Decoupling and the Power Sector of 2020 and Beyond

New Jersey Utilities Association

Presented by Richard Sedano

June 8, 2017
Introducing RAP and Rich

• RAP is a non-profit providing technical and educational assistance to government officials on energy and environmental issues. RAP staff have extensive regulatory experience. RAP technical assistance to states is supported by government and foundations.
  – Richard Sedano is President of RAP. Until recently, he directed RAP’s US work. He was commissioner of the Vermont Department of Public Service from 1991-2001 and is an engineer.
What is the Story of Electric Service over the Next Decade?

- Foundations and protections
- New services and capabilities reach consumers
- Technology, end to end
- Consumers become resources
- Role of the utility changing to enable innovation
1. Introduction

Billions of dollars are being spent each year upgrading energy systems to maximize demand side management (DSM) potential. Reports estimate up to $70-100 billion are spent each year to upgrade the larger energy efficiency of the U.S. economy (Laitner, 2013), and by 2015 as much as $200 billion may be spent on smart grid investments (Fox, Gohn, & Wheelock, 2009).

One major benefit of the Smart Grid is that it can enable consumers to take an active role in managing energy consumption by providing information in the form of energy use feedback. Traditionally, energy customers receive 12 data points per year about their energy consumption, corresponding to one per month based on the meter reading taken by the electric utility. A utility collecting smart meter data in hourly increments can produce thousands of data points per year, significantly increasing the amount and type of information available. Sampling within the home can enable even greater granularity of information to be collected, processed, and provided back to consumers (Figure 1). This allows for statistical analysis to distinguish energy use by time, and possibly by end-use, and information can be provided to consumers without having to process the information via the utility provider. “Adding sensors to the feedback equation helps solve problems of friction and scale. They automate the capture of behavioral data, digitizing it so it can be readily crunched and transformed as necessary. And they allow passive measurement, eliminating the need for tedious active monitoring” (Goetz, 2011).

Executive Summary

The Home Energy Management (HEM) market is rapidly expanding alongside substantial investments to improve energy efficiency and upgrade electricity infrastructure to a smart grid. These changes enable consumers to take greater control of their energy use, which can be enabled through the use of Home Energy Management Systems (HEMS).

Defining HEMS

HEMS can be broadly defined as those systems (including both hardware and software linked together via a network) that enable households to manage their energy consumption. This can be done in one (or both) of two ways:

1. HEMS can provide energy consumers with information about how they use energy in the home and/or prompts to modify consumption.
2. HEMS can provide the household (or third parties) the ability to control energy-consuming processes in the home, either remotely via a smart phone or web service or based on a set of rules, which can be scheduled or optimized based on user behavior.

As such, HEMS enable the delivery of a wide range of both household and utility objectives around energy management, financial benefits, comfort and convenience, greenhouse gas emissions reductions, as well as to ensure access to a reliable energy supply.

HEMS Technology

The HEMS sector is growing rapidly, and at the time of writing this report, 12 distinct product types or categories that make up a home energy management system were identified. These fall into three groups: (1) user interfaces, (2) smart hardware, and (3) software platforms.

User Interface

- Energy Portal
- Load Monitor
- In Home Display

Smart Hardware

- Smart Appliance
- Smart Thermostat
- Smart Lighting
- Smart Plug
- Smart Hub

Software Platform

- Smart Home Platform
- Data Analytics Platform
- Web Services Platform
The digital utility of the future captures opportunities all along the value chain.

- Distributed energy resources enabled by big data–driven alignment of supply and demand
- Data-driven asset strategies including preventative and condition-based maintenance and predictive outage
- Smart grid and smart pipes allow automated controls to improve network resiliency, safety, and efficiency
- Customer inter-actions governed by analysis of customer journeys, segmentation, and personalized communication
- Platform supports distributed energy resources and marketplaces

Back-office automation and data-driven decision making

Field workforce with mobile access to maps, data, work-management tools, and real-time expertise

High level of situational awareness to enable energy balancing
What does throughput have to do with this story?

• Nothing.
Decoupling Makes Throughput Not Matter

• Well, mostly
Why Throughput Matters in Traditional Regulation

• Utility makes more money if sales go up
• Utility makes less money if sales go down
  – Effect on margins is magnified
## Impact on Earnings of Sales Decline for Illustrative SW Electric Utility

<table>
<thead>
<tr>
<th>% Change in Sales</th>
<th>Revenue Change</th>
<th>Impact on Earnings</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Pre-tax</td>
<td>After-tax</td>
</tr>
<tr>
<td>5.00%</td>
<td>$9,047,538</td>
<td>$5,880,900</td>
</tr>
<tr>
<td>4.00%</td>
<td>$7,238,031</td>
<td>$4,704,720</td>
</tr>
<tr>
<td>3.00%</td>
<td>$5,428,523</td>
<td>$3,528,540</td>
</tr>
<tr>
<td>2.00%</td>
<td>$3,619,015</td>
<td>$2,352,360</td>
</tr>
<tr>
<td>1.00%</td>
<td>$1,809,508</td>
<td>$1,176,180</td>
</tr>
<tr>
<td>0.00%</td>
<td>$0</td>
<td>$0</td>
</tr>
<tr>
<td>-1.00%</td>
<td>-$1,809,508</td>
<td>-$1,176,180</td>
</tr>
<tr>
<td>-2.00%</td>
<td>-$3,619,015</td>
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Why Throughput Matters in Traditional Regulation

• Utility makes more money if sales go up
• Utility makes less money if sales go down
  – Effect on margins is magnified

• If sales go up, more investment needed?
  – On which to earn a return
  – But this investment may be avoidable!
  – Decoupling does not address this issue, but there are other solutions to the “capital bias” we can discuss in Q&A
What’s the Problem?

• The throughput incentive
  – Discourages end use energy efficiency
  – Discourages customer-sited resources
  – Discourages system efficiency
    • Investments that lower costs while lowering sales
  – Distracts from a focus on service, policy goals
  – Is a Risk Factor, promoting revenue volatility
  – Too much other stuff matters for throughput to matter so much!
Solving the Problem

• How to align regulation with a distributed resource-oriented power system?
  – The throughput incentive seems in conflict
  – How government can send consistent signals with policy AND regulation
  – While not messing with rate design
Decoupling

• A solution to the throughput incentive...
  – Focuses on allowed revenue
  – Rates change to reconcile revenue, multi-year
  – Effective at solving the throughput incentive
  – No change in retail rate design
  – Protections – build them in

• ... is really a vehicle with many choices that PUCs can make
  – To achieve important outcomes
How It Works

• Lots of slides about how it works
Revenue Regulation and Decoupling: A Guide to Theory and Application
What Did We Cover?

- How decoupling works
- Full, partial, limited decoupling
- Revenue functions
- Rate design and decoupling
- Current v. accrual methods
- Weather, economy, other risks
- Earnings volatility risks/costs of capital
- Other measures and how they relate to decoupling
- Concerns over decoupling
- Communicating with customers about decoupling
- More . . .
Decoupling Case Studies: Revenue Regulation Implementation in Six States

Authors
Janine Migden-Ostrander, Betty Watson, Dave Lamont, Richard Sedano
Decoupling Design: Customizing Revenue Regulation to Your State's Priorities

Authors
Janine Migden-Ostrander and Rich Sedano
Rate of Return Regulation Refresher

Revenue Requirement

\[ \text{Revenue Requirement} = \text{Test Year Expenses} + \text{Depreciation} + \text{Taxes} + (\text{Rate of Return} \times \text{Rate Base}) \]
Rate of Return Regulation Refresher

Revenue Requirement recovered from:

(# of Customers * Customer Charge) +
(Projected Sales * Price/kWh)
Rate of Return Regulation Refresher

Price/kWh

= 

(Revenue Requirement – Customer Service Charge Revenue)/Projected Sales

– Price/kWh collects all fuel costs and, generally, non-customer-specific fixed costs
Designing Decoupling

1. Decide what’s covered
Decoupling can be applied to:
- Distribution alone
- Distribution and transmission
- Distribution, transmission, and generation
It can cover residential, commercial, and industrial customers or apply selectively. Exclude fuel or power purchase costs if they are already covered in a rider, fuel adjustment mechanism, etc.

2. Choose how to adjust utility revenue
There are about a half-dozen options for “Revenue Adjustment Mechanisms” (RAMs) to adjust utility revenue to provide stability to utilities and customers. Among them:
- Revenue per customer
- Annual review decoupling
- No adjustment at all

3. Select how to handle refunds or surcharges
Truing up actual utility revenues with what utilities are allowed to earn can be done monthly or at longer intervals. Refunds or charges can be applied to all customers evenly or be allocated to customer classes. They can also be directed to encourage a particular policy goal, like rewarding low energy usage.

Customer Considerations

- Refunds if utilities over-collect
- Cuts on rate increases or decreases?
- More energy efficiency
- Reducing cost of capital
Decide what’s covered

Decoupling can be applied to:
- Distribution alone
- Distribution and transmission
- Distribution, transmission, and generation

It can cover residential, commercial, and industrial customers or apply selectively. Exclude fuel or power purchase costs if they are already covered in a rider, fuel adjustment mechanism, etc.
What’s Covered?

Decide What’s Covered

- Applicability of Utility Function
  - Transmission & Distribution
  - Transmission, Distribution, & Generation

- Applicability of Revenue Regulation to Customer Classes
  - Residential and Small Commercial
    - All

- Costs Included in Decoupling Mechanism
  - Base Rates Only
    - Riders
      - Some Riders, Not Others
      - All Costs Including All Riders

Energy solutions for a changing world
What’s Covered?

Applicability of Utility Function

Transmission & Distribution

Transmission, Distribution, & Generation
What’s Covered?

Application of Revenue Regulation by Utility Function

What Type of Utility is It?
- Vertically Integrated
- Distribution Only

What Costs are Being Included in the Decoupling Mechanism?
- Wires and Power Supply Costs
- Wires
What’s Covered?

Applicability of Revenue Regulation to Customer Classes

Residential and Small Commercial

All
What’s Covered?

- Costs Included in Decoupling Mechanism

- Base Rates Only
  - Riders
    - Some Riders, Not Others
  - All Costs Including All Riders

Watch out for Double Recovery
Double Recovery Issue

• Concern if generation costs are included in the decoupling mechanism that uses RPC.
  o Risk - number of customers increases while generation costs decrease due to depreciation;
  o Fuel, purchase power costs recovered in fuel adjustment mechanisms without an offset of declining investment cost which would be captured in a rate case.

  ▪ If regulators retain FAC, then FAC must account for changes in investment and operating costs if rate cases are not occurring to adjust. Otherwise, the value of generation is overstated.
2. Choose how to adjust utility revenue

There are about a half-dozen options for “Revenue Adjustment Mechanisms” (RAMs) to adjust utility revenue to provide stability to utilities and customers. Among them:

- Revenue per customer
- Annual review decoupling
- No adjustment at all
How to Adjust Revenue?

1. Frequency of Rate Cases to Determine Revenue Requirement

   - Rate Case as Needed
   - Mini or Full Rate Case Annually
   - Rate Case Every 3 to 5 Years
How to Adjust Revenue?

Ex Ante Adjustment to ROE/Capital Structure

Yes

No
## Illustration of Debt/Equity Ratio Shift

<table>
<thead>
<tr>
<th></th>
<th>Without Decoupling</th>
<th></th>
<th>With Decoupling</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Ratio</td>
<td>Cost</td>
<td>Weighted without-tax cost of capital</td>
</tr>
<tr>
<td>Equity</td>
<td>48%</td>
<td>10%</td>
<td>7.38%</td>
</tr>
<tr>
<td>Debt</td>
<td>52%</td>
<td>7%</td>
<td>2.37%</td>
</tr>
<tr>
<td>Weighted cost</td>
<td></td>
<td></td>
<td>9.75%</td>
</tr>
<tr>
<td>Revenue requirement: $1 Billion Rate Base</td>
<td>$97,506,154</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Savings Due to Decoupling Cost of Capital Benefit:</strong></td>
<td></td>
<td></td>
<td><strong>$3,250,385</strong></td>
</tr>
</tbody>
</table>
How to Adjust Revenue?

Choosing The Revenue Adjustment Mechanism

- None
- Stair/Indexing
- Revenue Per Customer
- Attrition
- K Factor
Revenue Per Customer or Attrition Decoupling?

What Type of Utility is It?
- Vertically Integrated
- Distribution Only

What Costs are Being Included in the Decoupling Mechanism?
- Distribution and Power Supply Costs
- Distribution Costs Only

What Type of Decoupling Mechanism Should Be Considered?
- Attrition Decoupling
- Attrition or Revenue Per Customer Decoupling
# Periodic Decoupling Calculation

## From the Rate Case

<table>
<thead>
<tr>
<th>Description</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Target Revenues</td>
<td>$10,000,000</td>
</tr>
<tr>
<td>Test Year Unit Sales</td>
<td>100,000,000</td>
</tr>
<tr>
<td>Price</td>
<td>$0.10000</td>
</tr>
</tbody>
</table>

## Post Rate Case Calculation

<table>
<thead>
<tr>
<th>Description</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Actual Unit Sales</td>
<td>99,500,000</td>
</tr>
<tr>
<td>Required Total Price</td>
<td>$0.1005025</td>
</tr>
<tr>
<td>Decoupling Price Adjustment</td>
<td>$0.0005025</td>
</tr>
</tbody>
</table>
### Revenue Per Customer Periodic Decoupling Calculation

#### From the Rate Case

<table>
<thead>
<tr>
<th>Item</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Target Revenues</td>
<td>$10,000,000</td>
</tr>
<tr>
<td>Test Year Unit Sales</td>
<td>100,000,000</td>
</tr>
<tr>
<td>Price</td>
<td>$0.10000</td>
</tr>
<tr>
<td>Number of Customers</td>
<td>200,000</td>
</tr>
<tr>
<td>Revenue per Customer (RPC)</td>
<td>$50.00</td>
</tr>
</tbody>
</table>

#### Post Rate Case Calculation

<table>
<thead>
<tr>
<th>Item</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of Customers</td>
<td>200,500</td>
</tr>
<tr>
<td>Target Revenues ($50 x 200,500)</td>
<td>$10,025,000</td>
</tr>
<tr>
<td>Actual Unit Sales</td>
<td>99,750,000</td>
</tr>
<tr>
<td>Required Total Price</td>
<td>$0.1005013</td>
</tr>
<tr>
<td>Decoupling Price “Adjustment”</td>
<td>$0.0005013</td>
</tr>
</tbody>
</table>
Select how to handle refunds or surcharges

Truing up actual utility revenues with what utilities are allowed to earn can be done monthly or at longer intervals. Refunds or charges can be applied to all customers evenly or be allocated to customer classes. They can also be directed to encourage a particular policy goal, like rewarding low energy usage.
How to Handle Refunds/Surcharges

Surcharge/Credit Symmetry

Yes
No
Changes in Rates From Decoupling Mechanisms 2005 to 2011

How to Handle Refunds/Surcharges

- Allocation Of Over And Under Recovery To All Rate Elements
  - Across the Board
  - By Class
  - By Rate Element
How to Handle Refunds/Surcharges

Choosing A Rate Adjustment Method

Via a Rider

Via Base Rate
How to Handle Refunds/Surcharges

Frequency of True-Ups → Accrual (Choose Period up to a Year) → Current Method (Monthly)
How to Handle Refunds/Surcharges

Caps on the Size of Decoupling Adjustment

- None
- Yes
  - Revenue
  - Rates
How to Handle Refunds/Surcharges

Carrying Charges for Decoupling Deferrals

- Risk-Free Rate
- Weighted Average Cost of Capital
- Symmetry
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Energy solutions for a changing world
Customer Considerations

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- Caps on rate increases or decreases?
- More energy efficiency
- Reducing cost of capital
Design Approaches to Protect Customers

• Symmetry in rate adjustments
• Stability: cap on rate changes
• Changes to capitalization ratio to reflect risk reductions
• Bill simplification
Design Approaches to Protect Customers

• Direct more energy efficiency/DERs
  o Decoupling conditioned on comprehensive programs
• Direct more distribution efficiency
• Low income provisions
  o Rate design approaches
  o EE programs directed towards LI
• Performance report card
## Customer Considerations

### Using Rate Design and Decoupling Surcharges to Effect Policy Goals

<table>
<thead>
<tr>
<th></th>
<th>Summer</th>
<th>Winter</th>
</tr>
</thead>
<tbody>
<tr>
<td>Customer Charge</td>
<td>$7.00</td>
<td>$7.00</td>
</tr>
<tr>
<td>First 500 kWh</td>
<td>$0.80</td>
<td>$0.073</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Minus any decoupling credit</td>
</tr>
<tr>
<td>Next 2,500 kWh</td>
<td>$0.102</td>
<td>$0.093</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Plus any decoupling surcharge</td>
</tr>
<tr>
<td>Over 3,000 kWh</td>
<td>$0.120</td>
<td>$0.113</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Plus any decoupling surcharge</td>
</tr>
</tbody>
</table>
Design Regulation for Policy Success

- Policy directions suggests increasing stress from the throughput incentive
- Rate design: increasing emphasis on price signals
- Decoupling works, aligns to policy
- Consumer welfare can be protected and furthered in decoupling
- Decoupling provides mechanism to ensure against utility over-recovery and excessive earnings
- Innovation: suited to support performance
Resources

Revenue Regulation and Decoupling: A Guide to Theory and Application

Decoupling Case Studies: Revenue Regulation Implementation in Six States

Decoupling Design: Customizing Revenue Regulation to Your State’s Priorities

Flexible and Customizable: Designing Decoupling for Your State (A Webinar)
Decoupling: Key Take-Aways

• It’s flexible, customizable
• It’s been done before, models exist
• It can serve policy goals
• It can be designed to protect consumers
About RAP

The Regulatory Assistance Project (RAP) is a global, non-profit team of experts that focuses on the long-term economic and environmental sustainability of the power sector. RAP has deep expertise in regulatory and market policies that:

- Promote economic efficiency
- Protect the environment
- Ensure system reliability
- Allocate system benefits fairly among all consumers

Learn more about RAP at www.raponline.org

rsedano@raponline.org