

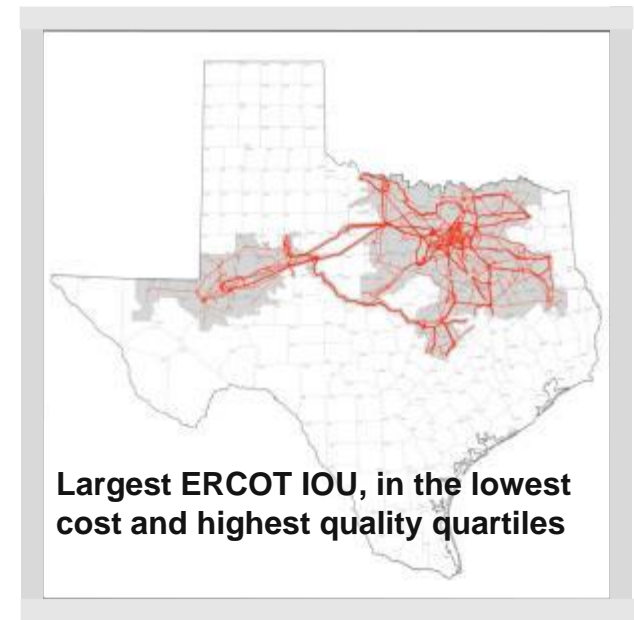
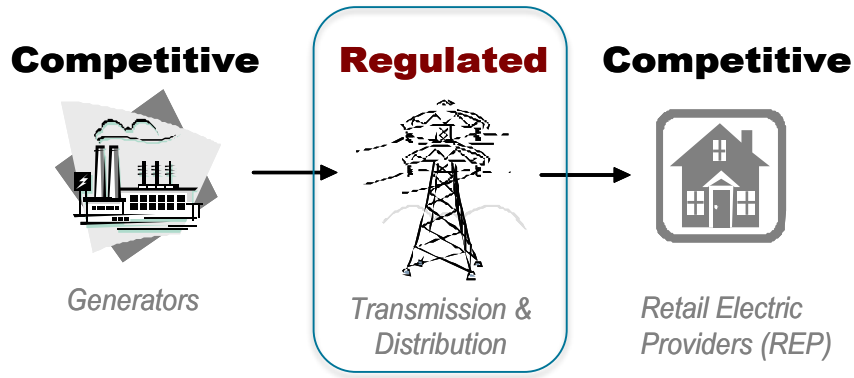
Alternative Transportation Fuels:

Impacts & Opportunities with Regard to Electric Transmission & Distribution Networks ... “The Grid”

One element of the in-progress greatest change to the Grid in its 100 years of existence

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ONCOR's UTILITY ROLE



▪ REGULATED DELIVERY & METERING

- Privately held PUC-Texas regulated ERCOT TDSP (Transmission and Distribution Service Provider)
- ERCOT is wholly contained in Texas, addressing 90% of state consumption
 - One of three North American grids; Owned by IOU TDSPs, Munis. and CoOps
 - IOU TDSPs do not ... cannot ... interact in wholesale, retail, or ancillary markets
- TDSP customers are wholesalers and REPs, also maintaining T&D assets to the Primary Point of Delivery (i.e., the 'Utility side of the meter')

***Delivery rate driven dominantly by peak load.
Transportation impact is currently minimal.***

Transportation Evolution: Impacts on the Grid

Corridors should encourage integrated refueling stops (gasoline, cng, hydrogen fuel cell, electric, biofuels, ...), to include separate capacity for freight haulers and family vehicles

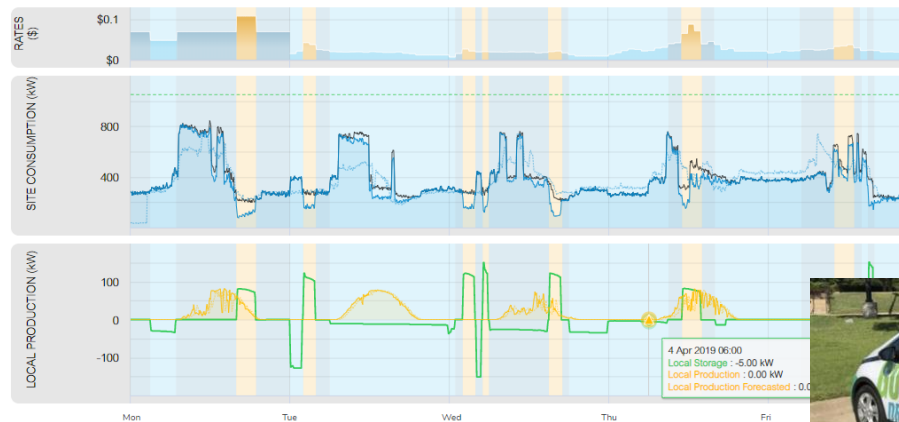
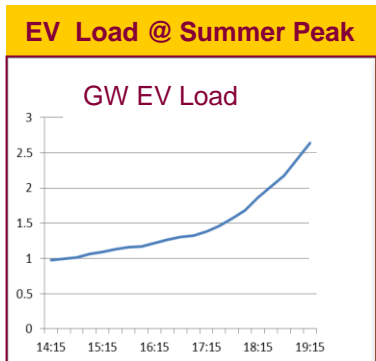
- Permit utilities to provide the required electrical capacity for all fueling most economically

One third of US energy is related to transportation. A gross increase in electric energy or how it is used ... be it for filling batteries, creating hydrogen, or finding/moving natural gas ... can change more than just the 'size' of the Grid

- e.g., time-of-day charging and reverse flow vs. cooldown periods, impacts of substation-sized heavy transport inverters, residential infrastructure, interconnect standards

The widespread distribution of Grid-connected power sources (many of these intermittent) and smart loads (IoT) introduces new market possibilities

- e.g., aggregated inverter-based voltage/frequency regulation, peak management, increased intermittent/renewable energy, time of day planning, resiliency and recovery operations, V2X functions



Peak Shaving & TOD Management

