Rate Design: Trends and Perspectives

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Electricity Markets and Policy Group

National Conference of State Legislatures
Energy Supply Task Force Meeting
Aug. 7, 2016
• The electricity bill on one foot
• Recent actions and trends in the U.S.
• Current topic of interest: *Rate design changes to recover fixed utility costs*
  • Options and perspectives
• Q&A
The Electricity Bill on One Foot

• **Fixed customer charge**
  - Set $ amount each billing period that does not vary with energy usage; also called customer charge or basic charge

• **Energy and delivery charges** for each unit consumed
  - Flat across all hours,
  - Vary by usage level (e.g., higher rates at higher levels/blocks), or
  - Vary based on time of consumption

• **Demand charge**
  - Typical for *large* customers (but *not* residential), based on highest electricity demand during a specified time interval

• **Other charges**
  - Such as taxes, franchise fees, and charges for public purposes such as energy efficiency (EE), low-income assistance

<table>
<thead>
<tr>
<th>NUMBER</th>
<th>From</th>
<th>To</th>
<th>DAYS</th>
<th>METER PRINCE</th>
<th>CURRENT</th>
<th>METER MULTIPLIER</th>
<th>AMOUNT USED THIS MONTH</th>
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<tbody>
<tr>
<td>18387602</td>
<td>Jun 3, 2016</td>
<td>Jul 6, 2016</td>
<td>33</td>
<td>13919</td>
<td>21307</td>
<td>1.0</td>
<td>7,388 kWh</td>
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</tbody>
</table>

Next scheduled read date: 08-03. Date may vary due to scheduling or weather.

<table>
<thead>
<tr>
<th>CHARGE DESCRIPTION</th>
<th>UNITS</th>
<th>COST PER UNIT</th>
<th>CHARGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Basic Charge - Single Phase</td>
<td>7,388 kWh</td>
<td>0.04482900</td>
<td>331.13</td>
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<tr>
<td>Delivery Charge</td>
<td>1,085 kWh</td>
<td>0.05006000</td>
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<tr>
<td>Supply Energy Charge Block 1 for 33 day(s)</td>
<td>6,303 kWh</td>
<td>0.07506000</td>
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<tr>
<td>Supply Energy Charge Block 2 for 33 day(s)</td>
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<tr>
<td>Blue Sky Usage</td>
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<td>Public Purpose</td>
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<td>24.60</td>
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<tr>
<td>Energy Conservation Charge</td>
<td>7,388 kWh</td>
<td>0.00300000</td>
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<tr>
<td>Low Income Assistance</td>
<td>7,388 kWh</td>
<td>0.00330000</td>
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<tr>
<td>J C Boyle Dam Removal for 6 day(s)</td>
<td>1,343 kWh</td>
<td>0.00038000</td>
<td>0.51</td>
</tr>
<tr>
<td>for 27 day(s)</td>
<td>6,045 kWh</td>
<td>0.00036000</td>
<td>2.18</td>
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<td>Copco &amp; Iron Gate Dams Removal for 6 day(s)</td>
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<tr>
<td>for 27 day(s)</td>
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<tr>
<td>B P A Columbia River Benefits for 33 day(s)</td>
<td>1,085 kWh</td>
<td>-0.01039000</td>
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</table>
Utility Industry Trends Driving Rate Change Proposals

(1) Aging utility infrastructure in need of replacement
(2) Grid modernization
(3) Environmental regulations
(4) Flat or declining loads and load factors, resulting from greater energy efficiency and slow growing economy
(5) Declining costs and rapidly growing markets for distributed energy resources, particularly solar PV and battery storage
(6) Net metering programs nearing or exceeding existing caps, triggering reviews
(7) Strong interest by growing numbers of large corporate and institutional buyers and municipalities to get more of their electricity from renewable or other low emissions resources

Adapted from Tom Stanton, National Regulatory Research Institute, 
Pending and Decided Utility Residential Fixed Charge Increases in 2015

Distributed solar is growing fast, but in most states still accounts for \(\leq 1\%\) of retail sales.

- With distributed solar’s growth, corresponding concerns about:
  - Fixed cost recovery: cost-shifting, erosion of utility shareholder profits, or both
  - Reduced utility earnings opportunities from deferred utility capital investments
- Similar concerns with energy efficiency

Calculated from PV installed capacity data from GTM Research and EIA.
New Report: *Recovery of Utility Fixed Costs*

- 5th report in Berkeley Lab’s Future Electric Utility Regulation series (see “Additional Slides”)
  - Primary funder of series: USDOE Office of Electricity Delivery and Energy Reliability - Transmission Planning and Technical Assistance Division
  - This report also funded by DOE Office of Energy Policy and Systems Analysis
- Four perspectives
  - **Utility** - Lisa Wood, Institute for Electric Innovation and The Edison Foundation, and Ross Hemphill, RCHemphill Solutions (former ComEd VP)
  - **Consumer** - John Howat, National Consumer Law Center
  - **Environmental** - Ralph Cavanagh, Natural Resources Defense Council
  - **Economist** - Severin Borenstein, University of California, Berkeley
- Literature review by Jeff Deason and Lisa Schwartz, Berkeley Lab
- Report, slides and webinar recording: [feur.lbl.gov](http://feur.lbl.gov)

"Future Electric Utility Regulation"
What Are Fixed Utility Costs?

- Some utility costs vary based on electricity usage, such as natural gas fuel for power plants.
- Other costs are “fixed” over the short run (e.g., a year).
- Typically, fixed charges only cover direct customer service costs: metering, meter reading and billing.
  - Also may cover customer call center and a portion of distribution costs
- Different points of view on what costs are “fixed”
  - Utilities see investments in generation, transmission and distribution infrastructure as fixed, because they are not sensitive to how much energy each customer consumes. (Most of these costs today are covered by variable energy charges.)
  - Others view only direct customer service costs as fixed.
  - Economists remind us that all costs are variable in the long run.
- Why the focus now on recovery of fixed costs?
  - Revenue loss with flat or declining loads in some regions
  - Rise in rooftop solar, and concern about paying fair share of costs
  - Regardless, utilities always are interested in more stable revenues.
1. **Raise fixed charges**
   - Utilities in more than half of U.S. states have recently proposed increasing fixed charges.*
     - For all customers, only for customers with onsite distributed generation, or only for net metering customers.
     - Many of the proposed increases have been significant — more than doubling previous fixed charges.
     - Utility regulators have allowed some of these proposed increases, often modified downward, but have disallowed more proposals than they have allowed.
   - **Pros** - Stabilize utility revenues and customer bills, reduce need for frequent rate cases.
   - **Cons** – Resulting lower energy charges reduce customer incentives for energy efficiency and onsite generation and increase demand for electricity; may disproportionately burden low-income households, which tend to use less energy.

*Sources: Stanton (2015); NC Clean Energy Technology Center and Meister Consultants (2016)*
2. Establish minimum bills

- Set a lower limit that a customer will pay the utility each billing period, even if the customer’s energy usage is zero
- Fixed charge + energy charges will exceed the minimum bill level for majority of customers under typical proposals, so minimum bills have no impact on most customers
  - Customers most likely to trigger minimum have strongly seasonal electricity usage or have onsite generation.
- Not widespread; a few CA utilities have implemented minimum bills
- *Pros* – Do not discourage energy efficiency or increase electricity consumption as much as equal-sized fixed charges
- *Cons* - Result in much less utility revenue compared to higher fixed charges
3. Apply demand charges more widely

- Today, only required for large commercial and industrial customers
  - ≥9 utilities offer optional residential tariffs with demand charges
- Based on customer’s highest energy usage in a specified time interval (e.g., 15 min. or an hour) over billing period, typically a month
- Usually applied to individual peak demand of customer, regardless of whether demand is coincident with (at the same time as) peak demand of utility system
  - But only highly local components (e.g., service drop, line transformer) are sized to individual customer load, so demand-related costs are primarily associated with peak demand of utility system, not individual customers.
- “Ratchet” – Highest demand in billing period charged for a full year
- Pros – If based on time of system peak, provides incentive to reduce system costs; utility can avoid potential cost recovery shortfall when energy use is down, so long as peak demand holds
- Cons – Need meters that can measure demand; hard for residential customers to understand, monitor and shift demand; outdated given time-varying rates
Options for Recovery of Fixed Costs (cont.)

4. **Offer time-varying rates**
   - Flat electric rates are not aligned with the dramatic differences in the actual cost of producing and delivering electricity at various times.
     - Under flat rates, customers who use more electricity when it is most expensive for the utility to acquire are subsidized by customers who use more off-peak, inexpensive electricity
   - **Pros** – Encourage customers to minimize electricity use during high cost periods, helping reduce utility system costs over time.
   - **Cons** – Need meters that can measure consumption by time of use, low-income households and others may have limited ability to shift load, some rate designs make customer bills less stable and shift price risk from the utility to consumers
5. Decouple utility revenues from energy sales
   • Decoupling adjusts prices (up or down) to ensure utility recovers its allowed revenue to recover fixed costs, as determined by the state regulator, regardless of the utility’s actual energy sales
   • ~1/3 of U.S. states have decoupled one or more of the electric utilities they regulate
   • Pros – Predictable customer bills, fewer rate cases, utility management focuses on cost control to make profit, reduces utility’s disincentives for EE related to reduced sales
   • Cons – Shifts some risks from utility to customers (e.g., weather, economy), utilities may still have incentive to increase sales

6. Adopt a lost revenue adjustment mechanism (LRAM)
   • Adjusts prices specifically to address revenue loss from EE and other distributed energy resources
   • Pros - Improves utility revenue stability; protects against under-recovery of costs, reduces utility disincentives for EE
   • Cons – Depends heavily on estimated EE impacts and controversial assumptions, reduces utility incentives for cost control
7. File frequent rate cases
   • Pros – Opportunity to review all utility’s costs and rate reasonableness
   • Cons - Generally seen as incomplete and costly solution; if there is only
     a small change in underlying costs but a large change in retail sales, a
     general rate case may not be an appropriately targeted tool

8. Adopt a formula rate plan (e.g., IL, MS, AL)
   • Allows a utility to reset rates on an annual basis to recover its cost of
     service without a rate case when its earnings fall above or below a
     predefined earnings “deadband”
   • Often implemented where frequent rate cases would otherwise be likely,
     due to costs growing more rapidly than delivery volumes
   • Often used in tandem with decoupling and performance incentives
   • Pros – Lowers regulatory costs, reduces operating risk, less likely for
     utility to under- or over-earn
   • Cons – May reduce incentive for utility to operate efficiently (design
     dependent), rate of return on equity may not be refreshed frequently
     enough, review provisions for filings may be inadequate
# Four Perspectives on Fixed Cost Recovery

<table>
<thead>
<tr>
<th></th>
<th>Wood/Hemphill (utility)</th>
<th>Howat (consumer)</th>
<th>Cavanagh (environmental)</th>
<th>Borenstein (economist)</th>
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<tbody>
<tr>
<td>Higher fixed charges</td>
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<td>Minimum bills</td>
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<td>Demand charges</td>
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<td>Time-varying rates</td>
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<td>Revenue decoupling</td>
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<td>Frequent rate cases</td>
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<td>Lost revenue adjustment mechanisms</td>
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- Poor
- Better
- Good
- Preferred

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1. First set volumetric price to reflect actual social marginal costs, including costs of externalities whether or not the utility has to pay those costs.
2. Linked to periods of coincident peak and subject to negotiated resolution of important technical issues.
3. Reflecting full social marginal cost, with the remaining revenue requirement balanced between higher volumetric rates and higher fixed charges.
4. Assuming a number of safeguards are implemented (see report).
5. Necessary but not sufficient.
6. In combination with a formula rate plan and only for setting revenue requirement; rate design issues to be addressed less frequently (e.g., every three years).
7. Implementation of formula rates should not deny utility customers and other stakeholders the ability to periodically review and litigate a utility’s cost structure.

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EMP
## Four Perspectives on Fixed Cost Recovery*

<table>
<thead>
<tr>
<th></th>
<th>Utility</th>
<th>Consumer Advocate</th>
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<tbody>
<tr>
<td><strong>Favored approaches and why</strong></td>
<td>• Formula ratemaking – streamlined, enables investments in critical infrastructure</td>
<td>• <strong>Time-varying rates</strong> – Properly designed and optional, some customers can reduce bills</td>
</tr>
<tr>
<td></td>
<td>• <strong>Higher fixed charges</strong> – cost-based, provides transparency in pricing grid services</td>
<td>• <strong>Decoupling</strong> – With consumer protections, enables EE</td>
</tr>
<tr>
<td></td>
<td>• <strong>Demand charges</strong> – cost-based, may incent more EE and DR</td>
<td>• <strong>Formula rate plans</strong> – With performance standards and consumer protections</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• <strong>Minimum bills</strong> – But in most cases won’t effectively address fixed cost recovery shortfall</td>
</tr>
<tr>
<td><strong>Least favored approaches and why</strong></td>
<td>• Decoupling and LRAM – Work well for EE, but too much cost-shifting with high levels of distributed solar</td>
<td>• <strong>Higher fixed charges</strong> – Shifts costs from high- to low-volume customers (low-income &amp; elder), reduces EE incentives &amp; control over bills</td>
</tr>
<tr>
<td></td>
<td>• <strong>Minimum bills</strong> – Level of minimum bill unlikely to recover full cost of grid services</td>
<td>• <strong>Demand charges</strong> – Consumers lack ability to respond</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• <strong>LRAM</strong> – Incentive for utility to overstate savings and weaken EE program effectiveness</td>
</tr>
</tbody>
</table>

*See footnotes on prior slide & report at feur.lbl.gov*
<table>
<thead>
<tr>
<th>Favored approaches and why</th>
<th>Environmentalist</th>
<th>Economist</th>
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<tbody>
<tr>
<td><strong>Minimum bills</strong> – Ensure that all customers make a reasonable contribution to maintaining critical infrastructure</td>
<td><strong>Time-varying rates</strong> – Should reflect full social marginal cost (SMC), with remaining revenue from higher volumetric rates and higher fixed charges</td>
<td></td>
</tr>
<tr>
<td><strong>Time-varying rates</strong> – Economically efficient, support EE &amp; distributed resources</td>
<td><strong>Higher fixed charges</strong> – Use with time-varying rates (see above). Concerns remain re: large vs. small users and low-income households. “Claim that ‘Fixed costs should be recovered with fixed charges’ has no basis in economics.”</td>
<td></td>
</tr>
<tr>
<td><strong>Decoupling</strong> – Necessary but not sufficient to recover fixed costs &amp; enable EE</td>
<td><strong>Minimum bills</strong> – “identical to fixed charge plus free electricity,” not cost-based</td>
<td></td>
</tr>
<tr>
<td><strong>Formula rate plans</strong> – Facilitates recovery of escalating multi-year costs of grid upgrades, use with decoupling</td>
<td><strong>Demand charges</strong> – inefficient, more volatile than dynamic pricing, not cost-based</td>
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<tr>
<td><strong>Demand charges</strong> – Works with EE &amp; solar, link to system-wide peak</td>
<td><strong>Others</strong> – Don’t fix problem</td>
<td></td>
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<tr>
<td>Least favored approaches and why</td>
<td><strong>Higher fixed charges</strong> – Reduce customers’ incentive for EE and distributed resources</td>
<td></td>
</tr>
</tbody>
</table>
Questions for Audience

• Has your legislature taken up any utility rate design discussions? What was the issue? And what was the result?
• Which issues should state legislatures decide, and which issues should be left to the authority of the public utility commission (for regulated utilities) and to city councils and boards (for municipal utilities and rural electric coops)?
For More Information

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lcschwartz@lbl.gov
Additional Slides
A new series of reports from Lawrence Berkeley National Laboratory taps leading thinkers to grapple with complex regulatory issues for electricity. Unique point-counterpoint approach highlights different views on the future of electric utility regulation and business models and achieving a reliable, affordable and flexible power system. Primary funder: DOE Office of Electricity Delivery and Energy Reliability, Transmission Planning and Technical Assistance Division. Reports published or underway:

1. Distributed Energy Resources (DERs), Industry Structure and Regulatory Responses


3. Performance-Based Regulation in a High DER Future

4. Distribution System Pricing With DERs

5. Recovery of Utility Fixed Costs: Utility, Consumer, Environmental and Economist Perspectives

6. The Future of Electricity Resource Planning

Additional reports forthcoming: feur.lbl.gov

Expert advisory group (see next slide)
Future Electric Utility Regulation Advisory Group

Janice Beecher, Institute of Public Utilities, Michigan State University
Ashley Brown, Harvard Electricity Policy Group
Paula Carmody, Maryland Office of People’s Counsel
Ralph Cavanagh, Natural Resources Defense Council
Steve Corneli, consultant
Tim Duff, Duke Energy
Hon. Mike Florio, California Public Utilities Commission
Peter Fox-Penner, Boston University Questrom School of Business
Scott Hempling, attorney
Val Jensen, Commonwealth Edison
Steve Kihm, Seventhwave
Hon. Nancy Lange, Minnesota PUC
Lori Lybolt, Consolidated Edison

Sergej Mahnovski, Edison International
Kris Mayes, Arizona State University College of Law/Utility of the Future Center
Jay Morrison, National Rural Electric Cooperative Association
Allen Mosher, American Public Power Association
Sonny Popowsky, Former consumer advocate of Pennsylvania
Karl Rábago, Pace Energy & Climate Center, Pace University School of Law
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Peter Zschokke, National Grid