

Electric Vehicles & Environmental Impacts

Joe Halso
Missouri PSC Workshop
May 25, 2016



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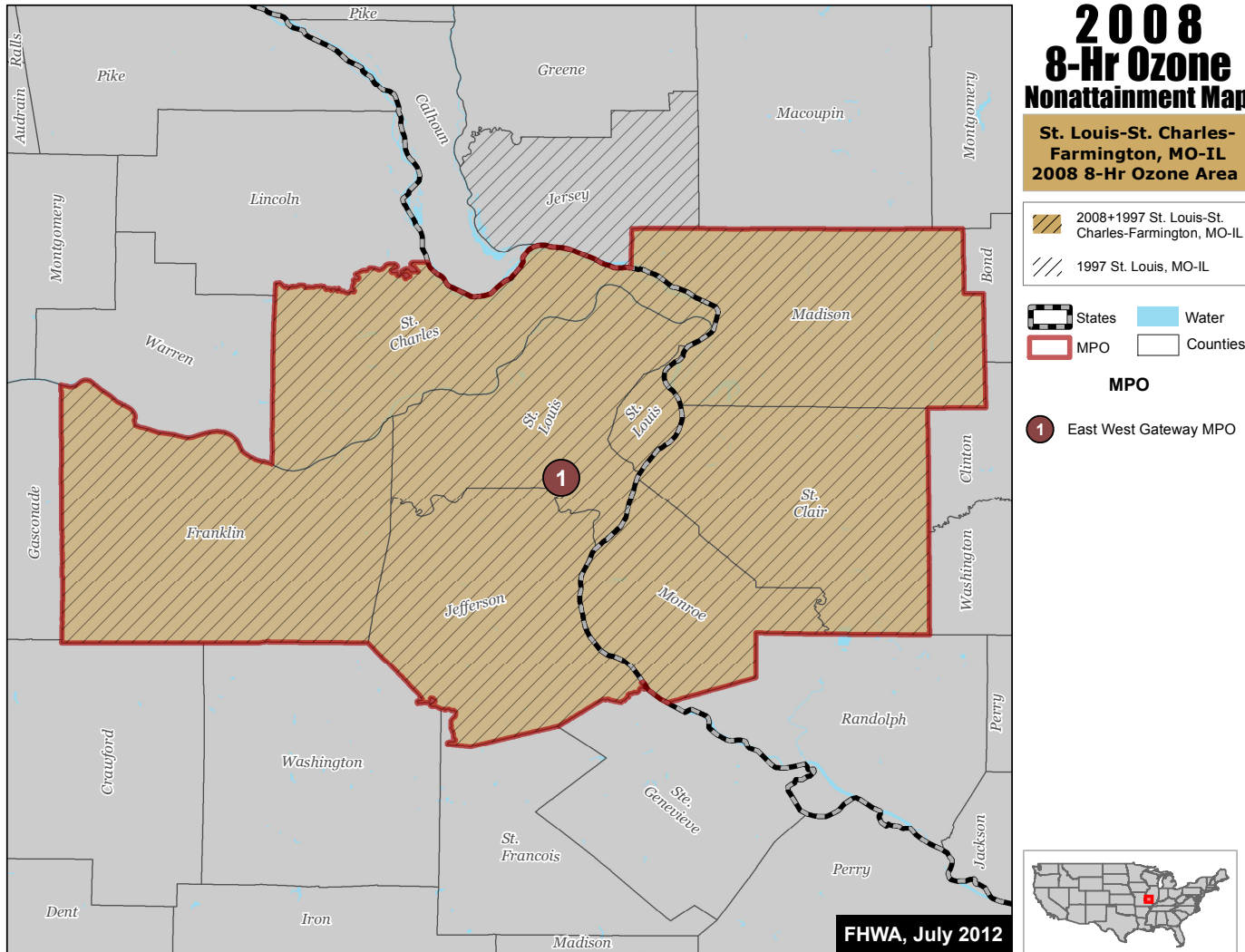


2.1 Traditional Transportation Fuels

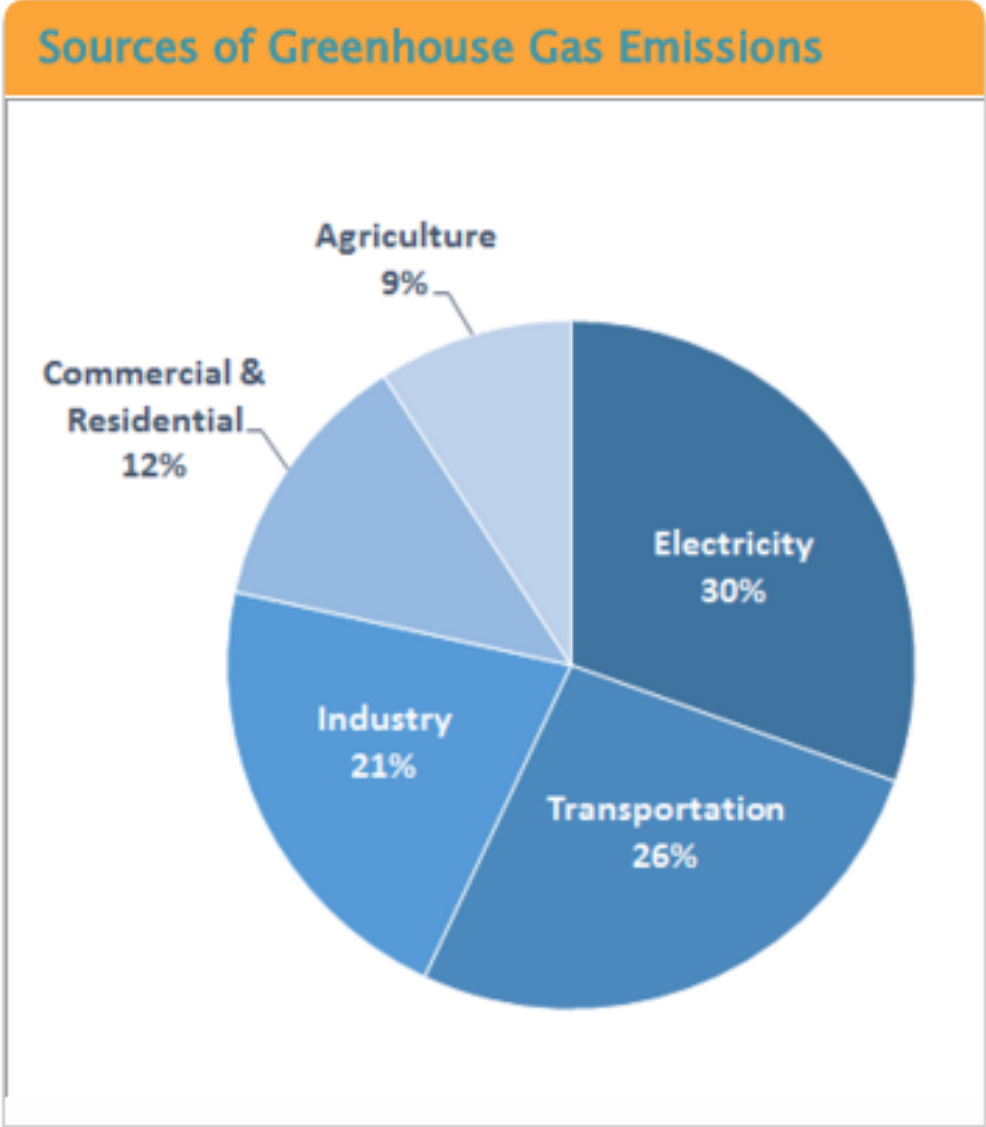
Nearly 100 percent of Missouri's transportation system is currently powered by fossil fuels - primarily gasoline for personal transportation vehicles and diesel for heavy-duty vehicles. As explained in Chapter 2, Missouri is not a major oil producer or refiner and therefore all gasoline used for transportation purposes is imported to the state.

From 1970 to 2012, Missouri's nominal expenditures on transportation fuels increased from \$878 million to \$15.0 billion in 2012¹⁵³, representing a sixteen-fold increase. The growth in expenditures was

Air Pollution Impacts



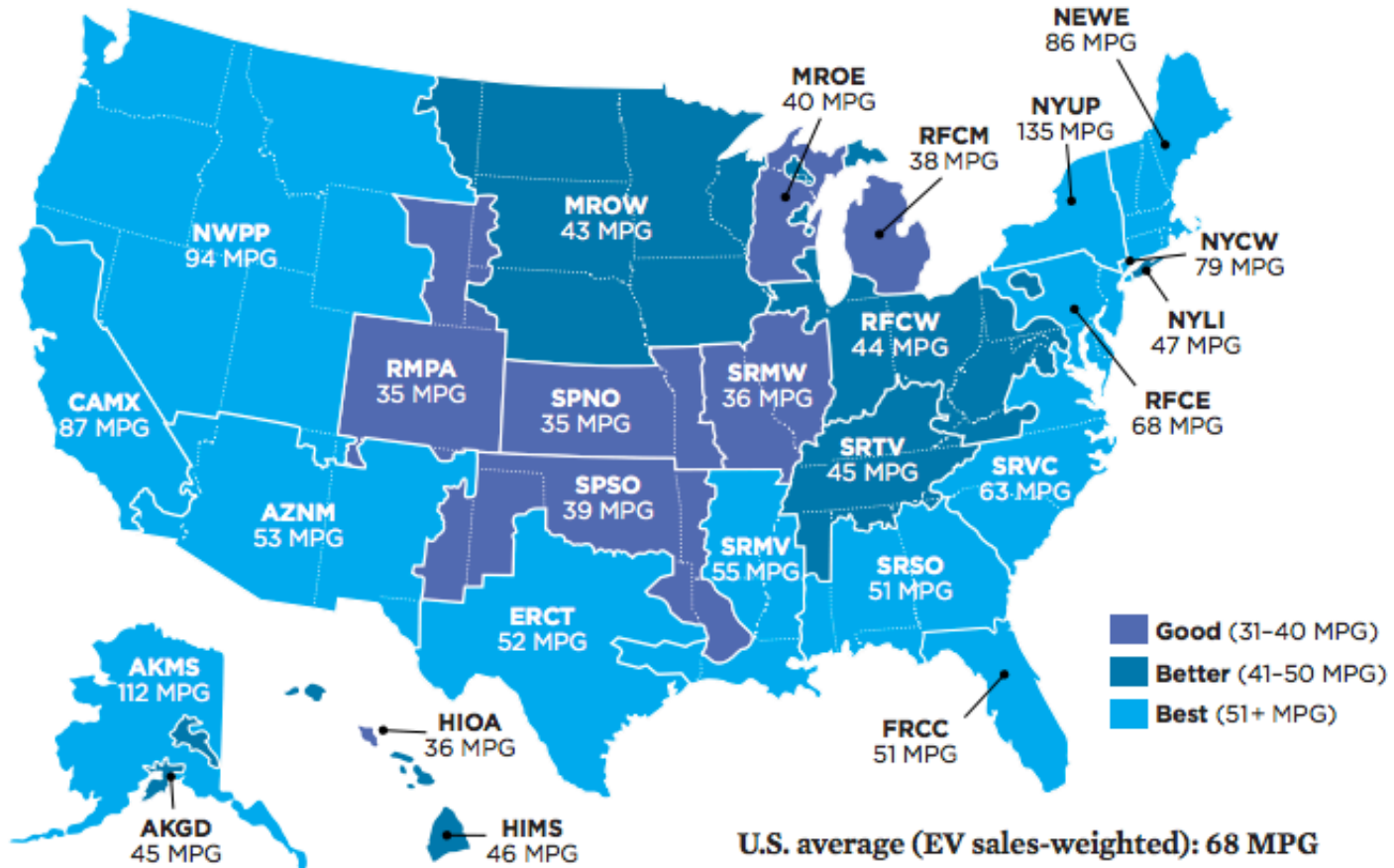
- MIT study estimates **1,192 premature deaths occur each year** due to PM 2.5 and ozone from tailpipe emissions
- In St. Louis, **235 premature deaths** each year
- In Kansas City, **199 premature deaths** each year



EV MPG Equivalency by Grid Region



FIGURE ES-1. Electric Vehicle Global Warming Pollution Ratings and Gasoline Vehicle Emissions Equivalents by Electricity Grid Region



Note: The MPG (miles per gallon) value listed for each region is the combined city/highway fuel economy rating of a gasoline vehicle that would have global warming emissions equivalent to driving an EV. Regional global warming emissions ratings are based on 2012 power plant data in the EPA's eGRID 2015 database (the most recent version). Comparisons include gasoline and electricity fuel production emissions. The 68 MPG U.S. average is a sales-weighted average based on where EVs were sold in 2014.

SOURCE: EPA 2015C; IHS 2015.

Figure 1: Residential PEV Load in San Diego, CA (1,187 Vehicles)¹¹

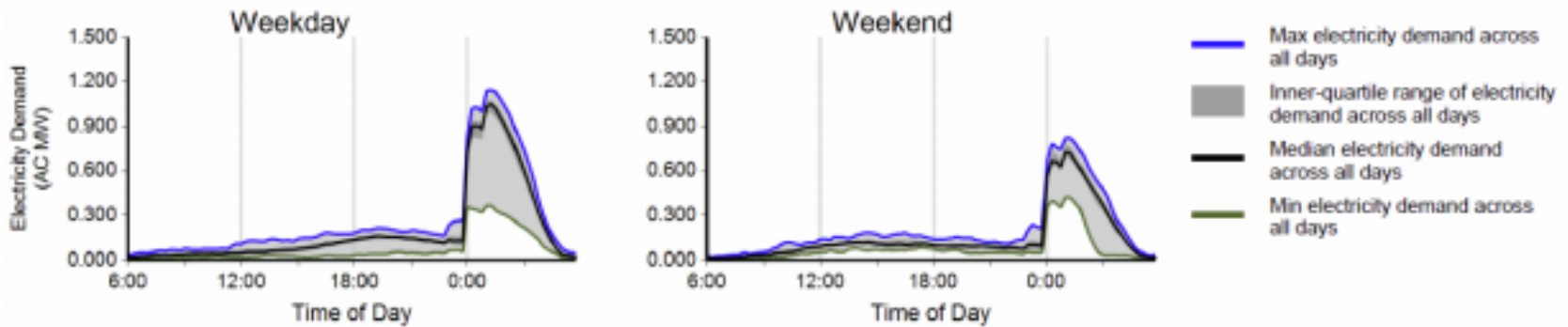
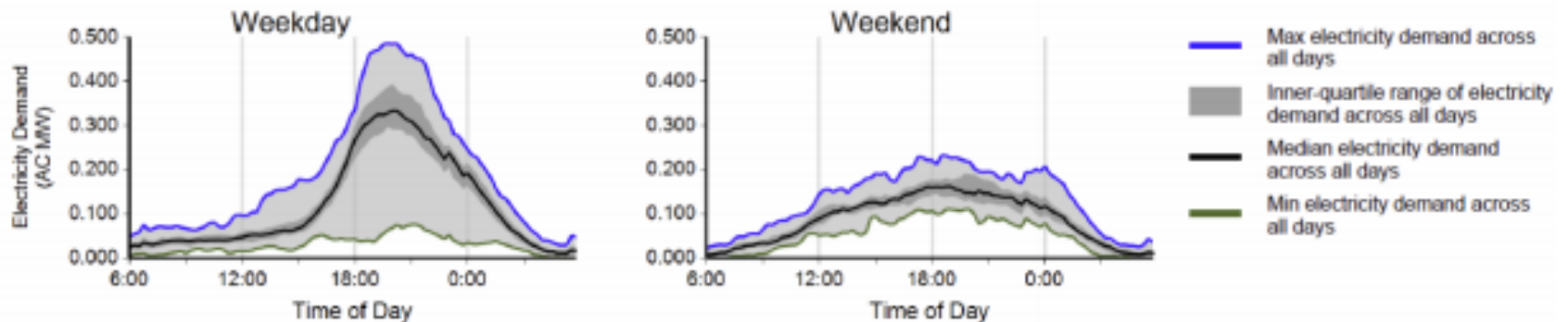
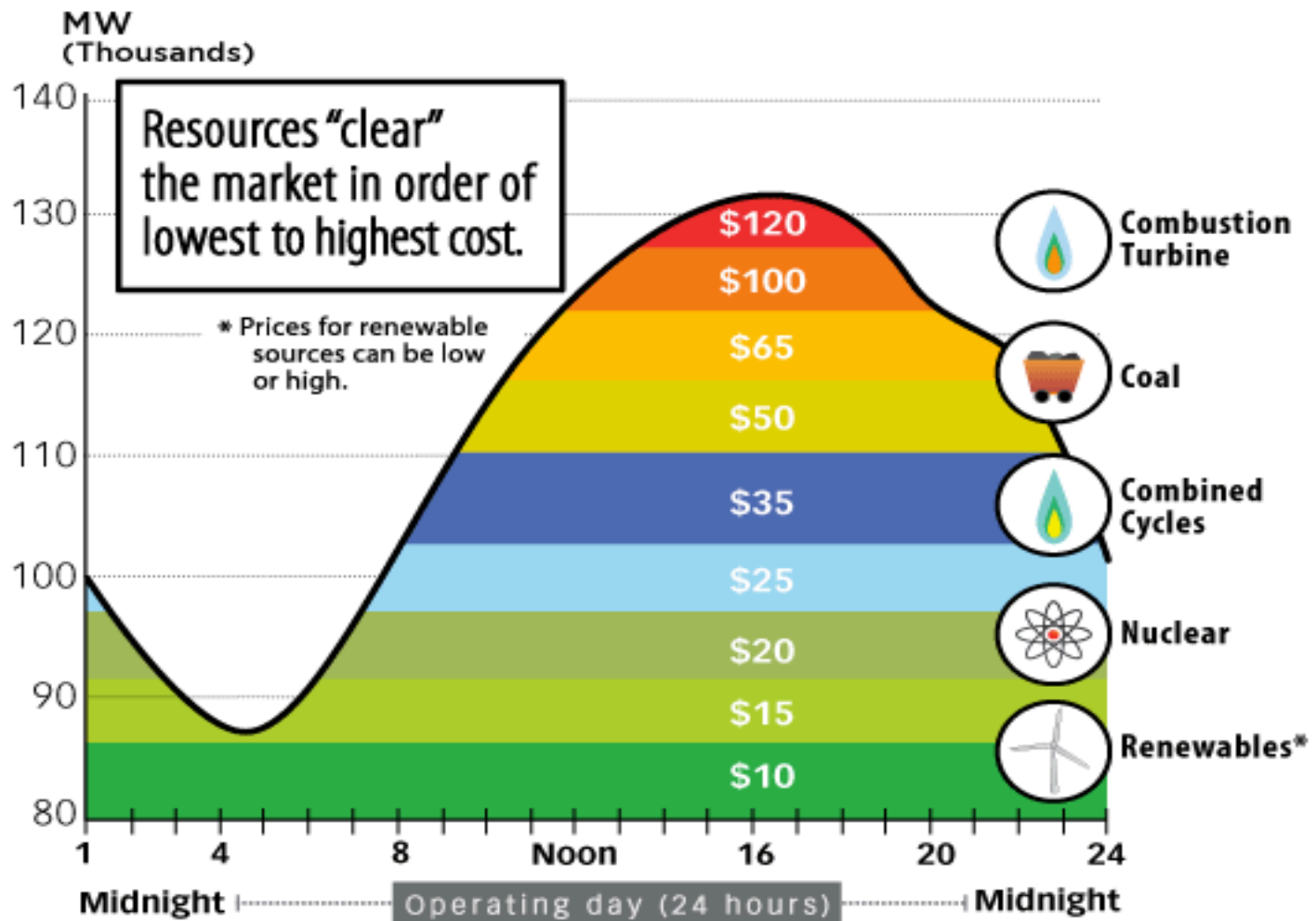


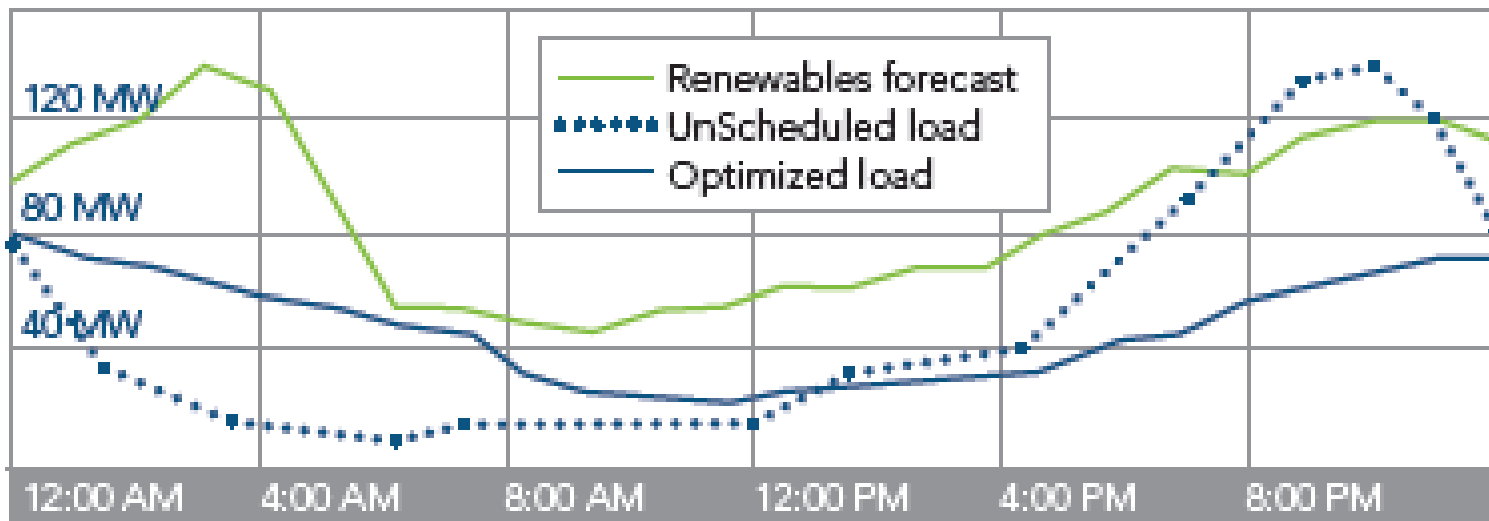
Figure 2: Residential PEV Load in Nashville Metro Area (407 Vehicles)¹²



Generation Resource Constitution



Creating Active Load to Increase Renewable Generation



Thank You



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Vehicle-Grid Integration

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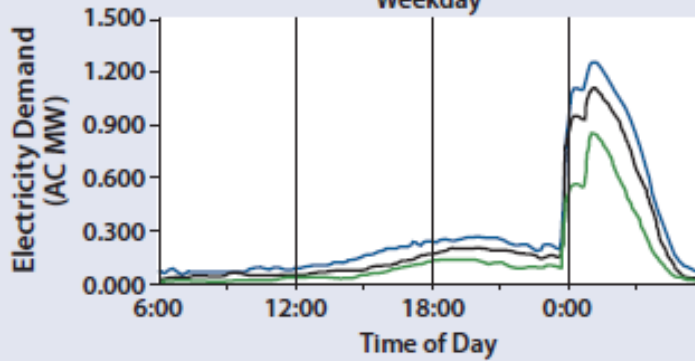
Load Management for Environmental Benefits



EV Project EV Charging Patterns With and Without TOU Rates¹²

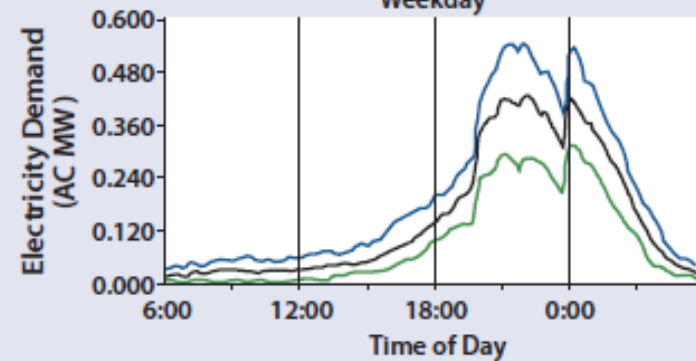
San Diego

Weekday



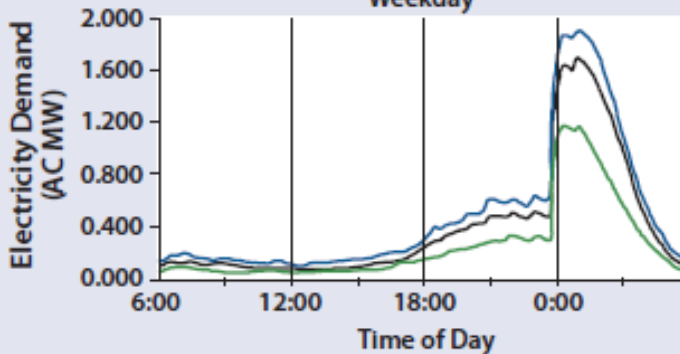
Los Angeles

Weekday



San Francisco

Weekday



Washington State

Weekday

