The Utility's Role with Natural-Gas and Electric Vehicles: A Consumer Advocate's View

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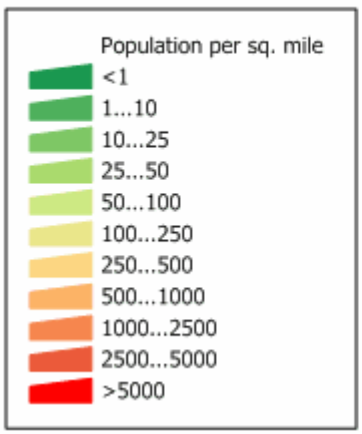
November 14, 2012
National Association of Consumer Advocates
Annual Meeting

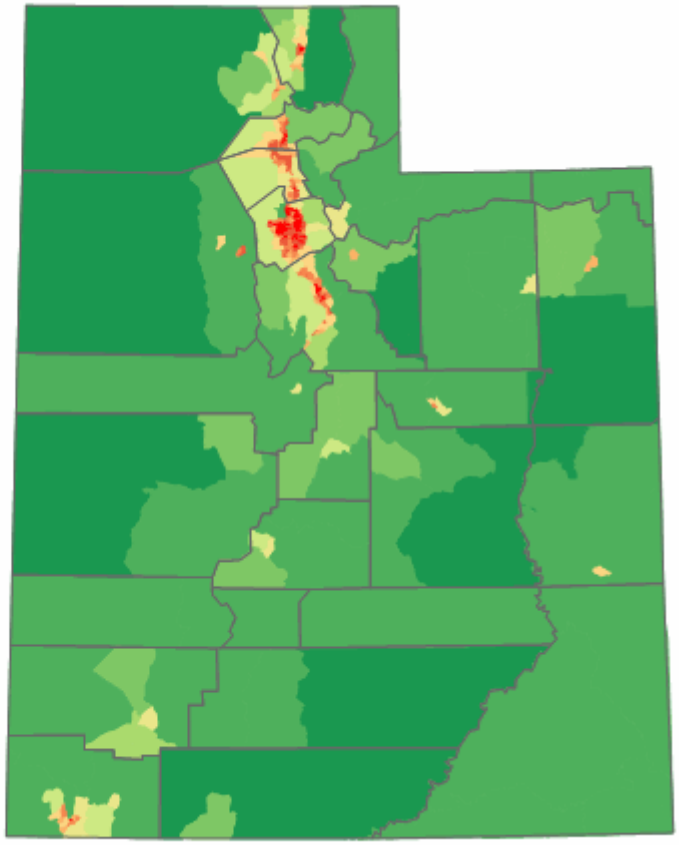
Today's Presentation

- Utah NGV Experience:
  - Utah background
  - NGV history
  - Lessons learned
- Regulatory Issues associated with NGV and EV are similar
- Determination of Public Benefits: some thoughts and a case history
- Recommendations for consumer advocates re: utility treatment and AFV

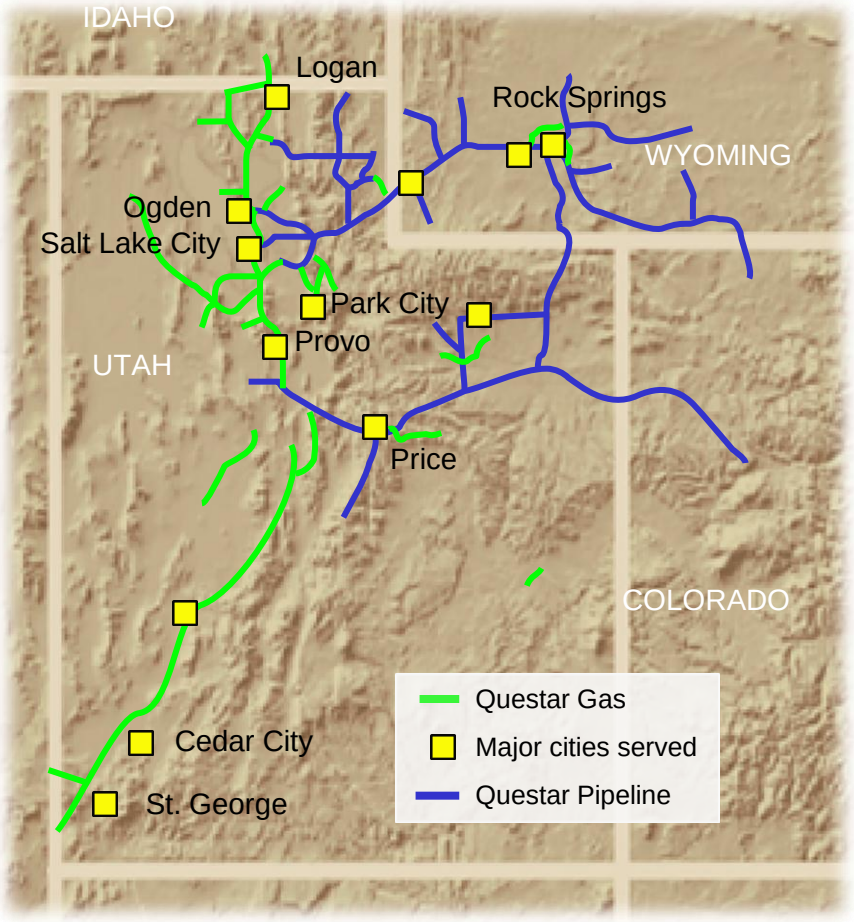
Utah's population is concentrated along the Wasatch Front

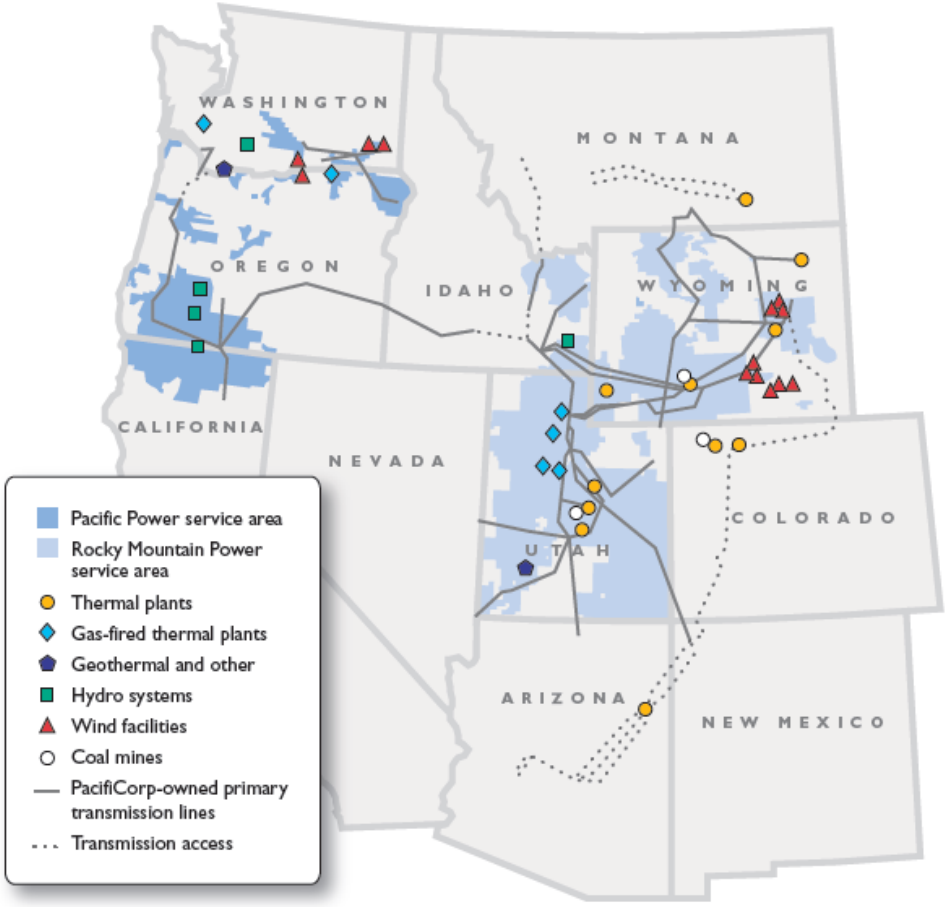


Source: U. S. Census Bureau
Census 2000 Summary File 1
population by census tract.



Utah has one major natural gas and electric utility



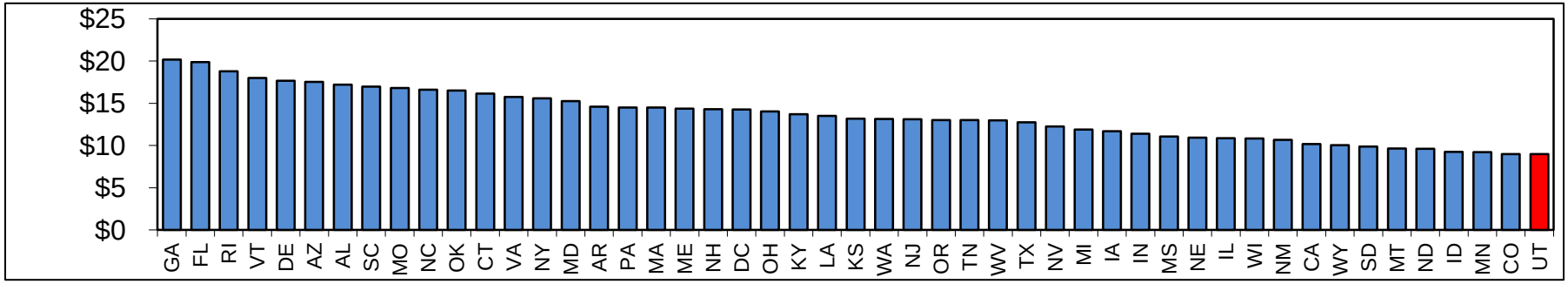


Questar Gas Company serves all of the Population centers in Utah.

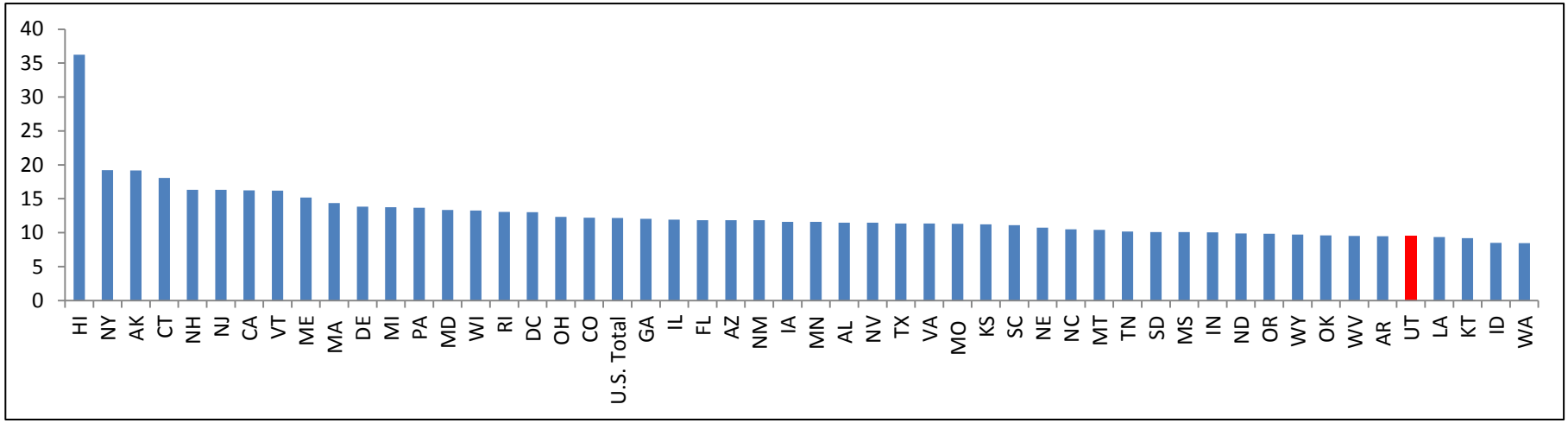
Rocky Mountain Power (PacifiCorp) serves the majority of the state except some rural areas and municipal systems.

Utah has low energy rates

Residential natural gas rates, July 2011, $ per Mcf Source: U.S. Energy Information



Residential electric rates by state, July 2011, $/kWh Source: U.S. Energy Information



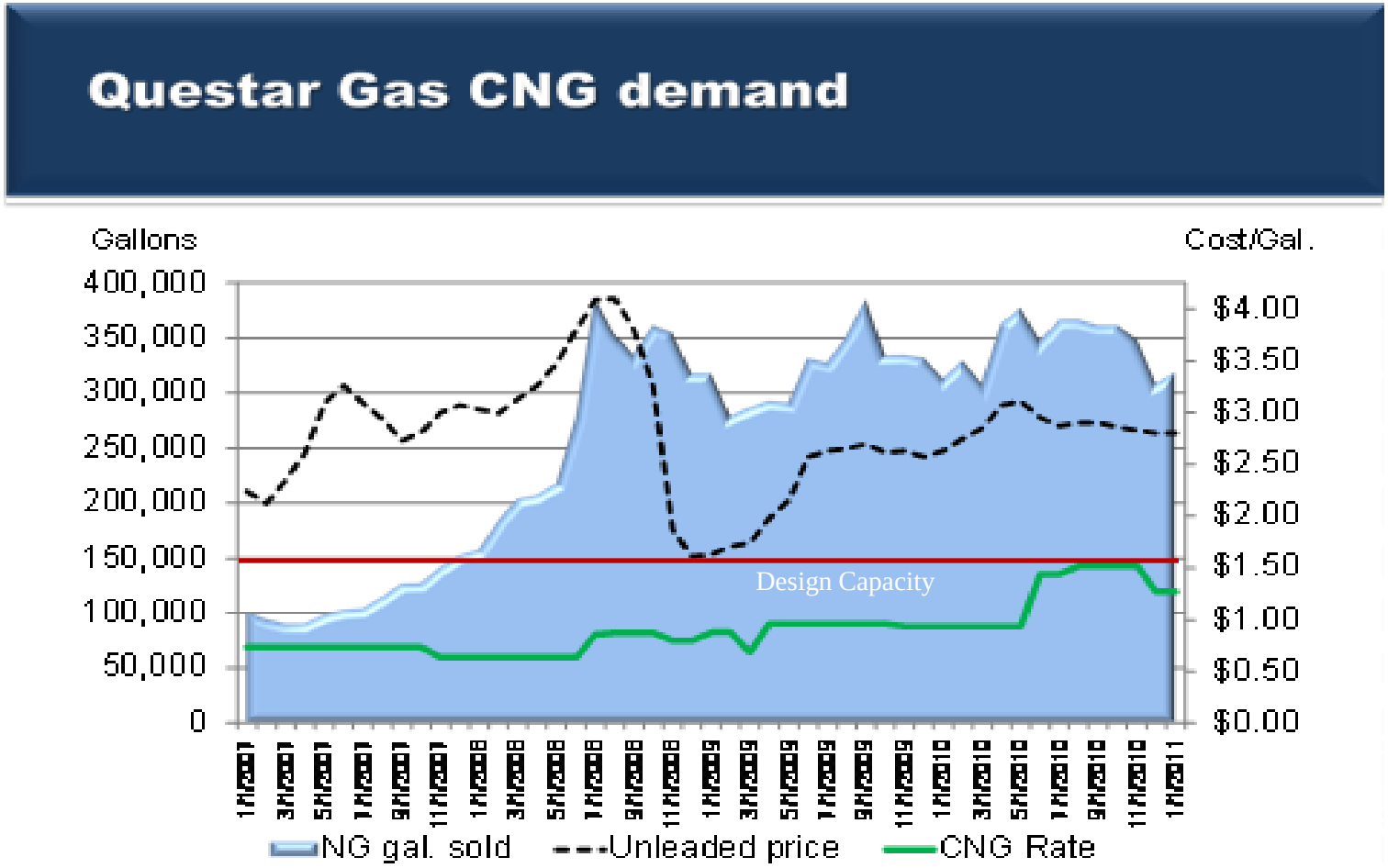
Utah has unique geography

Utah has unique geography . . . and weather

NGV Utah History

- Mid to late 80s, Questar Gas (Mountain Fuel) installed its first fueling stations
  - Levelized rate helped to jump start NGVs
  - Treated as a revenue credit with percentage increases at rate cases
  - Resulted in a low per gallon equivalent
  - Very little attention for many years
- Many factors converged to make this a significant issue in about 2008
  - Markets and prices of CNG in neighboring states
  - Tax policies in Utah
  - Air quality issues in Utah
  - Gasoline prices

NGV usage exceeded infrastructure capacity



NGV hits the PSC

- Facing costs of new investment to upgrade and expand the system, the NGV rate became a hot regulatory question
- General Rate Case
  - Original PSC order required NGV rate to move to cost of service within two rate cases & removed some cost of service gas
  - Public outcry in the NGV community; Questar appealed order
  - Revised order lessened magnitude of move toward cost of service and allowed use of cost of service gas
- Docket opened to examine NGV issues
  - Several technical conferences examined NGV and rate issues
- Legislation answers some of the questions
  - 2009 legislature allows less than full cost of service rate for NGV
- Current status: inching toward cost of service

Our Concerns

- Funding expanding infrastructure through rates is contrary to cost of service principles
- Using rate subsidies to accomplish clean air goals is a mismatch of payees and beneficiaries
- Raising rates for this purpose is no different than raising taxes (in a recession)
  - More regressive
  - Less transparent
  - Circumvents tax policies
- If you want NGV to thrive, allow a market to develop (i.e. don't give utility a monopoly over fueling stations)
  - Lower than cost of service rates give the utility a competitive advantage that is difficult to overcome

Lessons Learned

- NGV advocates and utility regulators speak a different language
- Important to establish rates correctly at first, because changing methodology is very difficult
- Compromise is sometimes better than controversy
  - Current subsidy is estimated to be 20 – 25 cents per year for a residential customer
- Utah model may not work elsewhere
  - Infrastructure installed at a low cost (25+ years ago, upgraded and expanded with ARRA funds)
  - System required only a small level of subsidy
  - Close match between set of ratepayers and total Utah population
  - Existing distribution system capable of handling the NGV load

Many issues are similar for NGV & EV

Natural Gas Vehicles

- Role of Utility
- Ratemaking
  - Cost of service
  - Rate base
  - Home refueling rates
  - Who pays system upgrades
- Vocal proponents advocate for discounts to promote technology
  - Conversions, home refueling, rates, new stations
- Policy orgs advocate broad PSC evaluation and role
  - Evaluate vehicle markets
  - Broad definition of public benefits
- Fairness/equity
  - Low income access
  - Subsidies by other customer classes
- Public Benefits
  - Air quality

Electric Vehicles

- Role of Utility
- Ratemaking
  - Are time of use rates necessary?
  - Rate base charging stations?
  - Separate rates or meters for home recharging?
  - Who pays system upgrades
  - Sales for resale
- EV advocates seek discounts to promote technology
  - Low recharge rate, net metering for sale back to utility, charging stations
- Smart Grid advocates seek broad PSC role
  - Promote vehicles
  - Promote smart grid
- Fairness/equity
- Public Benefits
  - Emissions
  - Integration of intermittent
  - Delay of future resources
  - Many questions remain: When will people recharge? How much flexibility are drivers willing to accept?

Determining Public Benefits

- AFV public benefits are not necessarily analogous to energy efficiency or even using externality values (i.e. not related to other utility usage)
  - Energy efficiency benefits are typically measured using actual system benefits
  - Externalities consider non-monetized costs caused by energy consumption
- Example: While NGV may have fewer pollutants than gasoline-powered vehicles, how do they compare to using natural gas for home heating or industrial purpose?
  - Why should one consumer's heating costs choices subsidize another customer's transportation choices?
  - If public policy favors certain transportation choices, use public funds
  - You don't know what transportation choices others are making. Why NGV instead of public transportation, or biking, or EV?

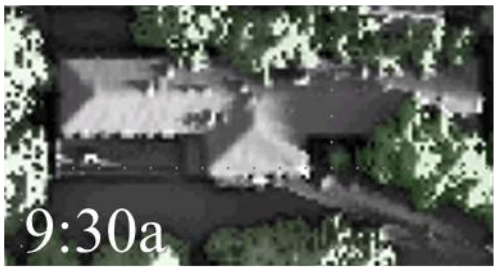
Rates Should Only Reflect Utility Benefits

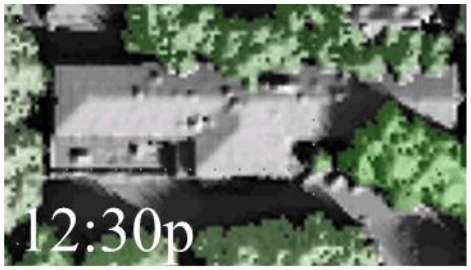
- It would be improper for utility rates to incorporate benefits such as reduced reliance on foreign oil, reduced emissions
  - Violates matching principles (beneficiaries are the general public while payees are the specific utility's ratepayers)
  - How do comparisons of emissions profiles include the generating sources used to power electric vehicles?
- Evaluate both short- and long-term benefits to utility
- Key Question: What are the utility benefits?
  - Advocates suggest that EV can delay need for additional generating resources, integrate variable resources and provide other operational benefits to the utility system.
  - Will EV driver flexibility be sufficient for all potential benefits to be realized? (time and place that batteries are recharged, battery and warranty issues, desire for availability of vehicle when needed)
  - Are any technical problems created by adding EV to the system?

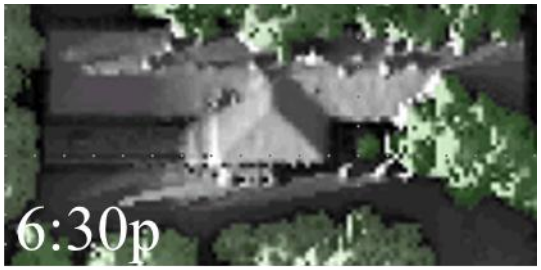
Determining Public Benefits: Case Study

- Issue: Urban, residential neighborhood in downtown Salt Lake City required upgrades to substation. Customer questioned expansion and public opposition delayed the project.
- Solar advocates asserted that solar reduces consumption during peak, expensive hours and could be a cost-effective alternative to additional infrastructure, i.e. putting PV on every rooftop could eliminate the need for the substation upgrades.
- Study: Rocky Mountain Power initiated detailed study to determine maximum potential of rooftop solar in neighborhood.
- Study methodology:
  - Determined all roof heights, shapes, trees, etc. for the defined neighborhood served by the substation
  - Determined solar placement to maximize solar output
  - PVs assumed to be installed on all surfaces where sun exposure justified doing so
  - All surface area assumed to have structural ability to install PV
  - Detailed modeling based on actual sunlight data simulated total solar output over time

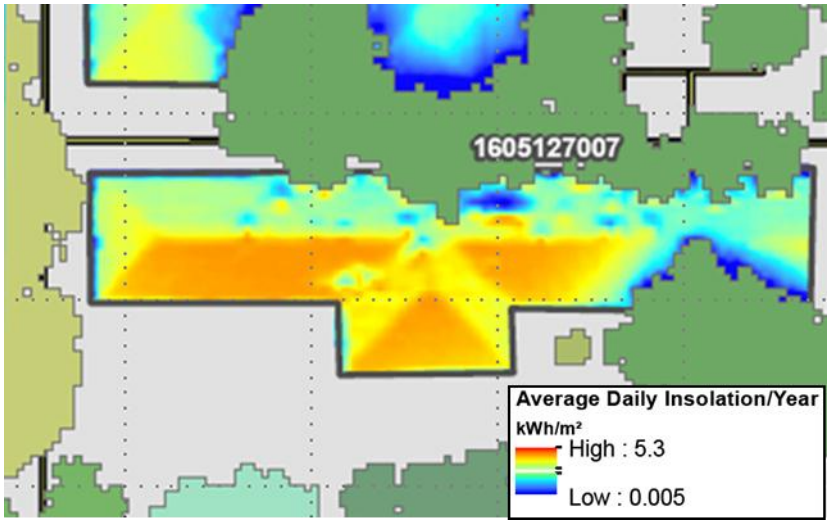
Study Methodology: Determining Panel Location





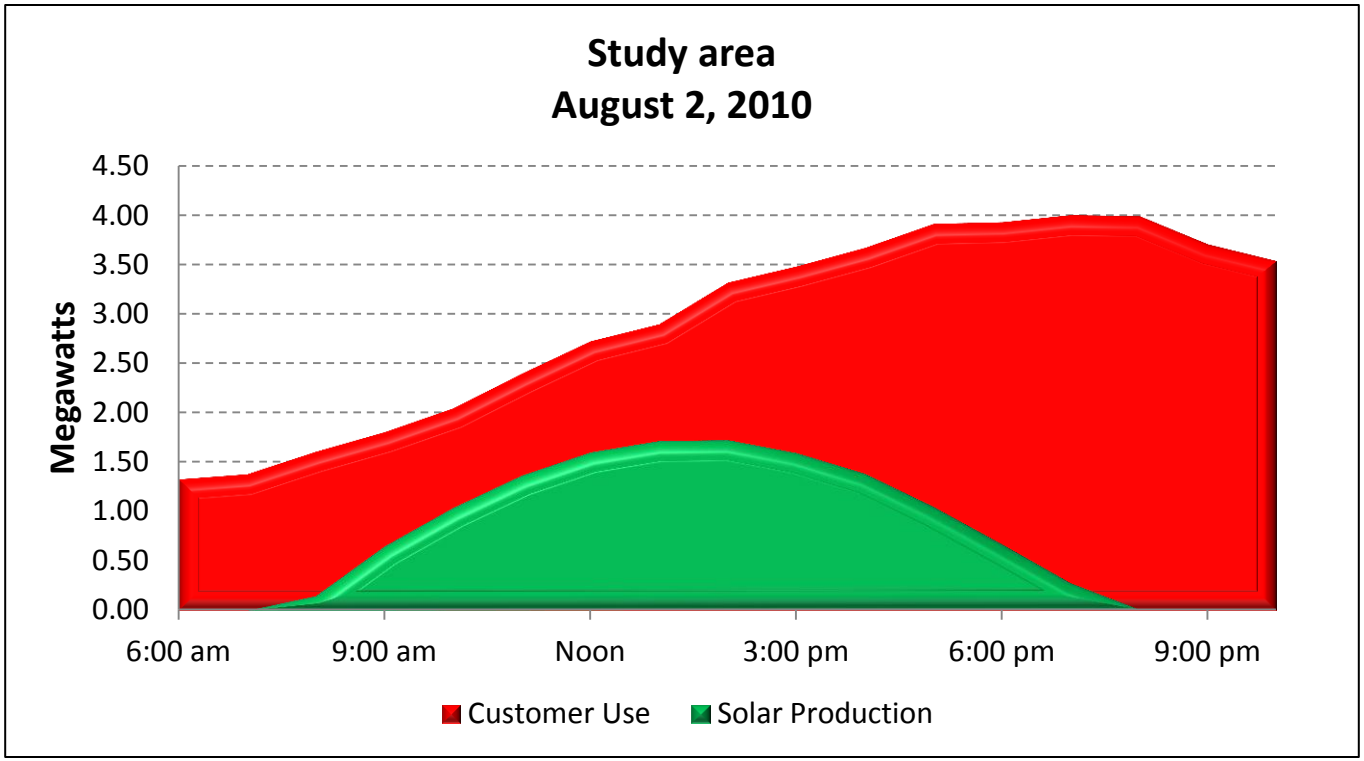


- Evaluated roof shading on every structure
- Determined solar exposure
- Located solar panels where they produce the most energy



Source: Rocky Mountain Power

Case Study Results



Source: Rocky Mountain Power

Conclusion: Solar production provides virtually no output at the time of this circuit's peak on this system's peak day.

Case Study: Lessons Learned

- It is critical to analyze benefits specific to each technology, application and system.
- Benefits that seem intuitive may not materialize
- Benefits likely to be different in different systems and even in different parts of the same system
  - Different peaks
  - Different load and resource profile
- Just as it was necessary to match the load profile for the substation with the potential solar output in the case study, it will be necessary to have good data on EV driver behavior to evaluate the EV impact on a utility system

Recommendations

- Bottom line: use the same fundamental tools we rely on as utility consumer advocates
- Set rates based on cost of service
  - Reductions from cost of service should come from an external source
  - Don't allow below cost home refueling or recovery for promoting AFV
  - Cost of service rates prevents distortion of market – don't pick winners/losers
  - Incredibly difficult to remove subsidies once in place
- Advocate for detailed analysis to demonstrate any public benefits
  - Benefits dependent on consumer behavior should specifically study that behavior
  - Benefits should only include utility system benefits
  - Benefits from comparison against other vehicles best addressed through public policy NOT rates

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