Glasgow Advisory Council

Meeting #1

May 11, 2017

Smart Electric Power Alliance

Agenda

Welcome & Introductions

Overview of Status Quo

Rate Design for Electric Utilities

Advisory Council Discussion

Wrap Up & Plans for Meeting #2

About SEPA

Smart Electric Power Alliance

SEPA is an educational non-profit (501c3)

570+ Utility Members

430+ Non-Utility Members

Core Functions

Education

Research

Advisory Services

SEPA Mission & Focus

- Our mission is to facilitate the utility industry's smart transition to a clean energy future through education, research, and collaboration
- Our focus centers on solar, storage, demand response, and other enabling technologies

COMMUNITY

Members, Events, USC, Fact Finding Missions, Partnership Opportunities, Power Player Awards

DATA

USD, Solar Calculators, Mapping Tools, Research Reports, Project and RFP News, Custom Research Solutions

INSIGHTS

Advisory Services, Webinars, Workshops, Case Studies, SEPA Publications, Blog, Expert Commentary

Group Intros

Smart Electric Power Alliance

- Name
- How long you've lived in Glasgow
- Favorite thing to do in May

Rates in Place Today

2015 Residential Rate

Smart Electric Power Alliance

Time Periods

- Winter Months
  - Jan, Feb, Mar, Dec
- Transition Months
  - Apr, May, Oct, Nov
- Summer Months
  - Jun, Jul, Aug, Sept

Charges

- Monthly Customer Charge
  - $10.77
- Winter Energy Charge
  - $0.07366/kWh
- Transition Energy Charge
  - $0.07181/kWh
- Summer Energy Charge
  - $0.07664/kWh

Items to note:

1. Time periods match how TVA breaks down charges to its purchasers
2. Energy Charges do not include FCA (fuel adjustor)

2016 Infotricity Rate

Smart Electric Power Alliance

Time Periods

- Winter Months
  - Jan, Feb, Mar, Dec
- Transition Months
  - Apr, May, Oct, Nov
- Summer Months
  - Jun, Jul, Aug, Sept
- On Peak Hours
  - Weekdays (non-holidays)
  - Apr – Oct = 1pm to 7pm
  - Nov – Mar = 4am to 10am

Charges

- Monthly Customer Charge
  - $27.56
- Winter Energy Charge
  - $0.05760/kWh On Peak
  - $0.04682/kWh Off Peak
- Transition Energy Charge
  - $0.04762/kWh
- Summer Energy Charge
  - $0.06851/kWh On Peak
  - $0.04478/kWh Off Peak
- Demand Charge
  - $10.37/coincident-kW Transition & Winter
  - $11.33/coincident-kW Summer

Items to note:

1. Time periods match how TVA breaks down charges to its purchasers
2. On Peak Hours definition matches TVA's definition for its purchasers
3. Coincident-kW = Customer's hourly consumption in the hour the GEPB system peaks
4. Energy Charges do not include FCA (fuel adjustor)

2016 Alternative Rate

Smart Electric Power Alliance

Time Periods

- Winter Months
  - Jan, Feb, Mar, Dec
- Transition Months
  - Apr, May, Oct, Nov
- Summer Months
  - Jun, Jul, Aug, Sept

Charges

- Monthly Customer Charge
  - $22.70
- Winter Energy Charge
  - $0.07971/kWh
- Transition Energy Charge
  - $0.07457/kWh
- Summer Energy Charge
  - $0.08439/kWh

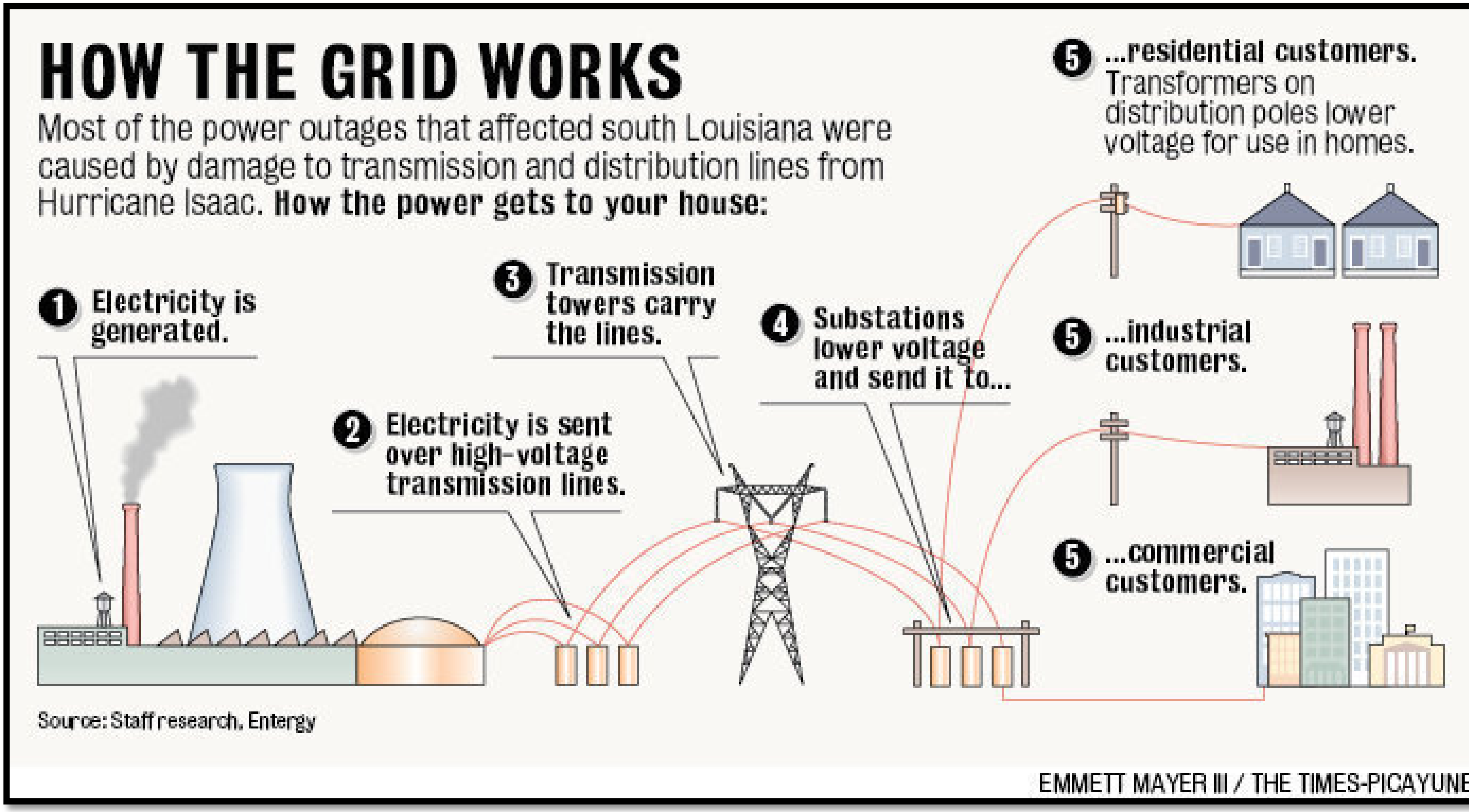
Items to note:

1. Time periods match how TVA breaks down charges to its purchasers
2. Energy Charges do not include FCA (fuel adjustor)

Open House Summary

Rate Design for Electric Utilities

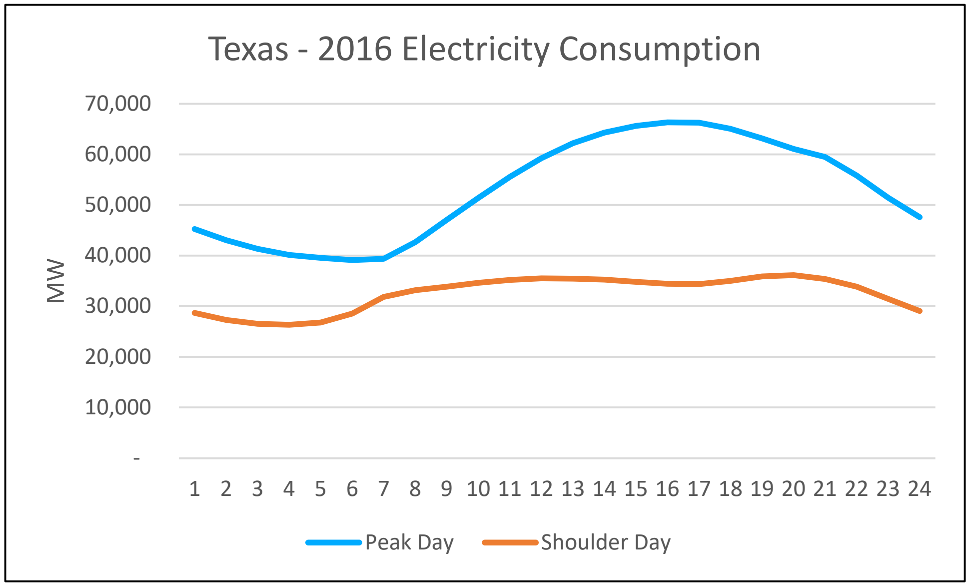
Electric Grid Overview

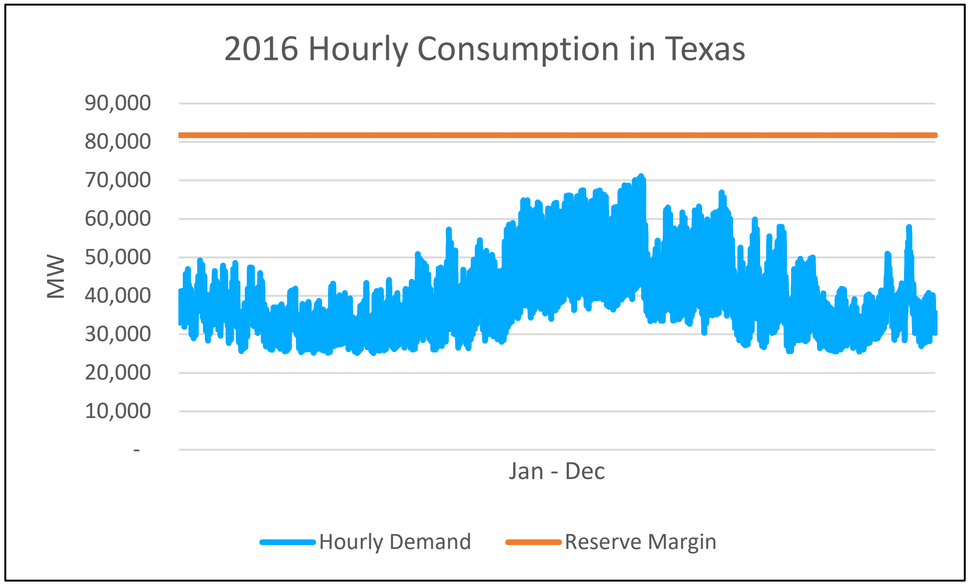


http://www.nola.com/hurricane/index.ssf/2012/09/louisianas_electrical_grid_tes.html

Serving Customers

- Utilities build enough generation to meet the maximum demand on the entire system – plus a "reserve margin"
  - Reserve margin (typically 15%) is needed in case of an unplanned outage on the system
- This trickles down to transmission and distribution investments as well
  - The transformer serving you and your neighbors is designed to meet your peak hour needs, plus some additional margin in case you use more in the future
- The "peakier" the system is – fewer hours at high demand – the more expensive it is to serve, all other things being equal





Fixed vs. Volumetric Costs

Smart Electric Power Alliance

- Many of the costs to the utility are relatively fixed in nature
  - Investments in generation assets, transmission and distribution equipment, meters and associated software, etc.
  - Purely variable / volumetric expenses are things like fuel and variable O&M
- Fixed costs can be broken down further, into purely fixed expenses (e.g., meters), and size-based costs (e.g., generation to meet customer needs)
- Historically, most rates for electricity – what the customers pay – have been almost entirely volumetric
  - Pay for what you use each month
- For a typical utility, fixed-related costs make up 50-55% of their cost structure*

*The Brattle Group (2016) - http://www.brattle.com/system/publications/pdfs/000/005/348/original/Retail_Costing_and_Pricing_of_Electricity.pdf?1471279927
*IEE / The Edison Foundation (2013) - http://www.edisonfoundation.net/iee/Documents/IEE_ValueofGridtoDGCustomers_Sept2013.pdf

Bonbright's Principles

Smart Electric Power Alliance

Key Concepts:

1) Stability and continuity in rates and revenues
2) Effectiveness in recovery of revenue requirements that are based on fair rates of return
3) Rate equity based on cost causation between customer classes
4) Promotion of efficiencies, both upon how services are supplied by the utility and how those services are consumed by the customer
5) Simplicity and clarity in design

BONBRIGHT'S THREE SETS OF OBJECTIVES FOR RATE-SETTING

REVENUE REQUIREMENT	REVENUE COLLECTION	PRACTICAL CONCERNS
1. Rates should yield the total revenue requirement 2. Rates should provide predictable and stable utility revenues 3. Rates themselves should be stable and predictable	4. Rates should be set so as to promote economically efficient consumption 5. Rates should reflect the present and future private and social costs and benefits of providing services (i.e., internalities and externalities)[15] 6. Rates should be apportioned fairly among customer classes and among customers in each class 7. Undue discrimination should be avoided 8. Rates should promote innovation in supply and demand (dynamic efficiency)	9. Rates should be simple, certain, conveniently payable, understandable, acceptable to the public, and easily administered 10. Rates should be, to the extent possible, free from controversies as to proper interpretation.

Taken from: Bonbright, J. C., *Principles of Public Utility Rates*, Columbia University Press, 1961

Cost of Service Studies & Revenue Requirements

Smart Electric Power Alliance

Functionalize Costs

Production	Transmission	Distribution	Customer	G&A

↓

Classify Costs

Capacity (Peak Demand)	Energy	Customer

↓

Allocate Costs

Residential	Commercial	Industrial	Other?

- Cost of Service Studies allocate the revenue requirement across each class of service (residential, commercial, industrial, etc.) based on cost causation
- Variables considered include:
  - # of customers in each class
  - Class peak demand & seasonal consumption
  - Voltages required
  - Etc.

Designing Rates

Smart Electric Power Alliance

Types of Charges

- Customer charge
  - $/day or $/month, designed to recover costs that exist regardless of a customer's consumption pattern
- Demand charge
  - $/kW, designed to recover fixed costs that are expensed to meet peak demand requirements
  - Common for commercial and industrial customers
- Energy charge
  - $/kWh, designed to recover costs that are variable in nature

Types of Rates

- **Flat**
  - Charges do not vary year round
- **Seasonal**
  - Energy and/or Demand charges are different summer vs. winter to represent costs to utility
- **Inclining Block**
  - The more energy consumed, the higher the incremental charge becomes
  - Designed to promote energy efficiency
- **Declining Block**
  - The more energy consumed, the lower the incremental charge becomes
  - Designed to promote energy consumption
- **Time-of-Use**
  - Rates are different at specific times of the day (e.g., 3-6pm) to align with highest consumption hours
  - Time periods and prices are static in nature
  - Designed to promote shifting and conservation
- **Dynamic**
  - Prices change dynamically based on the cost of generation in the real-time, load levels, or other factors
  - Ex: Critical Peak Pricing, Real-Time Pricing

Rates in Action

Flat

Inclining Block

Declining Block

Standard TOU

Super Peak TOU

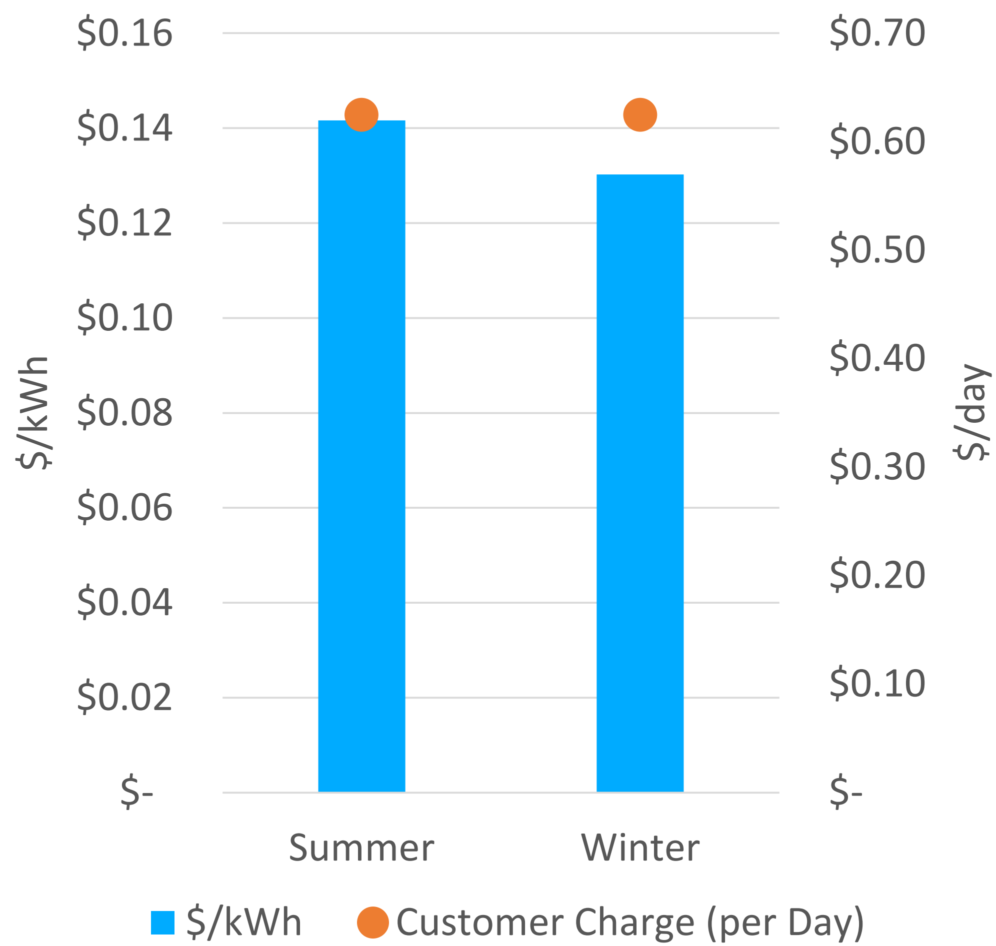
Demand Rates

Critical Peak Pricing

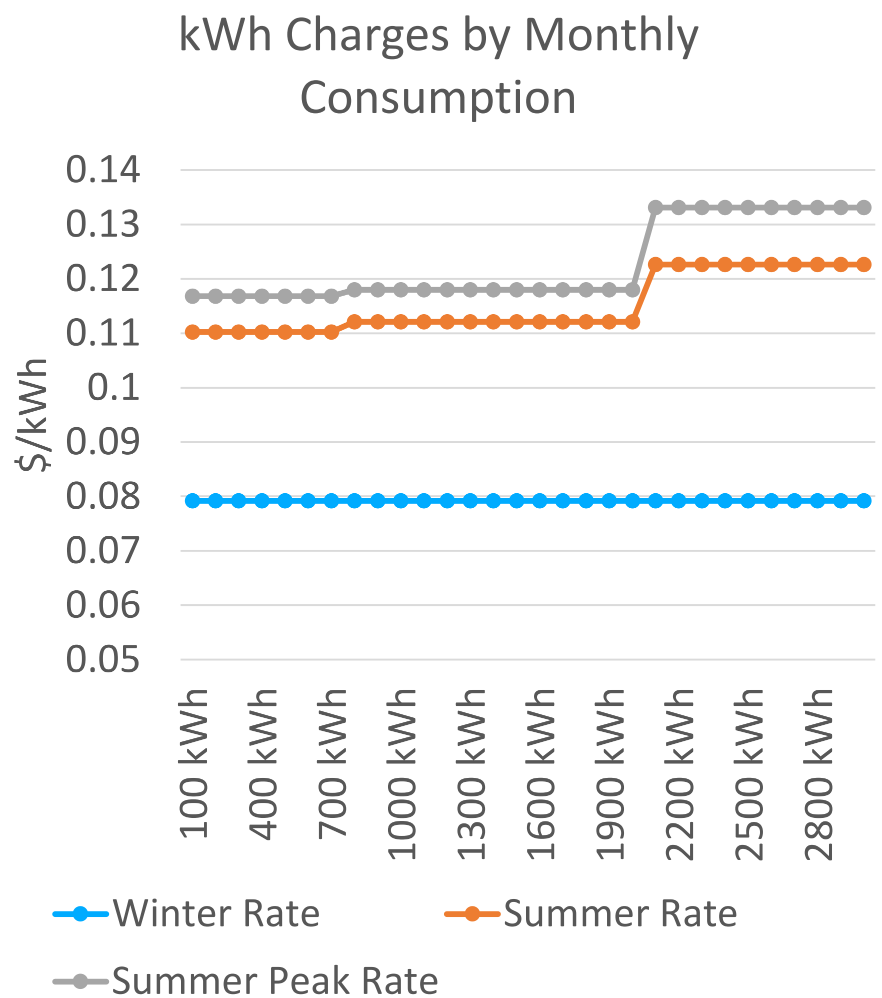
Seasonal Flat Rate

Smart Electric Power Alliance

- Simplest rate design
- No differentiation between cost / value of consuming energy at different times of the day



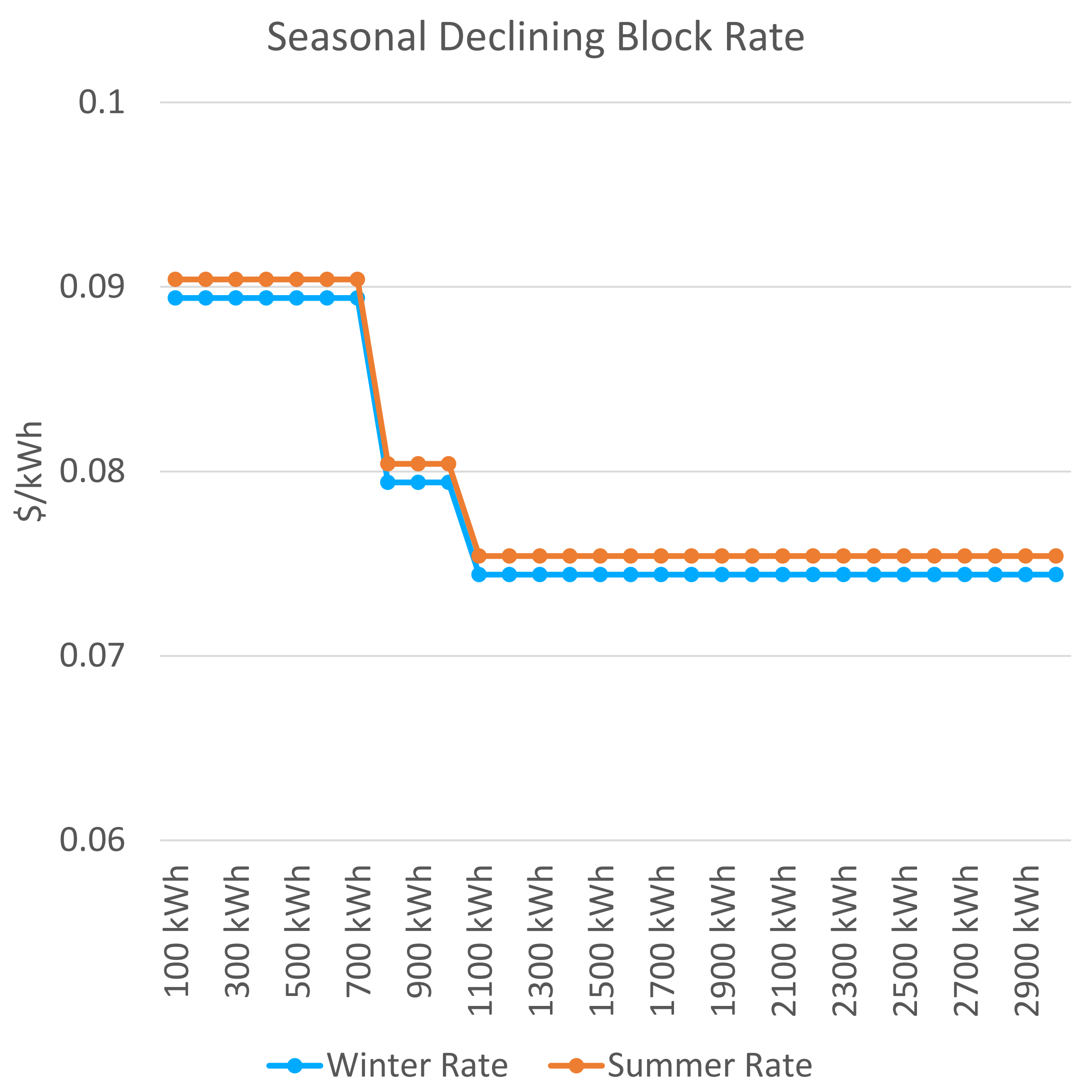
Seasonal Inclining Block Rate



- Leverages both an inclining block structure and seasonal rates
- The more you use, the more you incrementally pay

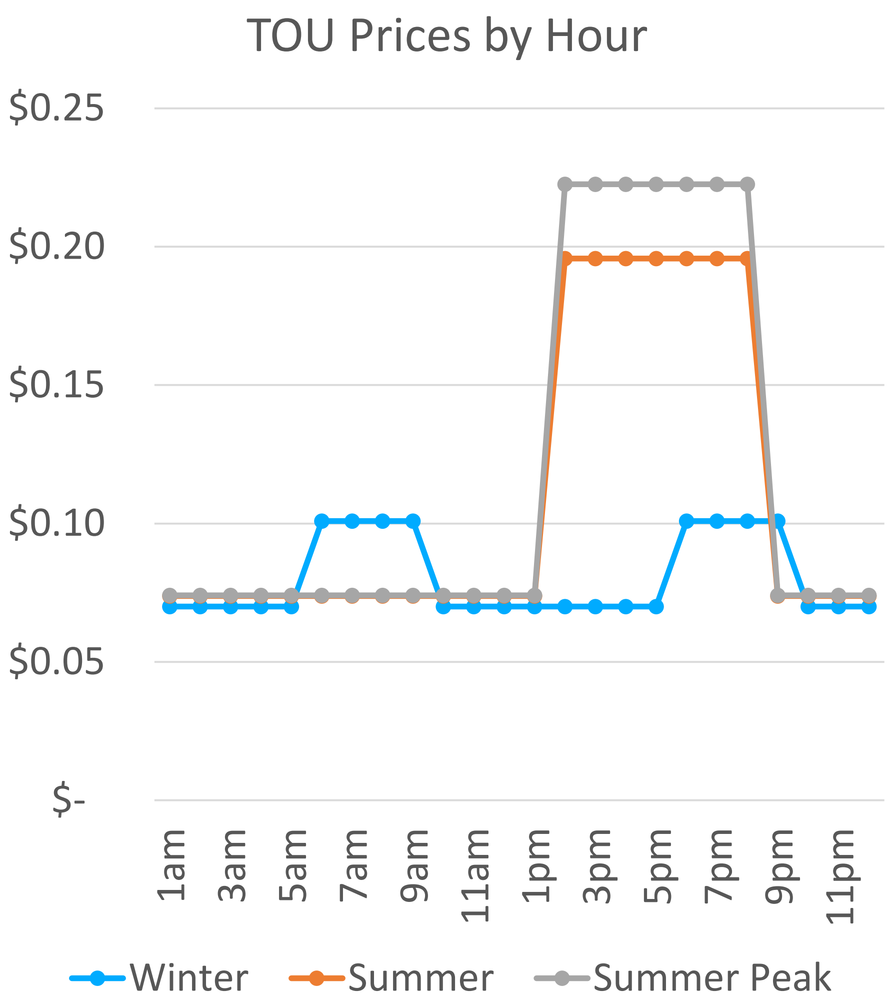
Seasonal Declining Block Rate

- Declining block rates incent more consumption
- The more you use, the ***less*** you incrementally pay



Seasonal TOU Price Plan

Smart Electric Power Alliance



- Summer = May thru October
- Summer Peak = July and August
- Strong incentive in Summer months to shift energy

Sidebar: Revenue Neutrality
TOU vs. Inclining Block

Smart Electric Power Alliance

Typically, if a utility offers multiple rate options to the customer they are designed to be "revenue neutral"; meaning, an average customer, changing nothing with regards to their consumption of energy, would pay roughly the same bill on either rate

Inclining Block Rate

Charge	Cost
Monthly Customer Charge	$20
1st Block, 700 kWh: $0.1082/kWh	$75.74
2nd Block, 300 kWh: $0.1101/kWh	$33.03
TOTAL	**$128.77**

TOU Rate

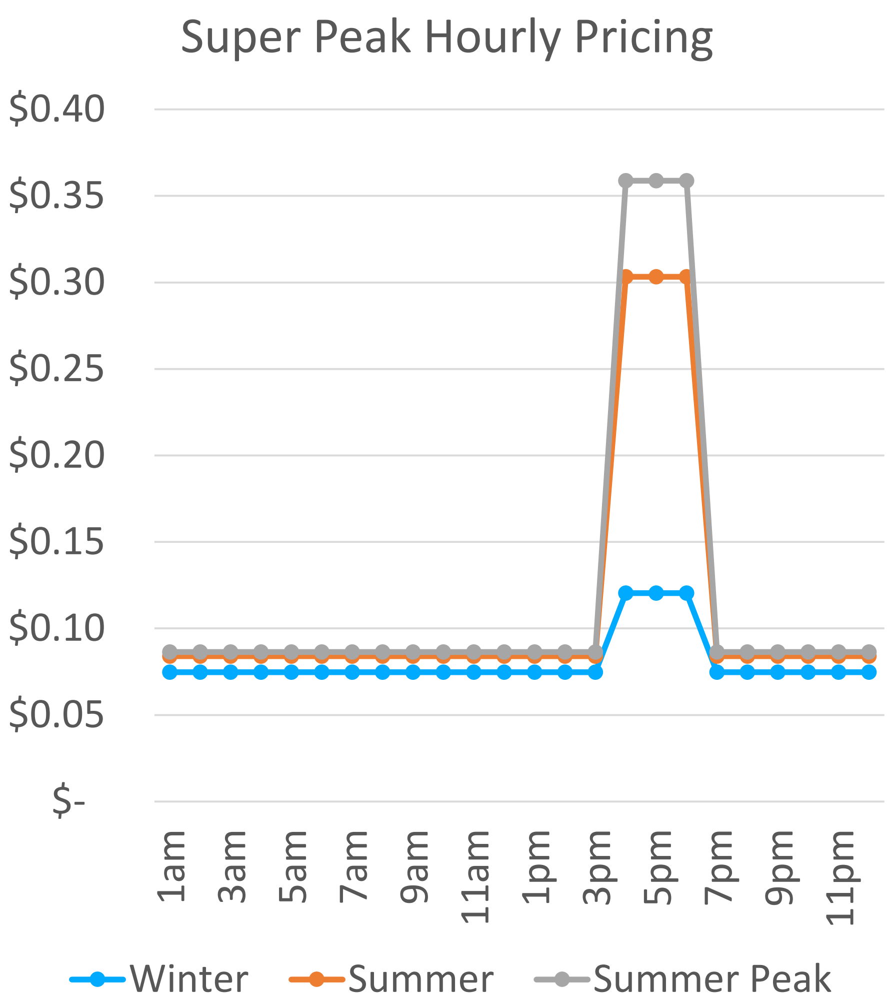
Charge	Cost
Monthly Customer Charge	$20
On Peak, 250 kWh: $0.2206	$55.15
Off Peak, 750 kWh: $0.0721/kWh	$54.08
TOTAL	**$129.23**

$0.46 difference

Assumption: 1,000 kWh summer peak bill
On Peak = 25% consumption (1-8pm, weekdays)

Super Peak Rate

Smart Electric Power Alliance



- Punitive pricing for energy consumption 3-6pm on weekdays (non-holidays)
- 3 hour window allows for activities like pre-cooling and load shifting
- Mimics a demand charge

Demand Rates

Time-of-Use Rate

Rate Component	Charge
On Peak Energy Charge	$0.24477/kWh
Off Peak Energy Charge	$0.06118/kWh

Time-of-Use + Demand Rate

Rate Component	Charge
On Peak Energy Charge	$0.08867/kWh
Off Peak Energy Charge	$0.04417/kWh
On Peak Demand Charge	$13.5/kW-mo

- Demand rates send a different kind of price signal to customers
  - Focus on more efficient use of energy
- Can be combined with TOU concept to create more ways to save
- Example:
  - Both rates define on peak as 12pm-7pm
  - Demand charge applicable only during that on peak window
  - Customer charges are the same for each rate option

Critical Peak Pricing (CPP)

Smart Electric Power Alliance

Overview

- Utility "calls" a CPP event
- During the event, the price for energy goes up substantially
- A small credit is provided at the end of the month for all consumption – meant to balance out the CPP price signal
- Customer saves money if they reduce consumption during event
    - Sometimes coupled with a smart thermostat program

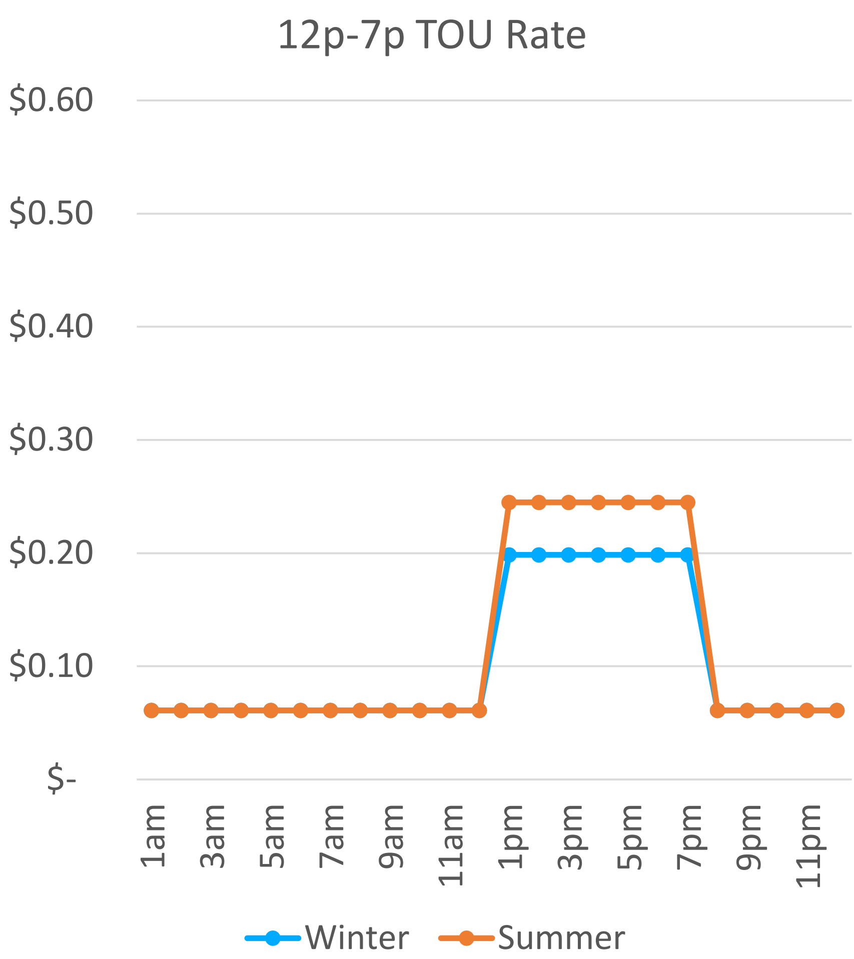
Sample Structure

- Utility will call at least 6 but no more than 18 CPP events on weekdays during the summer season (June – September)
    - Event length = 5 hours
    - CPP price adder = $0.25
    - CPP credit = $0.012

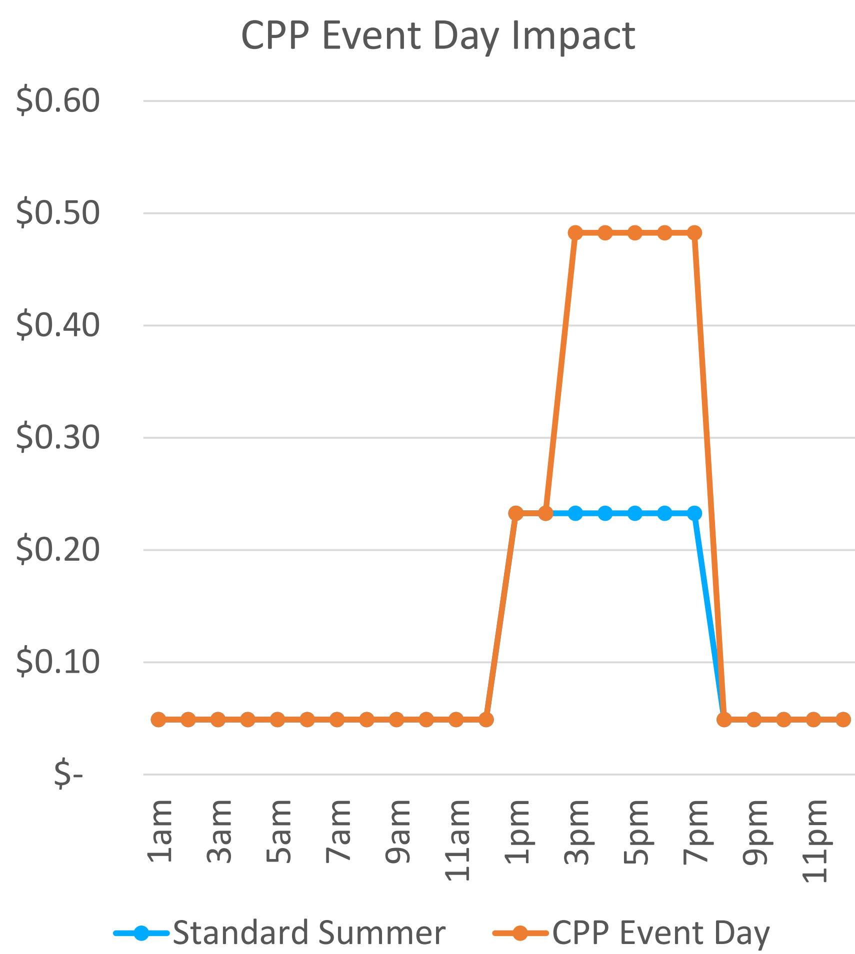
CPP in Action

Smart Electric Power Alliance

Standard TOU Rate

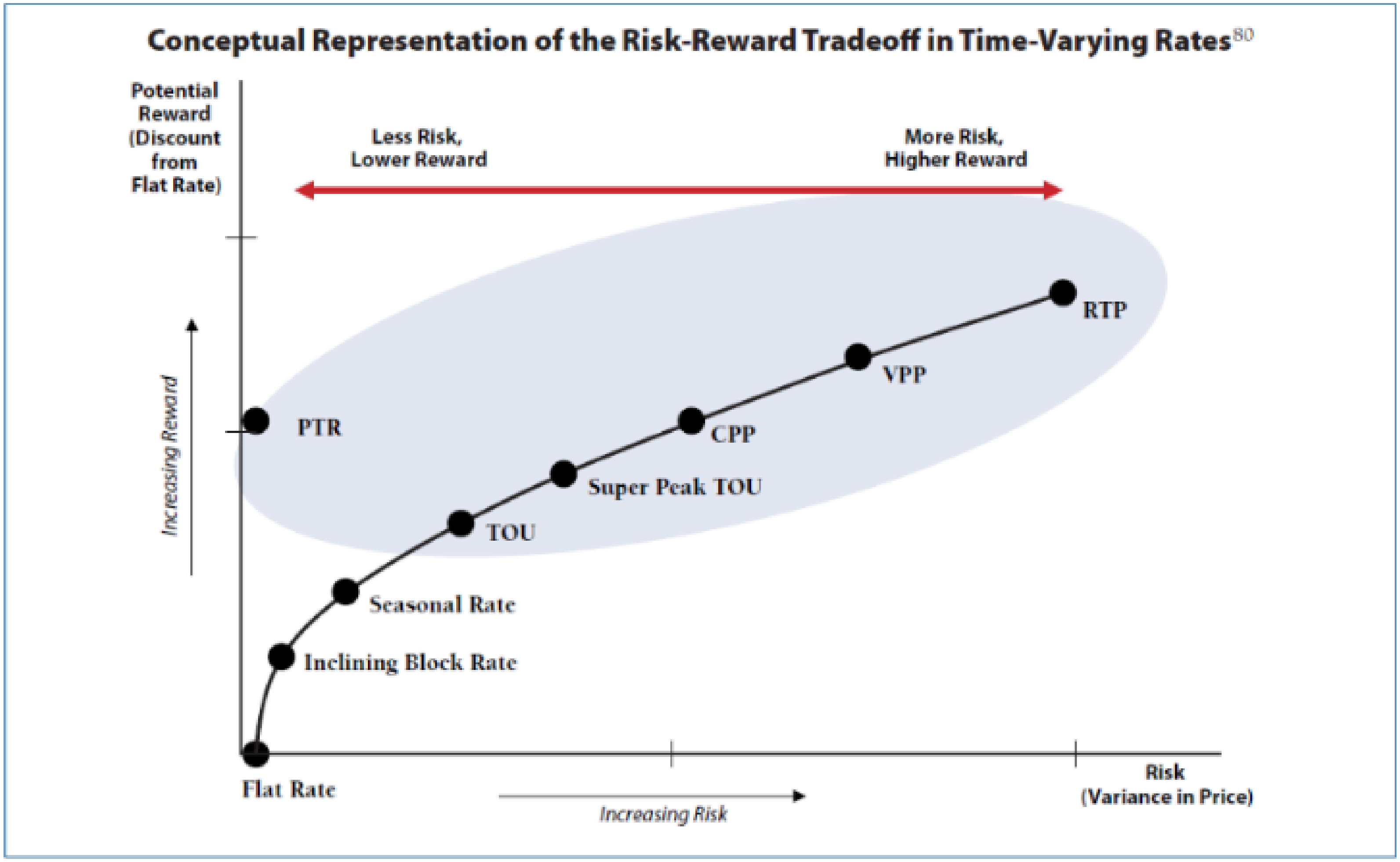


CPP Event Day



Rate Complexity Impact

Smart Electric Power Alliance



Creating the potential for savings also creates the potential for increased bills

"Smart Rate Design for a Smart Future", Regulatory Assistance Project (July 2015)

Ratemaking Summary

- Rate design should reflect cost causation principles
  - If different consumption patterns can save money overall, rates can be designed to encourage change
- Different rate designs can create different incentives for customer action
  - Shifting consumption versus reducing consumption

Discussion Seed Ideas

- Identify things that could be improved to make the rates:
  - Easier to manage
  - Easier to understand
- Gradualism is a tool in our toolbox
- Today is about brainstorming:
  - Let's get ideas on the table – we can refine as the process moves forward
  - If there are questions we can't answer, we will document and address in a future meeting

Future Meetings

Meeting 2: June 13/14/15 – preferences?

Meeting 3: June 27


Smart Electric
Power Alliance