

# Late Backup

## Stages of EV grid integration

### Where we are today

Plug in your vehicle and charge

Off-peak charging encouraged through Austin Energy programs

Vehicle and grid do not communicate

Modest EV adoption

### Basic demand response

Demand response capabilities (similar to smart thermostats)

Peak shaving (pause charging at peak rates/times)

### Managed charging

Charging varies to achieve peak shaving

Reduces cost /grid stress, mitigates ramp rates

Aligns with renewables

### Vehicle to grid (V2G)

Allows for varying power level and direction to maximize peak shave

Reduces cost/grid stress, mitigates ramp rates

Aligns with renewables

Most complex form of EV & grid interaction

Stage 1 -> 3: power flows only to the vehicle

Stage 4: power flows to and from vehicle

*Credit to: Dr. David P. Tuttle*