FOSTERING GROWTH IN ENERGY EFFICIENCY
AND RENEWABLE ENERGY

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Caribbean Clean Energy Program

CDB/OUR/USAID-CARCEP
EMERGING REGULATORY ISSUES
WORKSHOP
EVs and How the Regulator Can Prepare for Electricity Grid and Tariff Impacts
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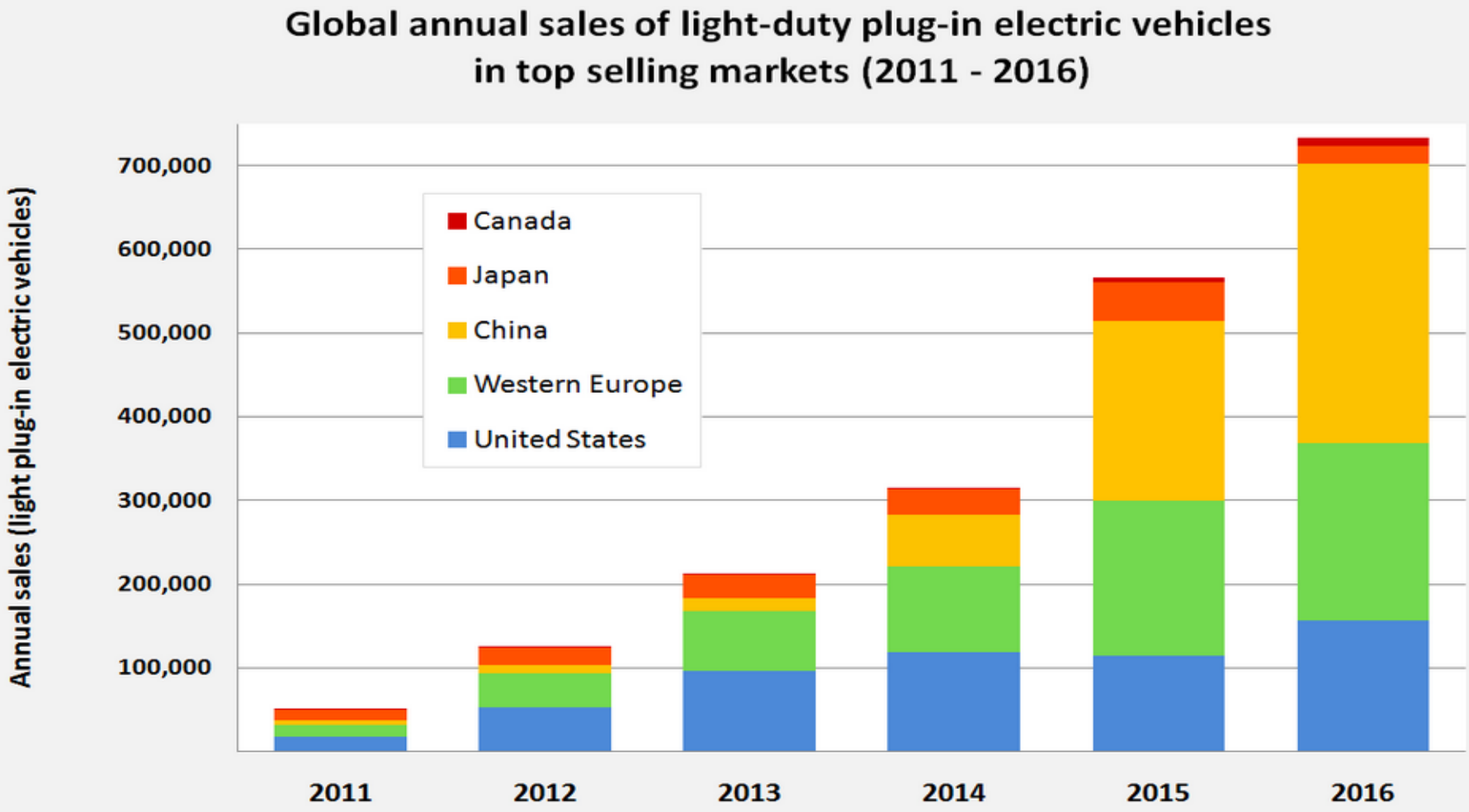
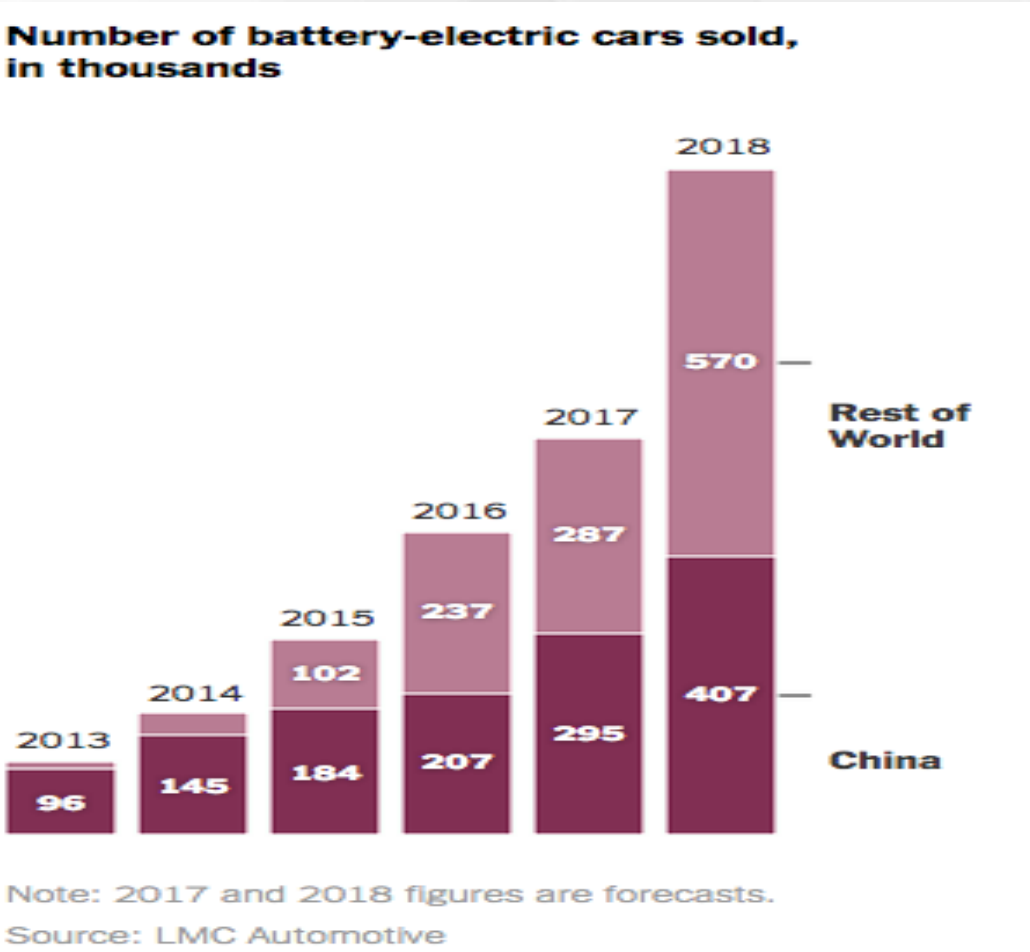
EV at the Intersection of Utility and Transportation Policy

- Possible EV role in:
  - Reduction in petroleum imports
  - Balance of trade
  - Carbon footprint and other environmental benefits
- Overall policy question: Does the proliferation of EVs, and the accompanying deployment of charging stations, serve a public purpose?

World Growth in EVs



World Growth in EVs



World Growth in EVs

G.M. said it would introduce two new all-electric models within 18 months as part of a broader plan toward what the company says is the ultimate goal of an emissions-free fleet. The two models will be the first of at least 20 new all-electric vehicles that G.M. plans to bring out by 2023.

G.M.'s chief executive, Mary T. Barra, announced in September that the company, America's largest automaker, expected the industry to move aggressively toward an automotive future with zero emissions, traffic accidents and highway congestion.

The Cost/Benefit Calculus for EV

- Costs:
  - First cost of vehicles (including import costs)
  - EV charging station infrastructure
  - Utility generation and T&D infrastructure
  - Policy and regulatory oversight
- Benefits
  - Vehicle point emissions (carbon and particulate)
  - Reduced petroleum imports and improved trade balance (depends on electricity production technology)
  - Electric energy storage value?

Coordinating Policy

- Who does the math?
- If the policy is to encourage EV, what entities should be involved?
  - Ministry controlling import duties and foreign investment policies
  - Entity (ministry, regulator, utility) developing generation and T&D plans
  - Parliament/regulator concerning decisions about where EV charging stations “fit”
  - Regulator/utility concerning rate design

Regulatory Status of Charging Stations

- Is EV charging a “utility” activity subject to regulatory oversight?
  - Many jurisdictions have found that it is not
  - Value of providing legislative guidance and clarity

Utility Ownership/Control Over EV Charging Stations

- Should the electric utility be allowed or required to provide EV stations and should other (non-utility) entities be allowed or encouraged to enter the market?
  - How should EV station costs be accounted for?
  - Tariff structures and rates, codes of conduct, and affiliate rules will be important if both utility and non-utility entities are operating EV stations
  - At least some utilities support EV in general, and unregulated (and unaffiliated) EV stations in particular. This is likely related to utilities' interest in finding supported uses for transmission and distribution.

Rates and Charges of EV Stations

- Should there be regulation of prices and terms at station/car point of sale?
- If utility is owning/operating EV station, what restrictions on, and accounting for, prices and revenues should apply?

Recovery of EV Infrastructure Costs

- Should all EV station related costs be recovered from EV customers, or should some costs be socialized over all electric utility customers?
  - Costs may (are likely to) include physical infrastructure for the stations themselves, distribution and transmission upgrades, and generation (base load, peak, regulation, balancing)
  - Where should the business risk of EV station costs be assigned?

Calculation and Assignment of Storage Benefits

- How should storage value of EVs be calculated, captured and reflected in cost allocations or EV station tariffs?
  - Matching charging times with renewable energy production will be challenging, though EV station storage capability (i.e. “utility to station battery to car battery” system) would help
  - Charging in off peak periods may flatten load curve (a good thing) but increase overall fossil baseload production (maybe not a good thing)

Rate Design Objectives

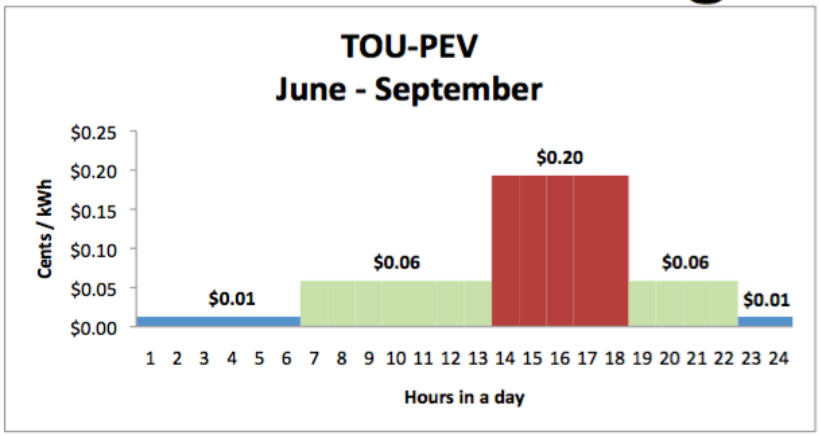
- Rate design principles “in play” regarding EV and EV charging stations
- Rate design objectives (Bonbright):
  - Customer understanding and ease of implementation
  - Collect utility’s cost of service
  - Current customers pay for use of current assets
  - Fairly apportion the annual cost of service among customers and avoid undue discrimination
  - Economic efficiency

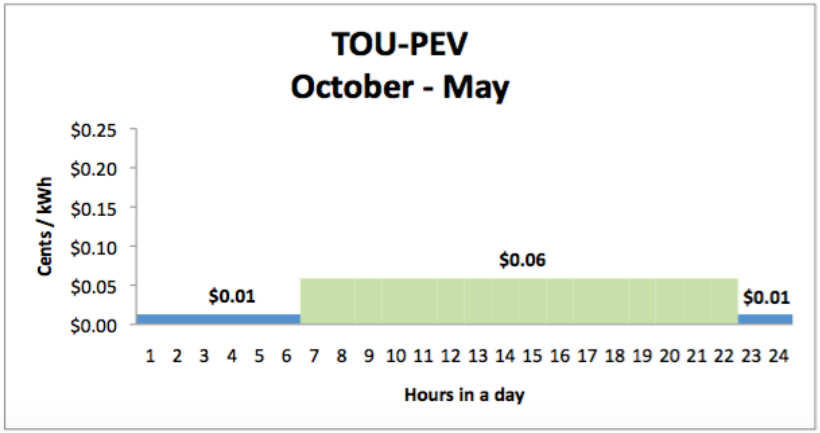
Rate Design Issues

- Should there be separate “sale for resale,” or EV station, and/or “home/business EV charging” tariffs?
  - This issue is integral to the broader issues of “correct” retail pricing and the opportunity for the utility to recover its costs (avoid stranded costs)
  - SCADA system implications
  - Implications for T&D as well as energy rates differentiated by time of use (dynamic, block time of use, critical peak, etc.)

Example of EV Rate Design: Georgia (USA)

Time of Use – Plug-in Electric Vehicle





- 1000 customers studied.
- Their annual electric bills decreased by $180 AFTER getting an electric car.
- Whole house rate
- Uses electricity at the cheapest time.

* Current Fuel Prices Rounded

Example of EV Rate Design: California

- **Three new, optional commercial rate schedules—EV-7 (<20 kW), EV-8 (21-500 kW) and EV-9 (> 500 kW)**
  - TOU energy-only for 5 years, includes generation capacity
  - Demand charge phase-in years 6-10
  - From year 11
    - 60% of distribution demand and 100% of transmission in demand
    - 40% of distribution demand in energy (incentivizes off-peak use)
- **Revenue neutral to the non-EV rates that would otherwise serve the EV customers**
  - Helpful in early years but users with load factor above class average and on-peak users will likely pay more

Rate Design Example: Pacific Power

- Challenge: Standard commercial rate with high demand component made EV station development difficult
  - Larger non-residential rates have demand charges that range from $6 to $8 per kW
  - DC fast chargers are often 50 kW of load (at least 19kW) and are currently used about 2% of the time or less
  - For a typical 50 kW DC fast charger: 2% utlization, $427 monthly bill, 58¢ per kWh
  - Average commercial rate is 9¢ per kWh (40% utlization)
  - Challenging business case for new charging stations
  - Existing stations shutting down or limiting demand/ speed of charging

Pacific Power Transitional Approach

- Transitional rate, anticipating return to “standard” when EV charging station market mature
  - 90% discount to demand charges reducing annually over a nine year glide path back to standard rates
  - First year: $173 monthly bill instead of a $427 monthly bill
  - Reduced revenues balanced with on-peak energy charges
  - Limit applicability to stations with high demand that are available for anyone to use
  - Broadly available to the general public
  - At least one DC fast charger
  - Only charging stations on meter
  - Less than 1 MW

Island EV Rate Design Challenges

- Basic rate designs still being developed
  - Depend on accurate cost data
  - May require removing or reducing legacy subsidy structures
- Data to develop appropriate cost curves for on/off peak price design may not be available
- Absent extensive storage, may be difficult to match low cost (e.g. wind, solar) generation with peak charging times

Island Status

- Iceland
  - By 2016 1.8% of new vehicle registrations were BEVs. August 2017's registrations of new BEVs were 2.5 times higher than the previous August. By July 2017 9% of new vehicle sales were EVs.
  - As of 2017, Orka Náttúrunar (ON) was working to complete a network of 50kW stations.
- Government incentives
  - The government eliminated VAT (24%) and CO2-based fees (up to 65%) on new car purchases for EVs.

Island Status: Business Community Concern

"In a nutshell, EVs possess plenty of potential, thanks to their energy efficiency and their environment-friendliness – but they have yet to see significant success in the region.

"EVs do have their strong points, especially for small island nations and territories. However, **the systems that must be in place for these vehicles to function optimally, and which might make them a truly compelling purchase for local buyers, are not yet widely installed in the region**.

"Government policy could also be more supportive of these vehicles and/or of the creation of charging stations and other necessary facilities."

Island Status: Caribbean

In Cayman itself, EVs are also available for rental alongside hybrids and other vehicles from Budget-Rent-A-Car which has shown an interest in marketing an emissions-free choice that they promote to visitors as helping to protect the islands natural environment.

Another interesting example is in Barbados, though not yet aimed specifically at sales to the tourism sector, a young dynamic company Megapower Ltd is selling and operating EVs. The company imports the all Electric Nissan LEAF, builds and manages solar carports, and is in the process of establishing a growing network of electric vehicle charging stations strategically located across the island.

Quoted from: The Business of Tourism
David Jessop
The electric car and the Caribbean

Final Thoughts

- Identify and quantify all benefits
  - Likely to require inter-agency coordination
- Identify and consider removing impediments where benefit/cost exceeds 1:1
- Consider transitional rate design if EVs will help achieve policy objectives
- Move quickly to establish regulatory (and related) certainty for the market

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Thank You!

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