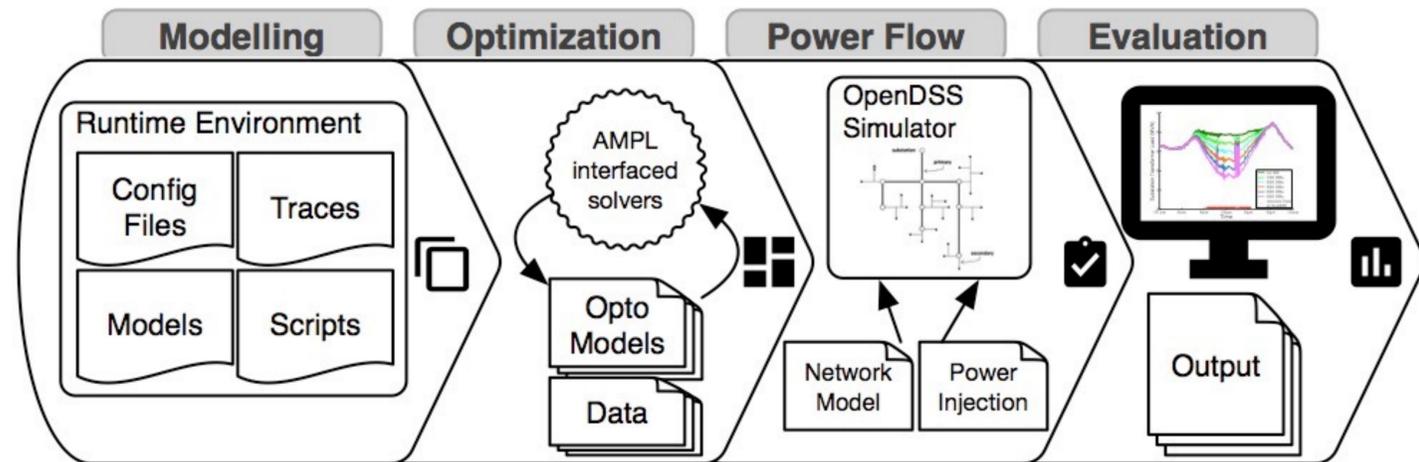
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## Problem Definition

- Voltage, reverse flow, and transformer overloading problems are expected at high penetration of distributed energy resources
- EV chargers and PV systems have opposite impacts on distribution grids
- Solution: **balance** demand and supply to the extent that is possible at the distribution level by controlling **new technologies**

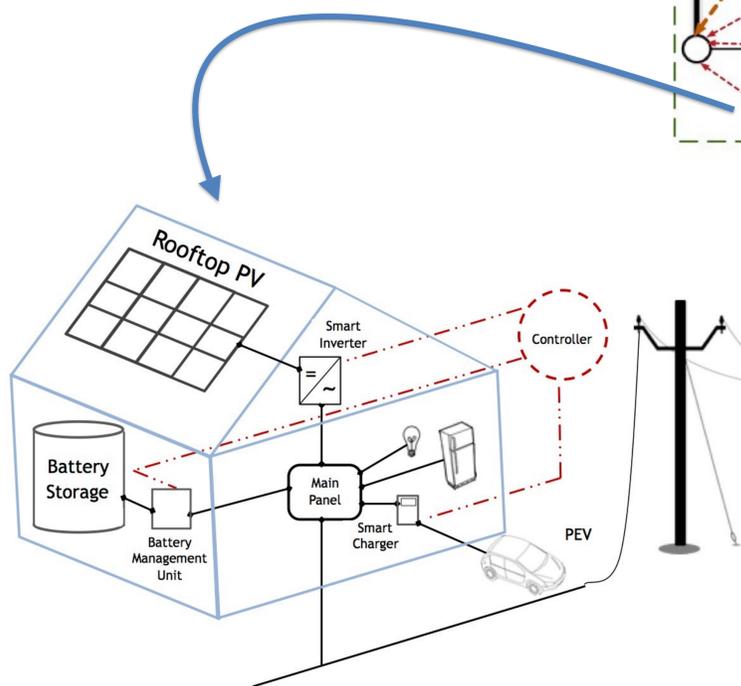
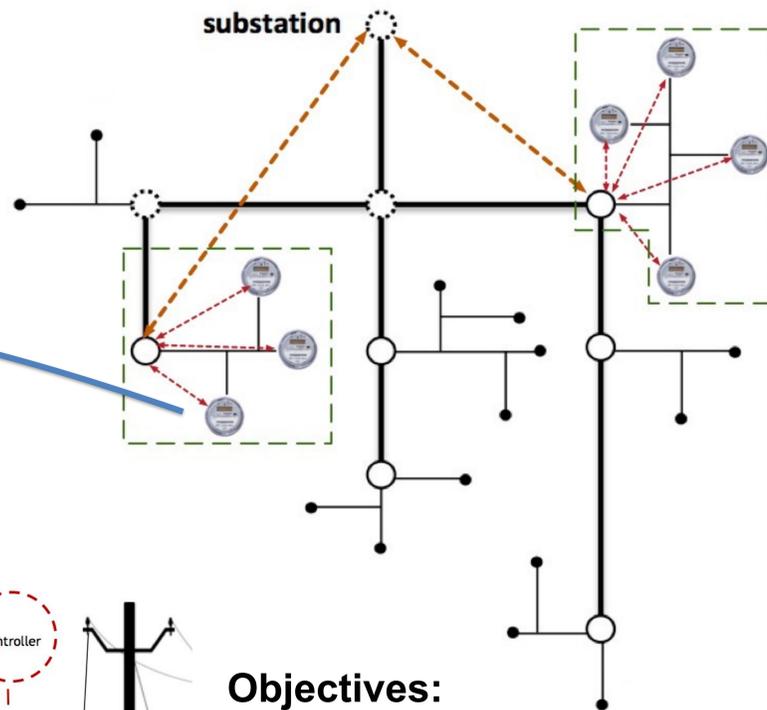


## Co-Simulation Framework



## System Model

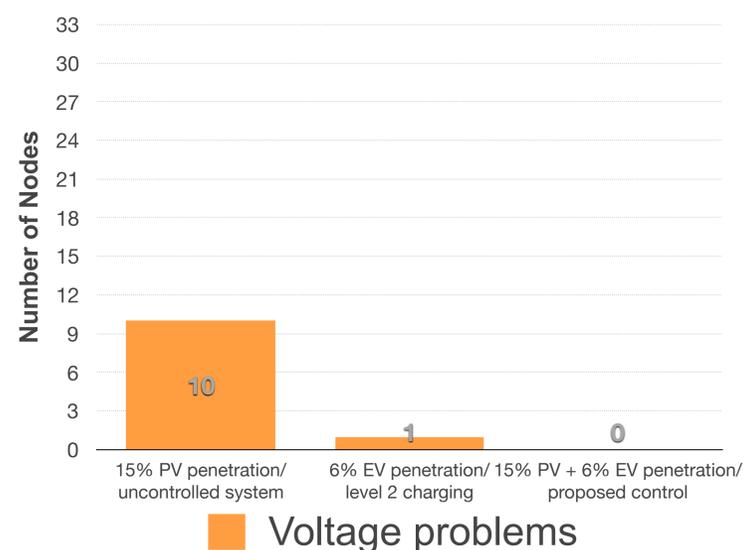
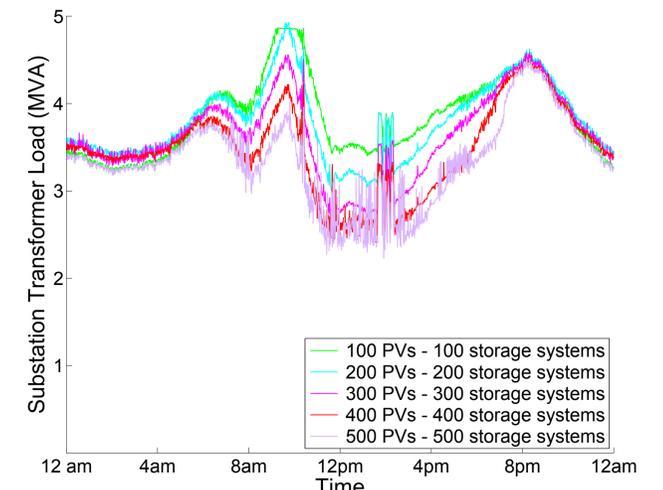
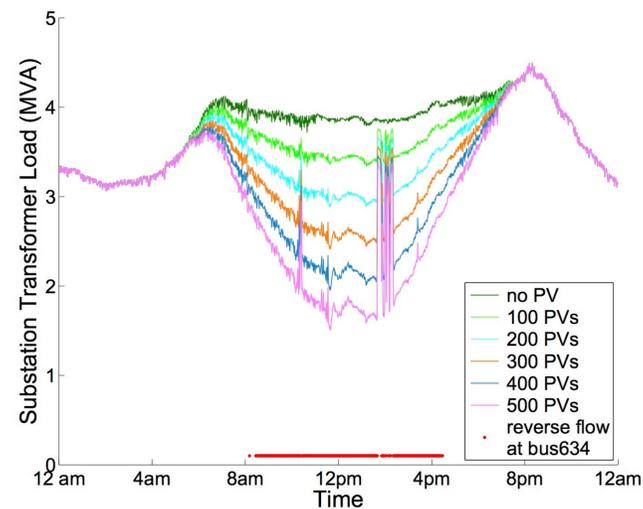
A **balancing zone** is a subtree of the distribution system in which reverse flow is permitted but real power cannot be exported to the grid at its root



### Objectives:

1. Maximizing revenue through fair power allocation to EV chargers
2. Minimizing solar curtailment
3. Minimizing the use of conventional power

## Example Results



## Contributions

- Exploited the synergy between EV chargers and PV inverters to cancel out their effects on distribution feeders
- Designed a decentralized control algorithm which solves two optimization problems at the substation and the balancing zone levels

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