Joint Panel for Rate Design and Energy Resources and the Environment Subcommittees
INTRODUCTION TO COST-REFLECTIVE RATES
THE GRID IS THE PLATFORM FOR OUR NETWORKED, 2-WAY POWER SYSTEM

SOME UTILITIES ARE EXPERIMENTING WITH COST REFLECTIVE RATES

SDG&E Dynamic TOU pilot:
- fixed charge
- market energy price (kWh)
- TOU delivery (kWh)
- CPP adders (kWh)

SRP E-27 rate:
- fixed charge
- TOU energy (kWh)
- coincident demand (kW)

APS residential rates:
TOU and coincident demand rates

Xcel CO & MN TOU pilots:
- Opt-in vs opt-out

Con Ed Smart Innovative Pricing Pilot:
- fixed charge
- flat vs TOU energy (kWh)
- monthly coincident demand vs subscription (kW)
- opt-in vs opt-out

Con Ed Smart Home Rate demo:
- fixed charge
- market energy price (kWh)
- daily demand vs subscription w/ overages (kW)
- CPP event charge (kW)

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EXAMPLE 1: CON EDISON INNOVATIVE PRICING PILOT (APPROVED)

**Opt-out**

- **Test element 1:** outreach and education
- **Test element 2:** Multiple rate designs (differing demand peaks, seasonal rates, TOU for energy)

**Opt-in**

- **Test element 3:** recruitment approach
- **Test element 4:** subscription rates

EXAMPLE 2: CON EDISON SMART HOME RATE DEMO (PROPOSED)

Rate A: Daily demand + price responsive tech

- Prices to devices demo enabled by price responsive tech:
  - smart thermostat OR
  - storage

- Locational components:
  - Both rates include NYISO LMP hourly supply charges
  - Peak window reflects network peaks
  - Separate, stackable G,T,&D events enable of locationally varied peaks

Rate B: Demand subscription + price responsive tech

- Embedded delivery charge: Monthly subscription
  - Same fee each month
  - $XX per kW subscribed preselected by customer
  - kW protected from G, T, & D event overages

- Critical peak demand charges
  - Dynamic event charges applies to max kW during event

- Critical peak overage charges
  - Charges applied to kW over subscription

- Embedded delivery charge: Daily demand charge
  - Daily charge assessed each day
RATE DESIGN APPROACH
### Traditional process

- Define cost component drivers (T&D costs) and billing determinants (total kWh)
- Calculate revenue neutral rates
- Identify rate (delivery charge per kWh)

### Cost-reflective process

1. Define various granular cost component drivers and map to billing determinants
2. Analyze T&D, system, and customer loads
3. Define additional rate attributes
4. Calculate revenue neutral rates
5. Estimate customer bill and volatility impacts, opportunity to save
6. Specify detailed rates

**Other considerations:**
- Piloting / testing
- Billing / metering system feasibility
- Customer perception / understanding
- Enabling technology / automation
TRADITIONAL RATE DESIGN DOES NOT REFLECT REALITY OF COSTS

Traditional rates misaligned w/ costs, determinants

<table>
<thead>
<tr>
<th>Cost</th>
<th>Revenue</th>
</tr>
</thead>
<tbody>
<tr>
<td>Generation</td>
<td>Flat energy charge (kWh)</td>
</tr>
<tr>
<td>T&amp;D delivery</td>
<td>Flat delivery charge (kWh)</td>
</tr>
<tr>
<td>Site specific fixed costs</td>
<td>Monthly charge</td>
</tr>
</tbody>
</table>

Rates could better reflect what, where, when

<table>
<thead>
<tr>
<th>Cost</th>
<th>Revenue</th>
</tr>
</thead>
<tbody>
<tr>
<td>Generation</td>
<td>Market price</td>
</tr>
<tr>
<td>Gen capacity</td>
<td>Critical peak charge</td>
</tr>
<tr>
<td>T&amp;D sunk capacity</td>
<td>Delivery charge</td>
</tr>
<tr>
<td>T&amp;D forward capacity</td>
<td>Critical peak charge</td>
</tr>
<tr>
<td>Site specific fixed costs</td>
<td>Monthly charge</td>
</tr>
</tbody>
</table>

- Total costs are spread across one or two non-granular rate determinants
- Market price of energy not reflected
- kWh not well suited for capacity
- Multiple cost drivers and rate components
- Temporal / locational granularity for each which reflects reality
- Transparency of cost drivers and savings opportunities
### MANY OPTIONS FOR EACH COMPONENT OF COST-REFLECTIVE RATES

<table>
<thead>
<tr>
<th>Energy (kWh)</th>
<th>TOU</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Hourly market price</td>
</tr>
<tr>
<td></td>
<td>Sub-hourly market price</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Sunk capacity (kWh or kW)</th>
<th>Time-of-use</th>
<th>Broad vs narrow peak window, seasonality</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Bi-directional (absolute value of hourly kWh)</td>
<td>Energy highway usage charge</td>
</tr>
<tr>
<td></td>
<td>Daily demand charges</td>
<td>Align window with whole system vs local usage</td>
</tr>
<tr>
<td></td>
<td>Coincident monthly demand</td>
<td>Average in top N system hours (many vs few)</td>
</tr>
<tr>
<td></td>
<td>Demand subscription</td>
<td>% of historical demand: all hours vs coincident</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Forward capacity (kWh or kW)</th>
<th>Critical peak event length</th>
<th>Broad vs narrow window</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Critical peak event frequency</td>
<td>More vs fewer events</td>
</tr>
<tr>
<td></td>
<td>Critical peak season</td>
<td>Summer only vs Winter and Shoulder</td>
</tr>
</tbody>
</table>
EVEN WITH SIMILAR COST-REFLECTIVE STRUCTURES, RATE VALUES AND WINDOWS WILL VARY TO REFLECT ACTUAL ENERGY USAGE PATTERNS

**Short, evening peak**

**Long, daytime peak**
PEAK LOAD DURATION CURVES VARY WIDELY ACROSS CUSTOMERS

Rate element choices substantially change the distribution of customer impacts.
Any change to an existing rate will have some immediate winners and non-winners but if structured right can provide non-winners an opportunity to benefit.
WHY AND HOW TO TRY COST-REFLECTIVE RATES
BENEFITS OF MODERN RATE DESIGN OVER TRADITIONAL APPROACH

- Reflects when and where costs are incurred, and which costs can and can’t be avoided
- Allocates delivery costs by share of system usage, not share of energy consumption
- Transparently incentivizes efficient customer investment
CONSIDERATIONS FOR TESTING COST-REFLECTIVE RATES

**Rate attribute selection**
Define menu of rate options to explore

**Rate Design and Bill Impact Analysis**
- How closely do rate attributes align with costs?
- What is the impact on customer bills? Which customers are structural winners/losers?
- What is the impact on customer bill volatility?
- Do the rates allow customers to save by taking peak shifting action?

**Billing Systems Implementation Feasibility**
- What types of rate attributes present implementation challenges for the billing systems?
- Are there certain non-starters to avoid?

**Customer Understanding**
- How will customers perceive particular features? Does the feature potentially enhance (or diminish) the customer experience?
- Can technology help the customer respond to the rate?

**Select and Test Rate(s)**
Measure impacts on customer bills, loads, and satisfaction
QUESTIONS?

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Joint Panel for Rate Design and Energy Resources and the Environment Subcommittees
SUBSCRIPTION PRICING

NARUC: FEBRUARY 2019

LON HUBER
DIRECTOR - HEAD OF NORTH AMERICAN RETAIL REGULATORY OFFERING
MEGA TRENDS

1. Declining traditional usage
2. Low energy costs but high peak infrastructure costs
3. Advanced metering and on-site tech
4. Electric Vehicles
5. Grid scale renewable energy
WHAT DO CUSTOMERS WANT?

• Most customers spend very little time reviewing their bill and are unlikely to know what they’re paying for – instead they look at the total amount due

• Around 25-30% of customers have a complete understanding of only a few energy related terms

• The majority of customers experience higher than expected electric bills
WHAT DO CUSTOMERS WANT?

- **Taxi-meter effect**: customers want to avoid the discomfort of knowing they are charged for each use/incremental increase
- **Insurance effect**: customers want to protect themselves against charges for instances of high use
- **Convenience effect**: flat rate costs are easier to track

VS.

- Desire for increased control over bill
**CUSTOMERS WANT “SIMPLIFIED” CHOICE**

### Netflix and Verizon

**STEP 1 OF 3**

**Choose a plan that’s right for you.**
Downgrade or upgrade at any time

<table>
<thead>
<tr>
<th>Plan</th>
<th>Basic</th>
<th>Standard</th>
<th>Premium</th>
</tr>
</thead>
</table>

- **HD available**: × ✔ ✔
- **Ultra HD available**: × × ✔
- **Screens you can watch on at the same time**: 1 2 4
- **Watch on your laptop, TV, phone and tablet**: ✔ ✔ ✔
- **Unlimited movies and TV shows**: ✔ ✔ ✔
- **Cancel anytime**: ✔ ✔ ✔

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**gounlimited**

*All the data you need on America’s best network.*

**How many lines do you need?**

- 4 lines

- **$40 per line/4 lines for $160**
  - Per month. Plus taxes & fees. When you enroll in Auto Pay.

---

**beyondunlimited**

*Everything you want from an unlimited plan. And then some.*

**Plan details**

- **Unlimited 4G LTE data**
- **Unlimited Talk & Text**
- **Unlimited Mobile Hotspot (500kbps)**
- **Unlimited Talk & Text**
- **HD-quality streaming**
- **Unlimited Mobile Hotspot**

**$50 per line/4 lines for $200**
  - Per month. Plus taxes & fees. When you enroll in Auto Pay.
ENERGY SERVICE SUBSCRIPTION MODEL

• The Energy Service Subscription Plan is an offering that would allow customers to pay a fixed monthly bill for energy use
  - Price is custom to each customer, based on historic usage and selected perks
• The Subscription Plan allows the customer to swap their volumetric price risk in exchange for a fixed monthly bill
  - Can be a long term lock
• The customer would be outfitted with DSM technology – the more control they give, the more they save
  - While there is some risk associated with overconsumption, that risk is confined to fuel and capacity risk during certain times of the year (if capacity short)
• Can be designed to give middle and lower income ratepayers access to newer, more efficient technologies and appliances
  - Stabilize their bills
• Subscription Plan option gives the provider a portfolio diversification benefit with respect to revenue recovery.
## Choose a Plan That’s Right for You

### Fixed Monthly Price Based on Household Profile Usage

*Your average current bill is $115/month*

<table>
<thead>
<tr>
<th>Feature</th>
<th>Unlimited Savings</th>
<th>Unlimited Choice</th>
<th>Unlimited Premium + EV</th>
</tr>
</thead>
<tbody>
<tr>
<td>30% Clean Energy with energy portal app</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>100% Clean Energy</td>
<td>×</td>
<td>×</td>
<td>✓</td>
</tr>
<tr>
<td>Free Smart Thermostat</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Access to free or discounted energy efficiency upgrades</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Unlimited EV charging at home and in community</td>
<td>×</td>
<td>×</td>
<td>✓</td>
</tr>
<tr>
<td>Maximum number of control days</td>
<td>30</td>
<td>15</td>
<td>7</td>
</tr>
<tr>
<td>Free control day over rides per year</td>
<td>3</td>
<td>5</td>
<td>7</td>
</tr>
</tbody>
</table>
STEP 2 OF 3
CHOOSE YOUR COMFORTS.

- Rooftop Solar + $15/Mo
- Smart EV Charger - $2/Mo
- Home Monitoring + $10/Mo
- Smart Thermostat - $5/Mo
- Battery backup + $20/Mo
- Home upgrades - $10/Mo
IS THIS A WIN-WIN-WIN?

• The incentive to limit usage has not gone away, but has been shifted to another party, namely the provider offering the Service Subscription Plan.
  - Business symmetry, upside and downside for the utility
• Low-moderate-income benefits
  - Predictable bill and access to home upgrades
• Focus on improving the cost of service with shared savings potential
  - Optimized DSM
• A customer centric portfolio approach
Investors give higher valuations to companies with a subscription business than those with transactional sales, analysts say.

Investors Business Daily, December 2018

https://www.zuora.com/resource/subscription-economy-index/
CONTACTS & LINKS

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Energy + Smart Devices.
One subscription.

Pay one flat monthly supply price for clean energy & a smarter home.

100% clean energy

Smart device packs
Joint Panel for Rate Design and Energy Resources and the Environment Subcommittees
2019 NARUC Winter Policy Summit
Rate Design Panel
An Overview of APS’s Residential Rates

Leland Snook
Director, Rates & Rate Strategy

February 10, 2019
58 PERCENT

RESIDENTIAL CUSTOMERS ON TIME-OF-USE RATES

ABOUT

229 THOUSAND

RESIDENTIAL CUSTOMERS ON DEMAND RATES
APS’s SETTLEMENT RESIDENTIAL RATES

• Approved without modification, ACC Decision No. 76295
• Cancels existing residential rates rather than freeze them
• Transition rates phased out May 1, 2018 after customer education and outreach
• Customers were advised of the best rate and options, but customers choose their rate plan
• Customers who did not choose a new rate moved to the “most like” rate
APS’s SETTLEMENT RESIDENTIAL RATES

New suite of rates:

• Three Time of Use Demand rates (on-peak 3pm – 8pm, weekdays)
  – Includes a new technology pilot rate, R-TECH

• Three basic rates, without an inclining block

• One Time of Use Energy rate (on-peak 3pm – 8pm, weekdays, plus a winter season super off-peak 10am – 3pm, weekdays)

• New solar customers must be on Time of Use Demand or Energy rates
  – A Grid Access Charge of $0.93 per installed kW-dc applies on TOU-E;
  – GAC designed to achieve a self-consumption offset rate of $0.105 per kWh;
  – Instantaneously exported energy is purchased at a Resource Comparison Proxy price of $0.129 per kWh for 10 years;
  – RCP is reset each year, creating tranches, reduced by no more than 10%;
  – Arizona Corporation Commission will use RCP and avoided cost to determine export compensation in APS’s next rate case

• Existing solar customers are grandfathered for 20 years from date of interconnection on legacy rates
## APS’s SETTLEMENT RESIDENTIAL RATES

<table>
<thead>
<tr>
<th>Plan</th>
<th>BASIC SERVICE CHARGE ($ per Month)</th>
<th>ON-PEAK DEMAND CHARGE ($/kW)</th>
<th>SUMMER ENERGY CHARGE (On/Off Peak $/kWh)</th>
<th>WINTER ENERGY CHARGE (On/Off/Super-Off Peak $/kWh)</th>
</tr>
</thead>
<tbody>
<tr>
<td>R-XS (≤ 600 kWh per Mo.)</td>
<td>$10</td>
<td>None</td>
<td>$0.11672</td>
<td>$0.11672</td>
</tr>
<tr>
<td>R-BASIC (&gt; 600 ≤ 1,000 kWh per Mo.)</td>
<td>$15</td>
<td>None</td>
<td>$0.12393</td>
<td>$0.12393</td>
</tr>
<tr>
<td>R-BASIC L (&gt; 1,000 kWh per Mo.)</td>
<td>$20</td>
<td>None</td>
<td>$0.13412</td>
<td>$0.13412</td>
</tr>
<tr>
<td>TOU-E</td>
<td>$13</td>
<td>None</td>
<td>$0.24314/$0.10873</td>
<td>$0.23068/$0.10873/$0.032</td>
</tr>
<tr>
<td>R-2</td>
<td>$13</td>
<td>$8.40</td>
<td>$0.1316/$0.07798</td>
<td>$0.11017/$0.07798</td>
</tr>
<tr>
<td>R-3</td>
<td>$13</td>
<td>$17.438 Summer/$12.239 Winter</td>
<td>$0.08683/$0.0523</td>
<td>$0.06376/$0.0523</td>
</tr>
<tr>
<td>R-TECH</td>
<td>$15</td>
<td>$20.25 Summer/$14.25 Winter/$6.50 Off-peak above 5 kW</td>
<td>$0.0909/$0.05475</td>
<td>$0.06670/$0.05475</td>
</tr>
</tbody>
</table>

After May 1, 2018: (1) R-Basic L will be frozen; (2) customers who do not qualify for R-XS must try a TOU Demand or Energy rate for at least 90 days; and (3) after 90 days, a customer may opt-out to R-Basic if they qualify, but must remain for a year.
3 ways to save during on-peak hours (3pm-8pm on weekdays)

- **Shift** usage from on-peak to off-peak
- **Stagger** the use of major appliances
- **Save** with tips and tools
APS’s RESIDENTIAL RATE MIGRATION DECEMBER 2018

• 1,048,600 residential customers on new suite of rates
• 76,000 grandfathered solar customers (approximately 7%)
• Customers received information in advance about their “most like” and “best” rates.
• Customers could choose a new rate beginning August 19, 2017
• Auto-migration began in mid-February, complete May 1, 2018
• If customers did not proactively select a new rate, they were placed on their “most like” rate as part of the auto-migration
• 33% of customers “most like” and “best” rate were the same
• 77% of customers were auto-migrated to the “most like” rate
• 23% of customers proactively selected a rate
APS’s RESIDENTIAL RATE MIGRATION DECEMBER 2018

WHAT RATES ARE CUSTOMERS SELECTING?

• 20.3% on three-part demand time-of-use rates (228.6k)
  • 0.3% on legacy demand rates (3.6k)
  • 20.0% on new demand rates (225k)
  • 3 out of 4 have selected the higher demand rate option (R-3)

• 38.1% on time-of-use energy only rates (428.1k)
  • 3.3% on legacy TOU (42.8k)
  • 34.3% on new TOU-E (385.3k)

• 41.6%, or 467.5k, on basic rates
  • 2.6% on legacy E-12 (29.4k)
  • 24.2% on Extra Small (R-XS) (271.6k)
  • 11.2% on Medium (R-Basic) (126k)
  • 3.6% on Large (R-Basic Large) (40.5k)
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