

Strategies for EV-Grid Integration

Siddiq Khan, Ph.D.

American Council for an Energy-Efficient Economy

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EV-Grid Integration

- Report published in February of this year
- The report focused on five categories of utility strategies: rate design, smart charging, charging station investment and ownership, vehicle purchase incentives, and state and local coordination efforts
- Included case studies of three utilities : Southern California Edison (SCE), Indianapolis Power & Light (IP&L), and Georgia Power Company (Georgia Power)

Strategies for Integrating Electric Vehicles into the Grid

Siddiq Khan, Ph.D. and Shruti Vaidyanathan

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Surge in Recent Electric Vehicles Sales

200,000 EVs were sold between July 2016 and June 2017:

- Battery improvements and costs reduction. Li-ion battery price reduced by 73% since 2010
- Introduction of new EV models. US auto companies now offer more than 40 EV models
- Renewed consumer interests in EVs. More people are interested in buying EVs than before (Consumer Federation of America survey)

Environmental Implications of EV Adoption

- EVs could deliver net reductions in energy use and emissions from transportation sector
- Could significantly reduce localized air pollution, therefore, improving health of people living in transportation corridors
- Could facilitate future transportation choices including ridership and automated vehicles

EV Adoption: Implications for Utilities

- Increased Electricity sales
- Diversify electricity consumers
- Optimize Grid capacity

Two Caveats

- Optimized EV charging that won't necessitate new electricity generation in near term, and
- Use of renewables and energy-efficient power generation in the long run

Strategies for EV Adoptions

- Electricity rate structures, Time-of-Use (TOU) rates
- Smart charging (not covered in this presentation)
- EV charging station investment and ownership
- EVs and EV charging stations purchase incentives
- Coordination with local and state efforts

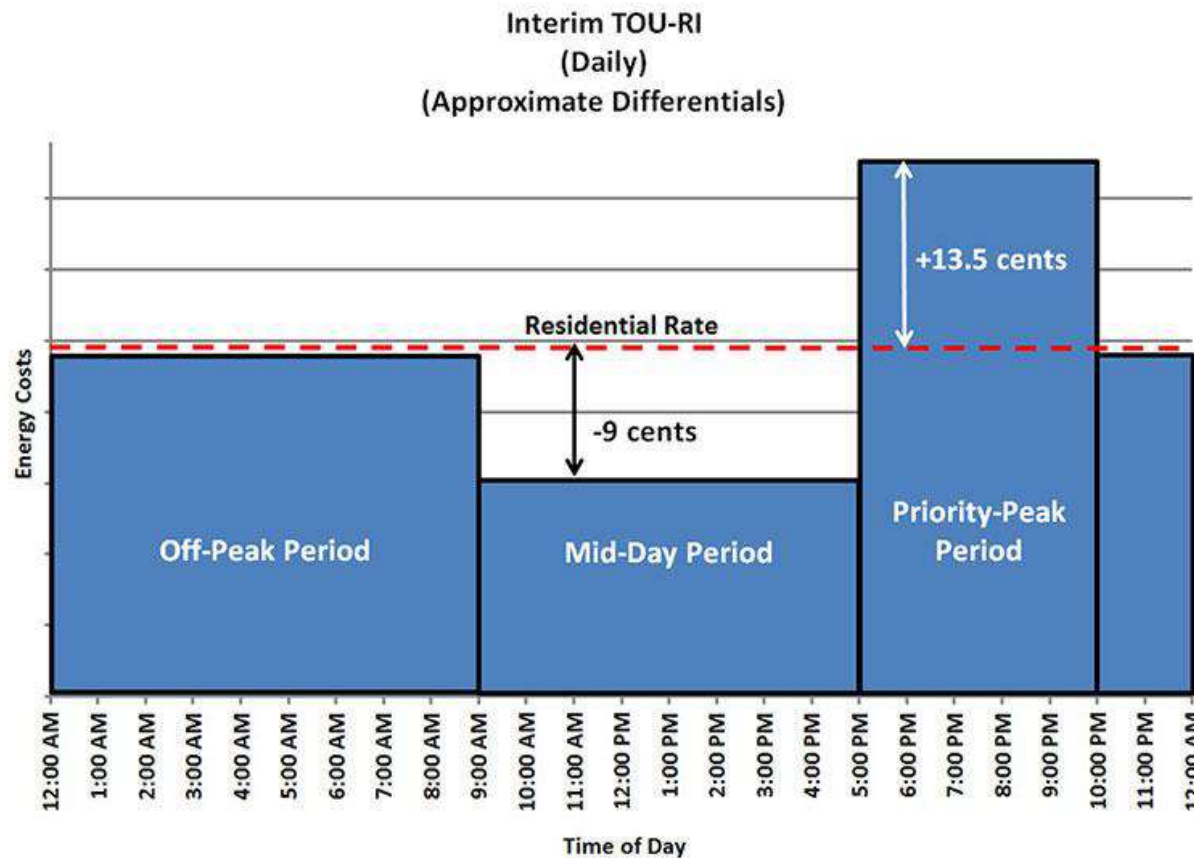
TOU Rates

- More than 200 utilities, including most of the largest, offer some form of TOU rates
- TOU rate structures vary widely. Electricity costs during off-peak and super off-peak hours can be as little as 5–10% of peak hour rates.
- TOU rates encouraged customers to charge their EVs at off-peak hours and helped reduce electricity demand at peak hours

Utility	On-peak rate	Off-peak rates	Super off-peak rates	Peak hours
SCE	0.34		0.14	12-9pm
IP&L	0.12	0.06	0.02	2-7pm
Georgia Power	0.20	0.07	0.01	2-7pm

Summer rates only. IP&L and Georgia Power rates are energy charge, exclusive of power supply and service charges

TOU rates and abundance of afternoon solar may create new peaks or move peak to evening hours



TOU rates offered by Hawaiian Electric Company. Source: HECO 2017.

EV Charging Stations Investment and Ownership

- Limited utility efforts - pilot programs, shareholder investment, and public-private partnerships
- Utility investment on charging stations - most states have yet to address the issue
- California leads the way - only a few states including California permit utility investments in charging stations but are subject to public interest evaluation
- Utilities may consider investing public funds on charging stations when EV adoption provides system benefits and public benefits, especially for underserved communities

Purchase Incentives for EVs and Charging Stations

- High upfront costs for EVs and the costs of charging infrastructure remain as major barriers to electrification
- Utilities have adopted diverse plans to offset the upfront costs and charging station costs
- These incentives include EV purchase rebates. Georgia Power and IP&L, in partnership with Nissan, gave \$10,000 rebates for their employees and customers, and rebates for charging station purchase (Georgia Power)

Utility Coordination with State and Local Governments

- Utility collaboration with state and local policies can result in identifying appropriate user groups, achievable deployment goals, and supporting policies
- Coordination with states can lead to multi-party agreements involving other states and funding for EV pilots: California funding for SCE and Pacifica Gas & Electric smart charging pilot and other EV related projects
- Early engagement with high level officials helps ensure success of the utility EV programs. For example, IP&L EV program and Indianapolis Mayor Greg Ballard
- Utility engagement with other stakeholders can result in reduced purchase price for EVs (IP&L and Georgia Power)

EV-Grid Integration: Findings

- Electricity rate structures (TOU rates) can benefit both EV owners and utilities by creating an incentive to charge EVs when electricity demand is low
- Utilities are investing customer funds in EV charging equipment where EV adoption benefits the power system, customers, or underserved communities
- EV stakeholders, including utilities, offer purchase incentives to boost sales of EVs and chargers
- State and local government involvement with utilities is critical to ensuring that EVs do not create an added burden on transportation and utility systems

Transportation Electrification: ACEEE Activities

- Utility working group: Focused on only utilities
- EV Convening in Atlanta, November 14th: Assembling all stakeholders including utilities, automakers, policymakers, and advocates



Thank You!

Siddiq Khan

skhan@aceee.org