



Time-of-Use Generation Rates

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Time-of-Use Rates

Abstract: the 'basics' of electricity markets are complicated (*ehh hmm not basic*).

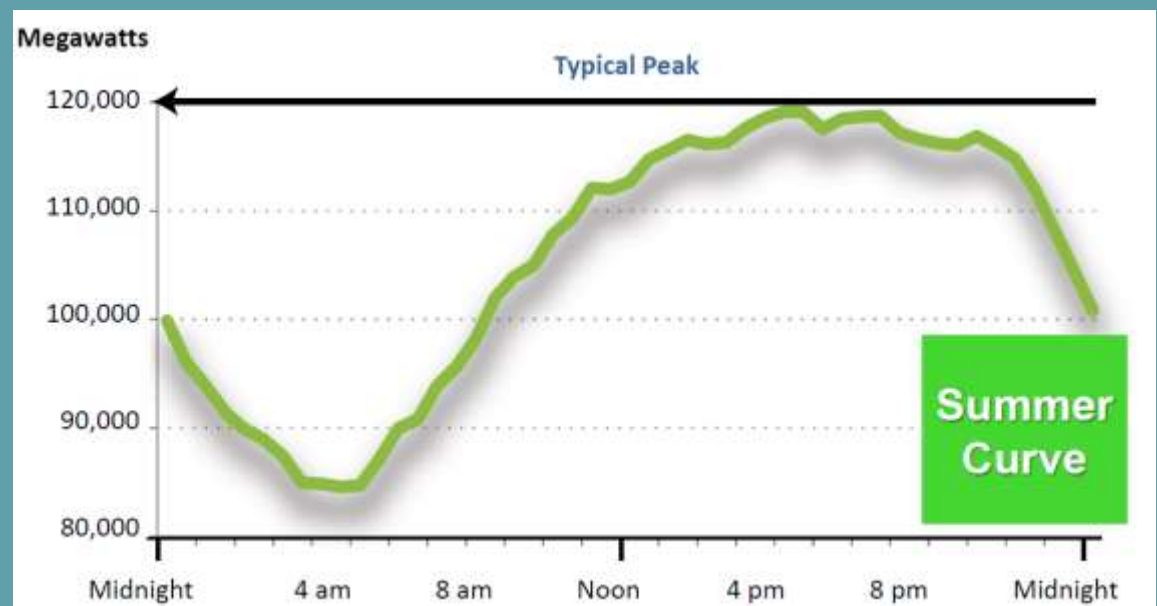
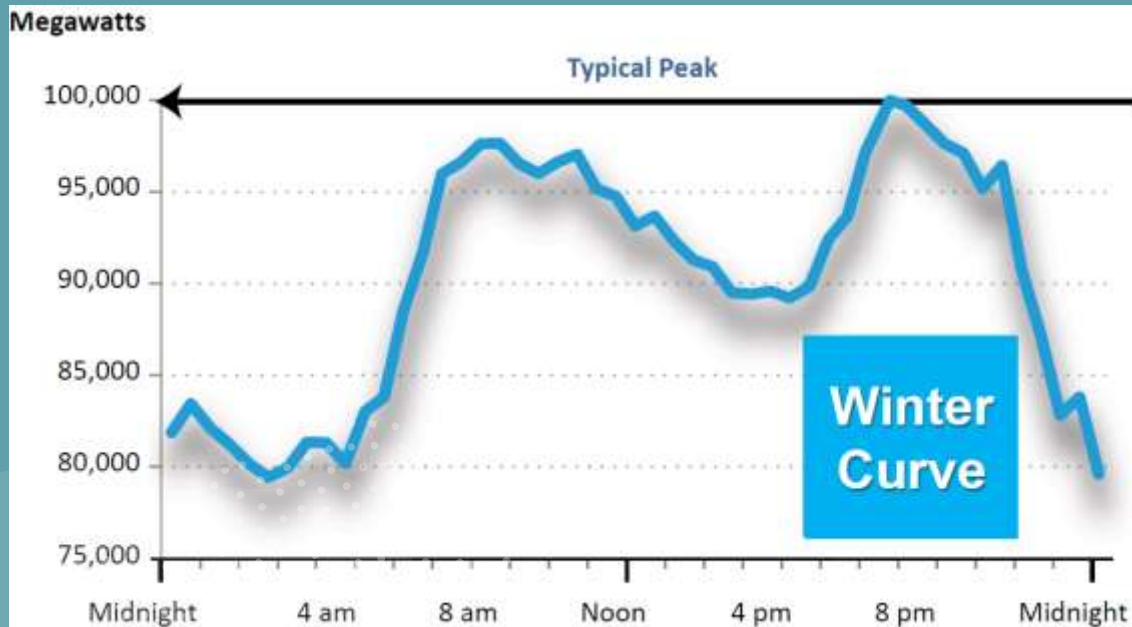
Result: it is never unwise for policy makers to reflect on the basics.

Goal: A seven-to-10-minute primer on what Time-of-Use rates are and how they fit into the Pennsylvania electricity marketplace.

Generation Markets

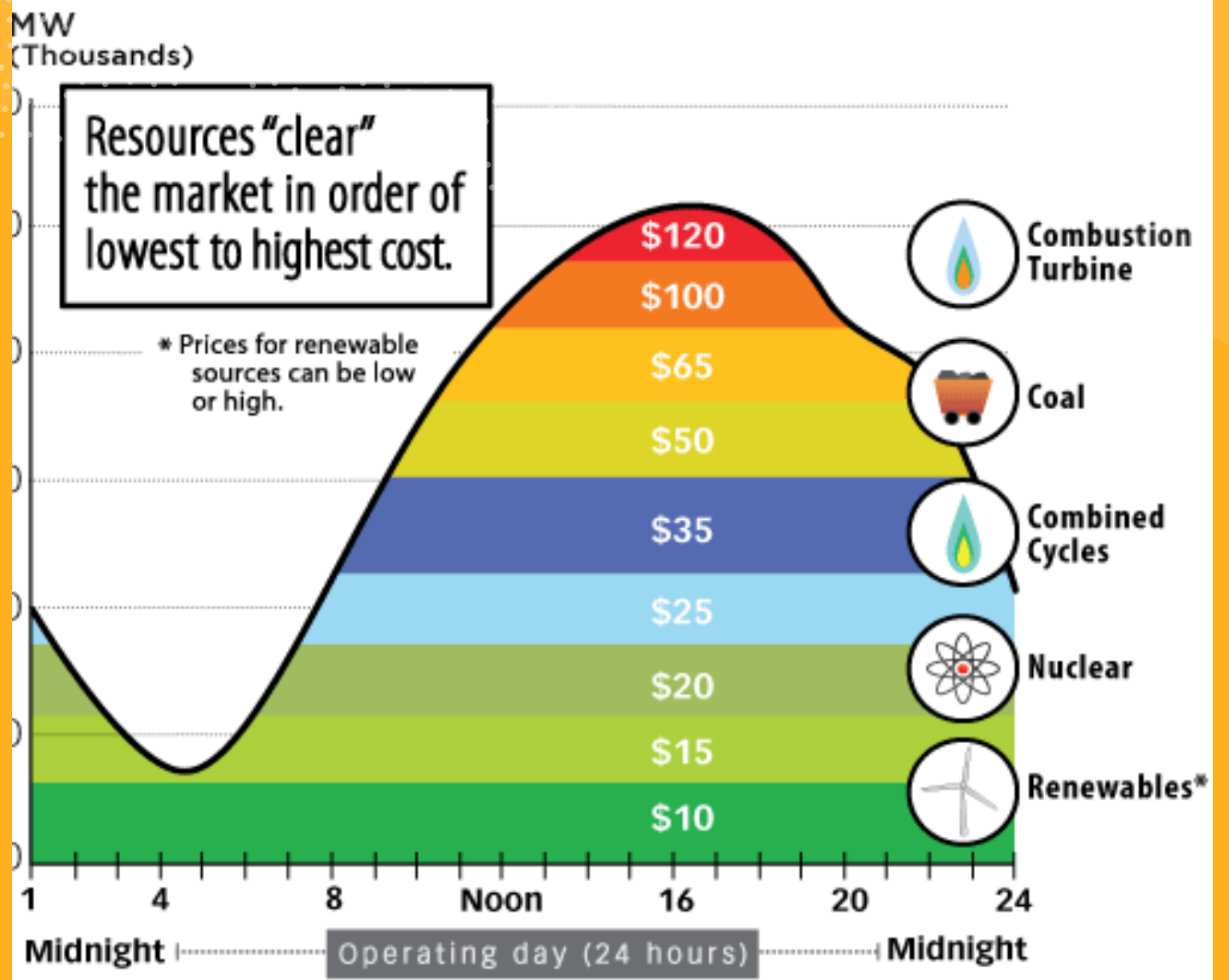
– Load


- Demand for electricity is dynamic, changing over the course of the day.
- Load profiles (i.e. demand curves) are distinct for summer and winter.
- In PJM, the overall system peaks in the summer



Generation Markets - Prices

- As demand changes throughout the day, so to do energy prices.
 - *Single uniform market clearing price*
- The price in PJM is based on dispatch bids from generators. The prices set are called Locational Marginal Price (LMP).





“Rate design should make the choices the customer makes to optimize their own bill consistent with the choices they would make to minimize system costs.”

Caveat: this stands for all rates; generation, transmission, and distribution – but the topic here is TOU generation rates

TOU Generation Rates Defined

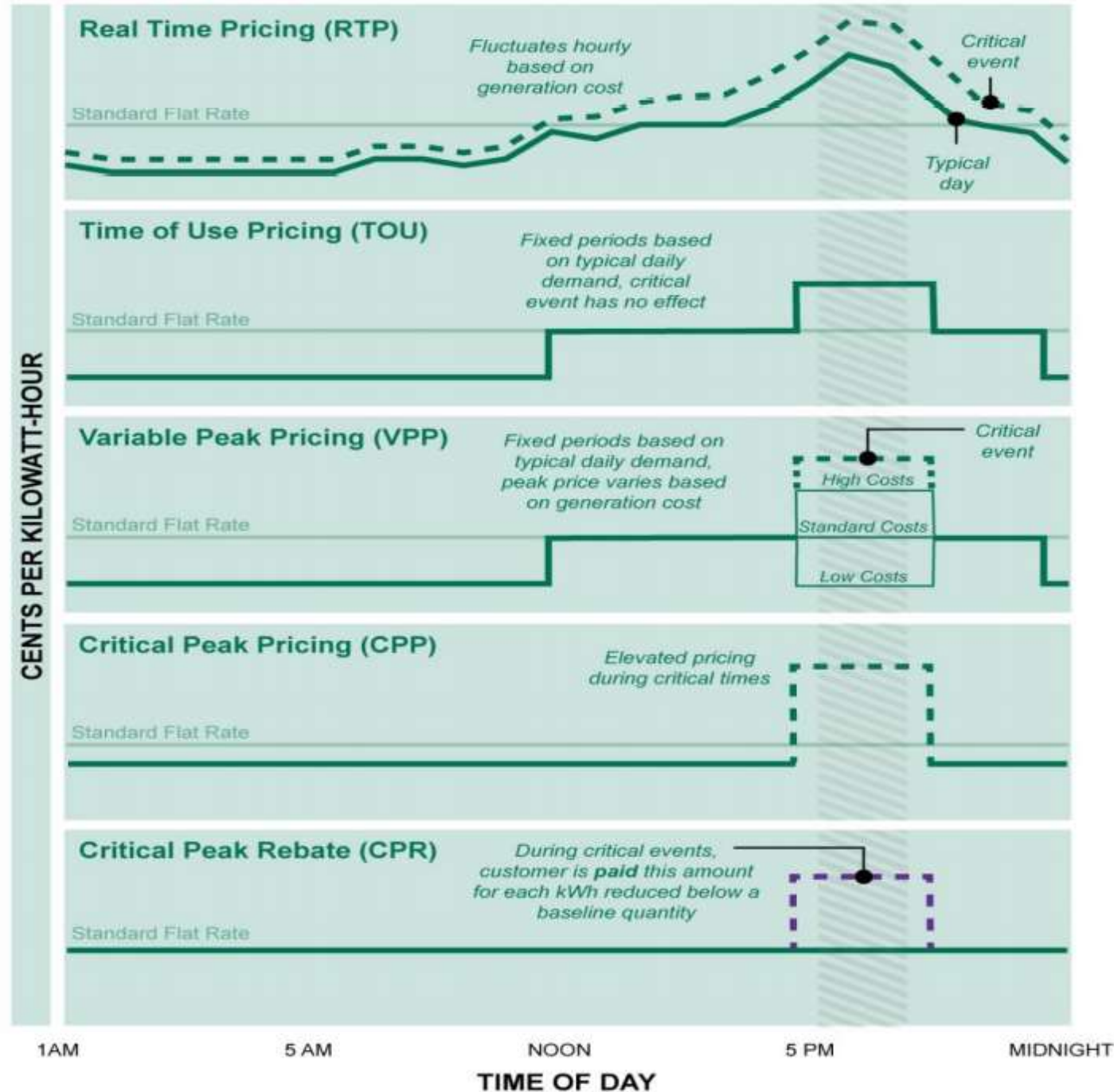
Conceptually – an end-user may still consume the same amount of electricity, BUT, adjust behavior to reduce the overall peak demand of the system.

- TOU is a broad term which encompasses any rate that varies over time to reflect dynamic electricity costs, including but not limited to...
 - Real Time Pricing – frequent price changes, such as hourly
 - **Time-of-Use Pricing** - the day is set into two or three periods with varying prices
 - Critical Peak Pricing – a daily period determined where generation costs may increase significantly.

TOU Rates Illustrated

* note the 'Standard Flat Rate' overlaying each type*

PRICING OPTIONS



What Enables TOU Rates in Pennsylvania?

- Smart Meters
 - Over 5.9 million smart meters installed throughout Pennsylvania
 - All capable of reading usage in 15-minute intervals
 - *Factoid: At the end of 2020 approximately 100 million smart meters were deployed in the U.S. Roughly 4% of those meters are being utilized for TOU rates*
- Competitive Retail Generation Market
 - Restructuring/Deregulation permits PUC licensed Electric Generation Suppliers to offer various products, including TOU and dynamic rates
- Electric Distribution Company Default Service
 - Public Utility Code Statute requires EDCs to offer TOU rates to customers with smart meters.
 - PUC recently approved new designs for PECO, Duquesne, and PPL.



Potential Benefits of TOU Rates

- End-user bill savings **IF** usage behavior appropriately adapts.
- Avoid dispatching higher marginal cost electric generation, thereby lowering LMP
 - Additionally - marginal units can often be carbon intensive, so avoided dispatch may also benefit the environment via avoided carbon emissions.
- Reduce peak demand thereby reducing future distribution, transmission, and generation resource capacity requirements. This can result in avoided investment in upgraded or new infrastructure.

'Long Term' Potential of TOU Rates

It's all
intertwined

- Behavioral change in electric demand is likely a necessary complement to an evolving electric market
 - EV proliferation will be challenging if customers don't modify demand behavior
 - POINT: if everyone charges at 6 pm on the hottest August day the cost to serve demand will potentially be a negative externality on social energy economics
 - Solar primarily generates from roughly 10 till 4pm and wind can often produce the most during nighttime hours.
 - POINT: Economically interfacing this non-dispatchable generation efficiently with the wholesale electric market will require modification in retail behavioral demand.
- Is there a panacea? Theoretically...
 - Electric storage – store power generated during off-peak hours economically to dispatch during peak
 - Weakness – may not reduce transmission and distribution infrastructure investments still required to serve load (i.e. only reduces the LMP)
 - OR, what we're talking about...TOU RATES

“IS THIS THE END OF
THE BEGINNING?”

-Black Sabbath

THANKS!

Views are my own and not those of the Commission
Any follow-up on the presentation, its substance, or
conveyed information can be directed to:

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