Synapse
Energy Economics, Inc.

Performance Based Regulation

NARUC Rate Design Subcommittee Call

September 12, 2016

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Introduction

- Synapse Energy Economics is a research and consulting firm specializing in energy, economic, and environmental topics.
- Since its founding in 1996, Synapse has been a leader in providing rigorous analysis of energy, environmental and regulatory issues, for environmental and public interest clients.

http://www.synapse-energy.com/project/performance-based-regulation-high-distributed-energy-resources-future

http://www.synapse-energy.com/project/performance-incentives-utilities

Traditional Cost of Service Regulation (COSR)

Throughput Incentive	• Much of the utility's revenue requirement is generally recovered by volumetric and demand charges, which are dependent on usage. • Incentive to oppose anything that decreases sales (energy efficiency, distributed energy resources), even when these technologies can meet customer needs at lower cost.
Capital Investments	• Utility earns a return based on capital investments. • Financial incentive to increase rate base.
Rate Cases and Performance	• Base rates are adjusted in occasional rate cases that occur as they are needed. The more financial attrition that a utility is subject to, the more frequently they will ask for rate cases. • Frequent rate cases can erode the utility's incentive to improve performance and contain costs.

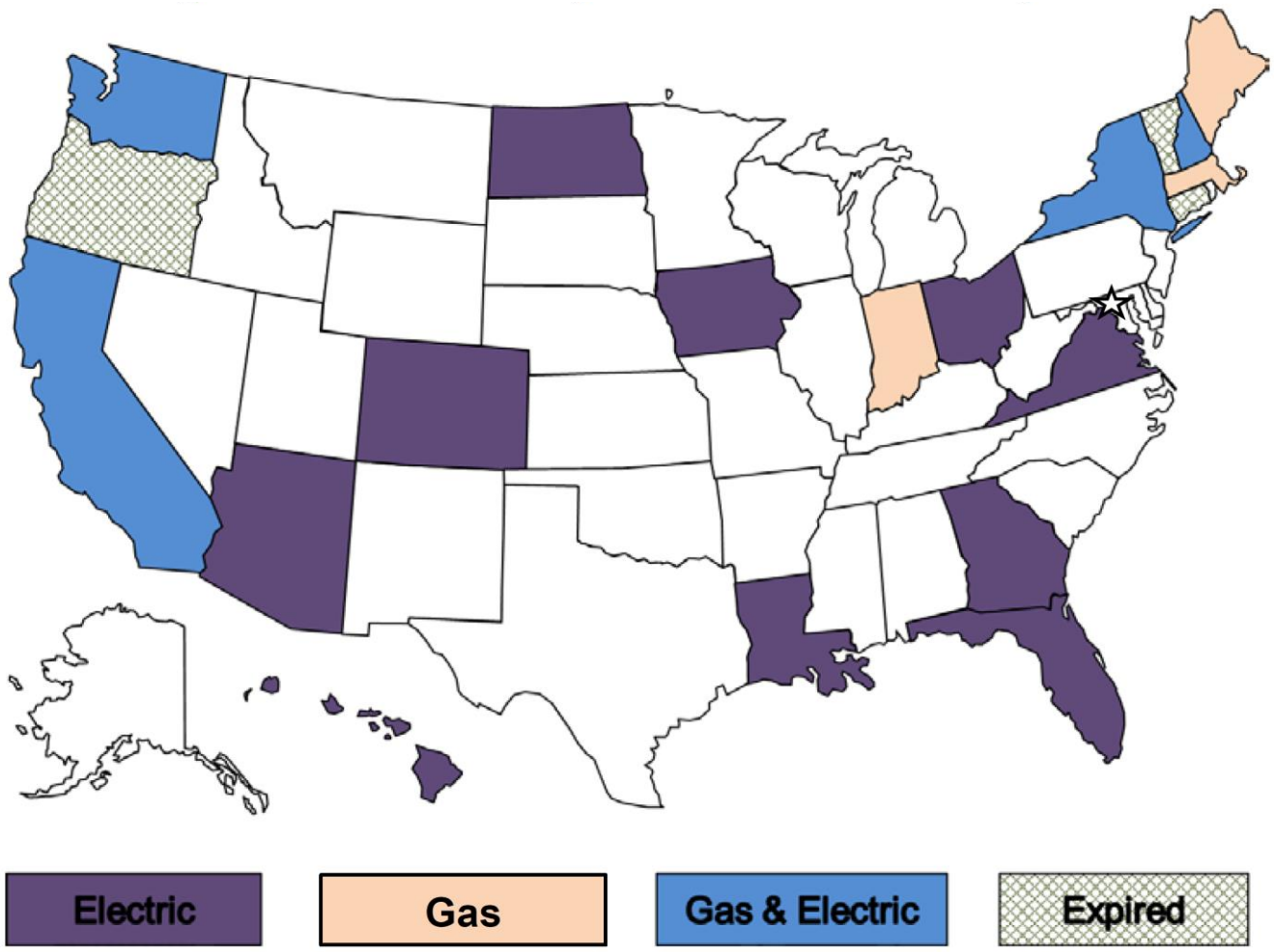
Regulatory Models (simplified comparison)

Regulatory Element	Cost of Service Regulation	Multi-year Rate Plans (MRPs) (A form of PBR)
Frequency of rate cases	As needed	Pre-determined, fixed period (e.g., 5 years)
Revenue adjustments between rate cases	Generally none	Attrition relief mechanisms
Performance Incentive Mechanisms (A form of PBR)	If implemented at all, generally narrowly focused on safety, reliability, and customer service	• Traditionally focused on areas that may experience service degradation due to cost reductions • Increasingly designed to create incentives to achieve a broad set of desired outcomes.

Multi-Year Rate Plans (MRPs)

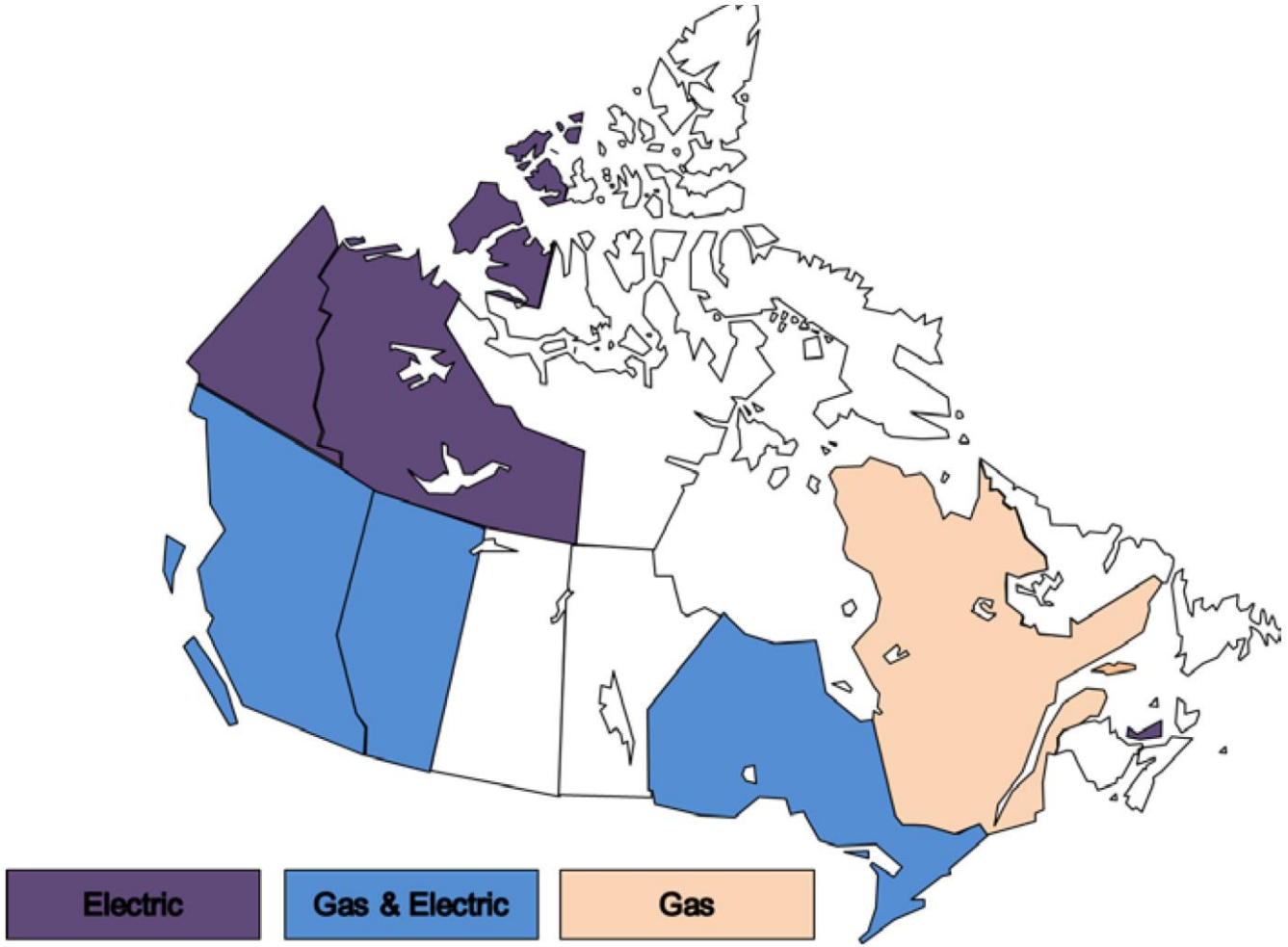
Objective	• Provide financial incentive for utility to increase efficiency and reduce utility costs. Reduced costs should ultimately benefit customers.
Key Components	• Rate case moratorium • Attrition relief mechanism (ARM) provides automatic relief for increasing cost pressures, but is not linked to a utility's actual costs • Performance incentive mechanisms for reliability, safety, etc.
Optional Components	• Revenue decoupling • Earnings sharing mechanism • Efficiency carryover mechanism • Cost trackers

Recent United States MRP Precedents



Source: PEG Research, *Alternative Regulation for Emerging Utility Challenges* 2nd Edition, EEI 2015

Recent Canadian MRP Precedents



Source: PEG Research, *Alternative Regulation for Emerging Utility Challenges* 2nd Edition, EEI 2015

RIIO: Britain's RIIO Approach to PBR

RIIO: **R**evenues = **I**ncentives + **I**nnovation + **O**utputs

Builds off of 20-year history of PBR in Britain

Multi-year rate plan features:

- 8-year plan term
- Revenue decoupling
- Attrition Relief Mechanism based on:
  - detailed cost forecasts for 8-year term
  - extensive use of statistical benchmarking & engineering
- Incentive compatible menu of revenue and earnings sharing options
  - A utility can choose a plan with lower allowed revenues but with the ability to keep a larger proportion of any cost savings, or a utility can choose higher revenues but with a lower proportion of any savings
- Elaborate system of performance metrics and PIMs
- "Totex" approach:
  - Rate of return earned on a % of total expenditures, regardless of whether they are capital or operational expenditures

Customer Perspective on MRPs

Advantages

- Improved utility performance and lower utility costs
- Benefits can be shared with customers
- Less frequent rate cases may permit more attention to other important issues
- May improve information transparency regarding utility performance
- Can encourage implementation of cost-effective DERs

Disadvantages

- Typically results in automatic rate increases
- Revenue may exceed cost for extended periods
- Fewer rate cases means less frequent opportunities to review costs
- ARM design methods can be opaque, complex and controversial
- U.S. intervenors may lack resources and skills to effectively protect consumers

Utility Perspective on MRPs

Advantages

- Timely, predictable revenue growth
- Superior returns possible for superior performance
- Improved performance can be an important new earnings driver
- Utilities typically have expertise to support their MRP proposals
- Streamlined regulation

Disadvantages

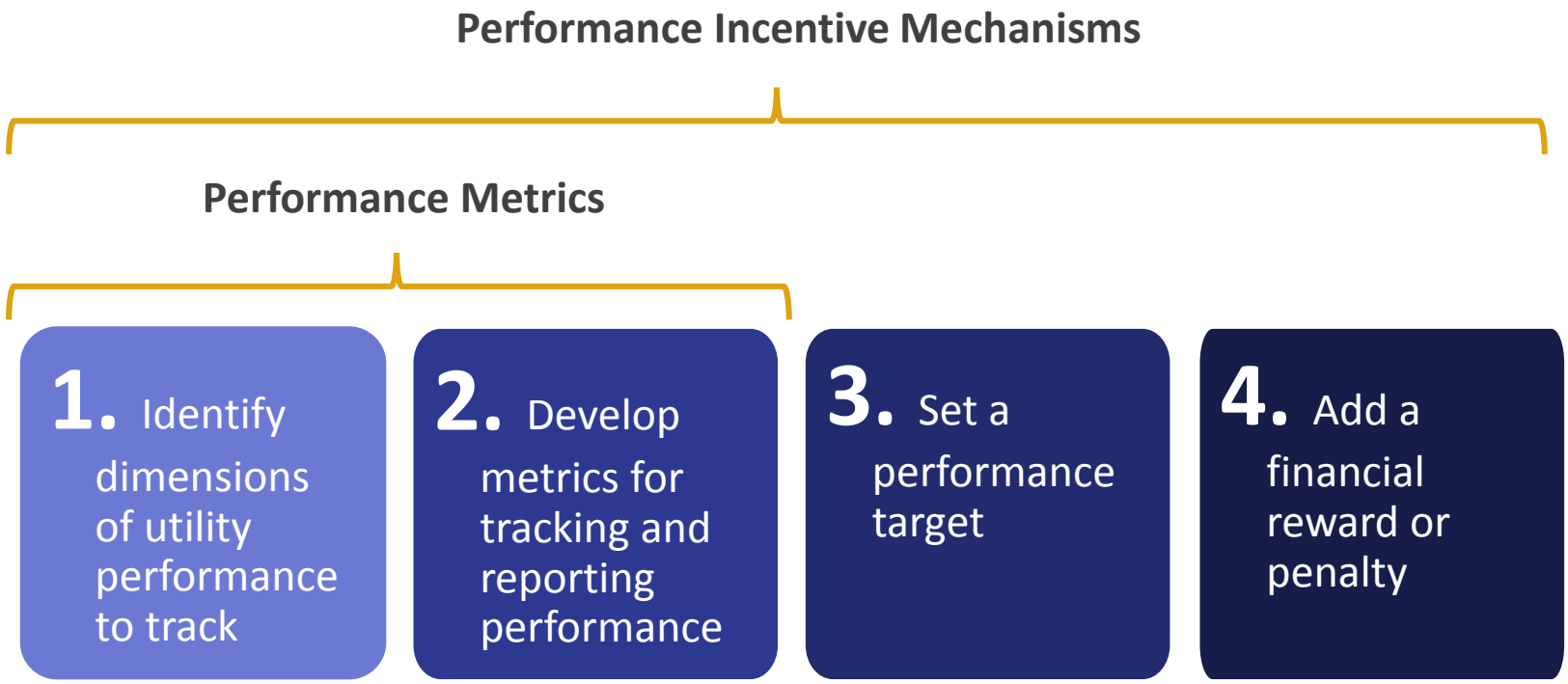
- Operating risk may increase materially
- Corresponding increase in target ROE unlikely
- Difficult to accommodate occasional cost surges
- Greater focus on a utility's comparative performance

Performance Incentive Mechanisms (PIMs)

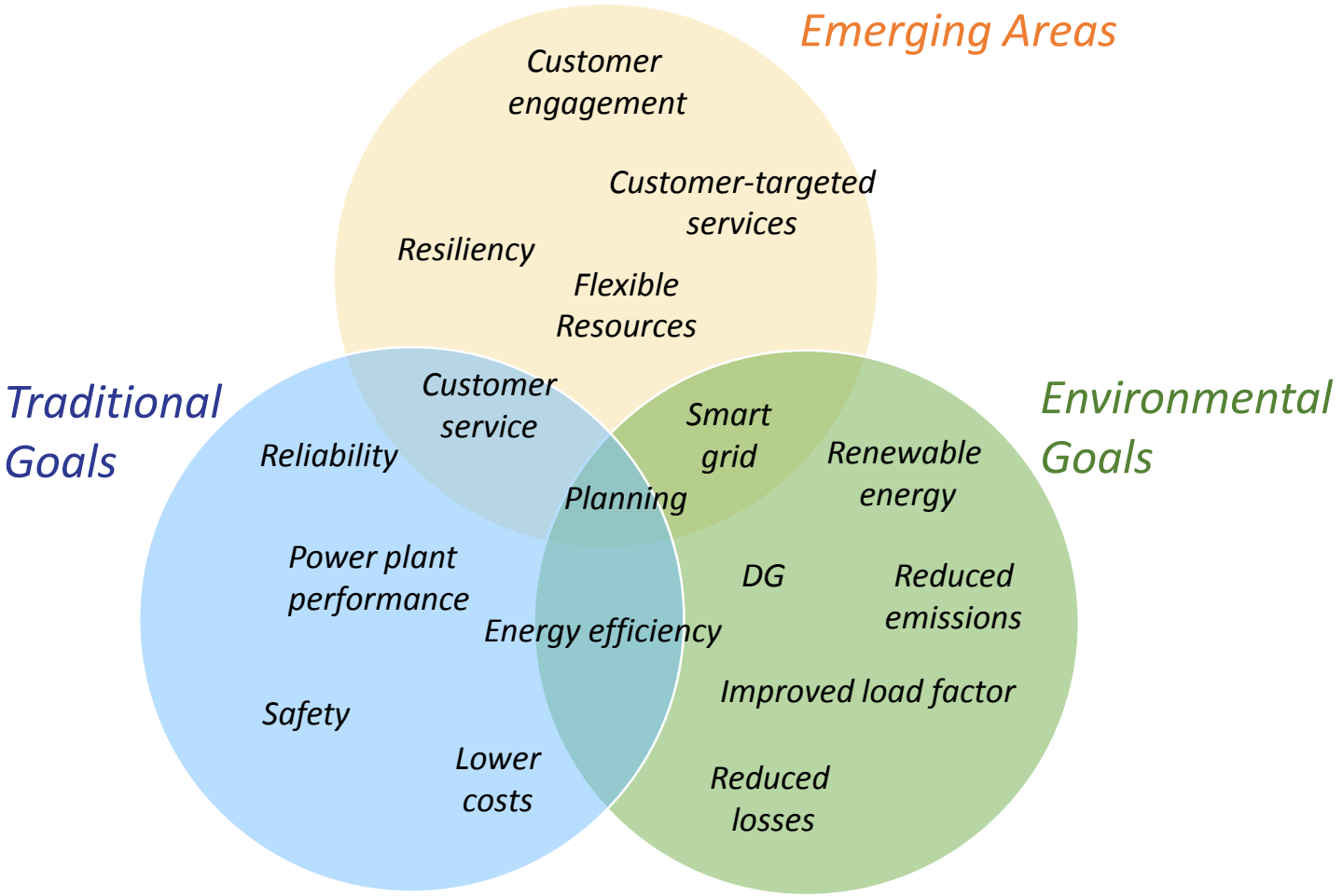
Objective	• Articulate regulatory goals • Track performance • Incentivize improvements
Key Components	• Regulatory policy goals – identifying performance areas and outputs • Metrics – detailed information regarding utility performance • Targets – requirement to achieve specific goals • Financial incentives – based on performance relative to targets
Optional Components	• Scorecards • Public reporting (e.g., websites)

Four Discrete Steps

PIMs can be implemented incrementally, allowing for flexibility



1. Identify areas of performance to track



2. Develop metrics

- Ensure the metric is tied to the policy goal and will provide useful information about whether the goal is being attained
- Define metrics precisely, using regional or national definitions where possible
  - Helps avoid contention, and facilitates comparisons over time and across jurisdictions
- Choose metrics that are easily measured and interpreted
  - Complex data analyses reduce transparency

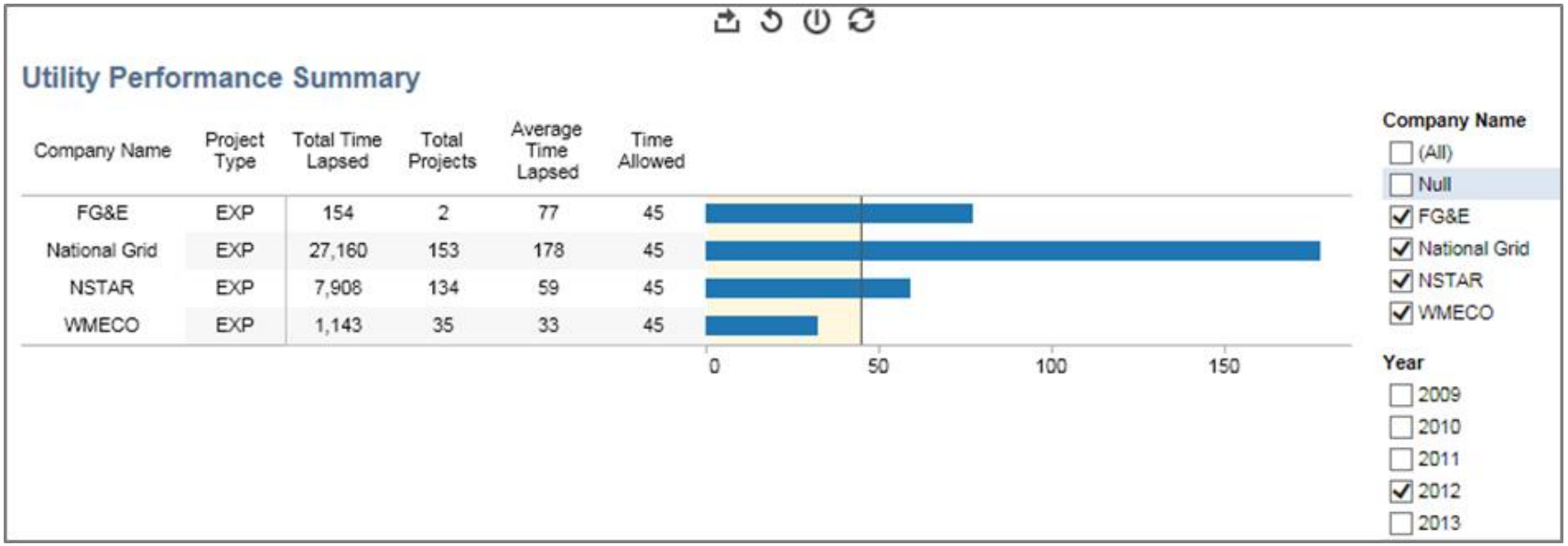
Examples of possible metrics

Metric	Purpose	Metric Formula
System load factor	Indication of improvement in system load factor over time	System average load / peak load
Line losses	Indication of reductions in losses over time	Total electricity losses / MWh generation, excluding station use
Demand response (DR)	Indication of participation and actual deployment of DR resources	Potential and actual peak demand savings (MW)
Distributed generation (DG)	Indication of the technologies, capacity, and rate of DG installations, and whether policies are supporting DG growth	Number of customers with DG
		MW installed by type (PV, CHP, small wind, etc.)
Information availability	Indicator of customers' ability to access their usage information	Number of customers able to access daily usage data via a web portal
		Percent of customers with access to hourly or sub-hourly usage data via web
Time-varying rates	Indication of saturation of time-varying rates	Number of customers on time-varying rates

Data Dashboards

- Data dashboards enable regulators and other stakeholders to quickly review utility performance across a large number of performance areas
- Publicly accessible (website)
- Show historical trends, possibly comparison across utilities

Example: Interactive website displaying utility performance



3. Set performance targets

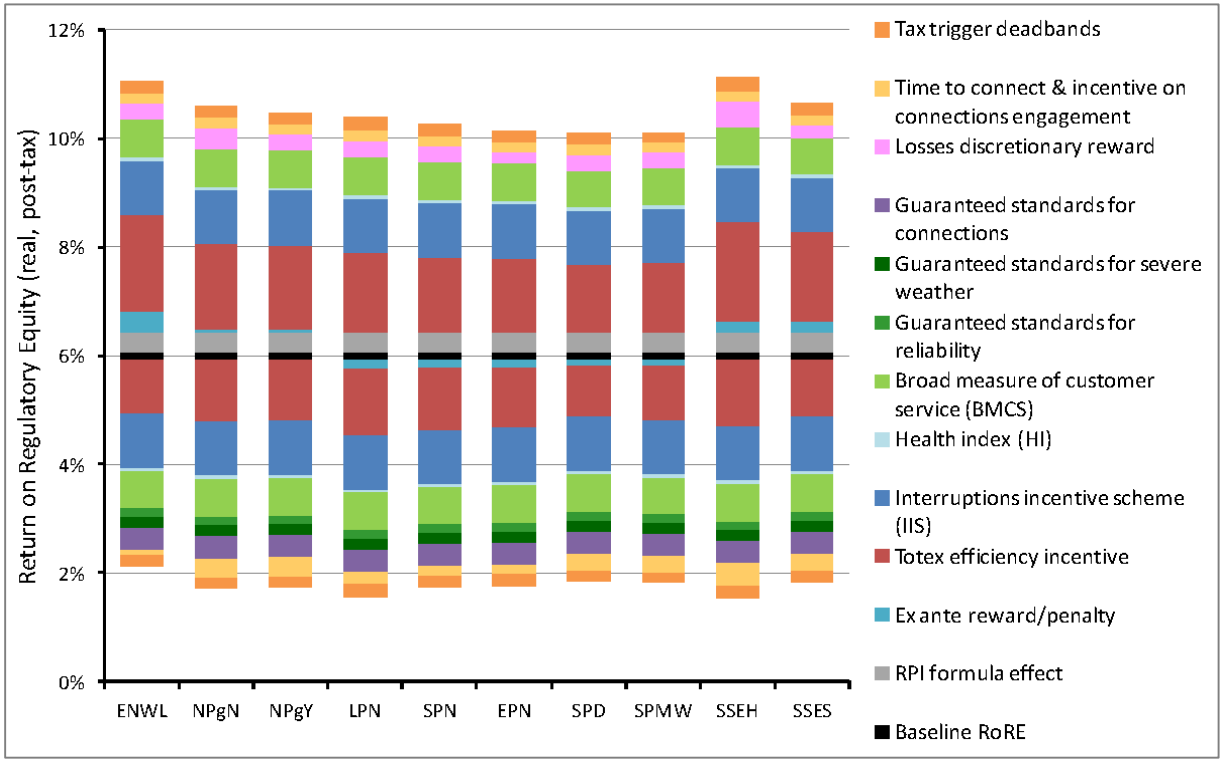
- Balance the costs of achieving the target with the benefits to ratepayers
  - **What is the value** of achieving the target? Customer surveys can help determine value to customers (e.g., is extra reliability worth the additional cost?)
  - **What are the costs** of achieving the target? Does the utility have a budget cap on how much it can spend to achieve the target? Will costs be automatically passed on to customers?
- Set a realistic target. Various analytical techniques can help:
  - Historical performance (*if still relevant)*
  - Peer utility performance (*if inherent differences between utilities can be controlled for)*
  - Frontier methods (*measures technical efficiency of various firms*)
  - Utility-specific studies (*IRPs and engineering studies can be useful*)
- Use deadbands to mitigate uncertainty around a target

4. Set Financial Rewards and Penalties

- Symmetric vs. Asymmetric
- Ensure a reasonable magnitude for incentive
  - Large enough to capture utility management's attention
  - Should not overly reward or penalize utility
- Start with small incentives; increase only if necessary

How big should financial incentives be?

- In the United States, the total maximum of all financial rewards/penalties has often been set at approximately 1% - 3% of base revenues.
- In the UK, the RIIO model could have an impact greater than 5% of base revenues (equivalent to +/- 500 basis points on ROE).



Customer Perspective on PIMs

Advantages

- Can encourage better utility performance in areas of concern
- Can make regulatory goals and incentives explicit
- May help mitigate utility bias toward capital investments
- Can be designed to directly benefit customers
- Can help ensure cost-cutting doesn't degrade service quality or safety
- PIMs for DERs can be designed to encourage cost-effective DERs
- Metrics serve as a low-risk, low-cost option for highlighting and monitoring key performance areas

Disadvantages

- Design, implementation, and review may be complex, contentious and resource intensive
- May distract from more important issues
- Design of PIMs may favor utilities, be subject to gaming and manipulation, or lead to unintended consequences
- Incentives may be insufficient to achieve goals
- Important performance areas may not be addressed

Utility Perspective on PIMs

Advantages

- Alert utility managers to areas of special concern to customers and regulators
- Provide new earnings opportunities
- PIMs for DSM and many experimental metrics likely to involve rewards but no penalties
- Risks and rewards are in balance
- Help to maintain good relations with regulators and customers
- Price of admission for access to desirable forms of regulation (e.g. multi-year rate plans and formula rates)

Disadvantages

- Financial rewards may be small due to low stakes and narrow focus
- Some PIMs involve only penalties
- Some PIMs may address areas that are largely outside of utility control
- Targets may be unreasonably difficult to meet
- May be resource-intensive and distract from core goals

Options for Different Contexts and Goals

Performance Improvement Goals	Openness to Regulatory Change	PBR Options
None	Low	Maintain current ratemaking practice
Improvement in specific areas	Low	Adopt PIMs for specific areas
General improvement in utility cost performance **Streamlined regulation**	Moderate to high	Adopt an MRP with only traditional PIMs
Improve performance in many specific areas **General improvement in utility cost performance** **Streamlined regulation**	High	Adopt wide range of PIMs and an MRP

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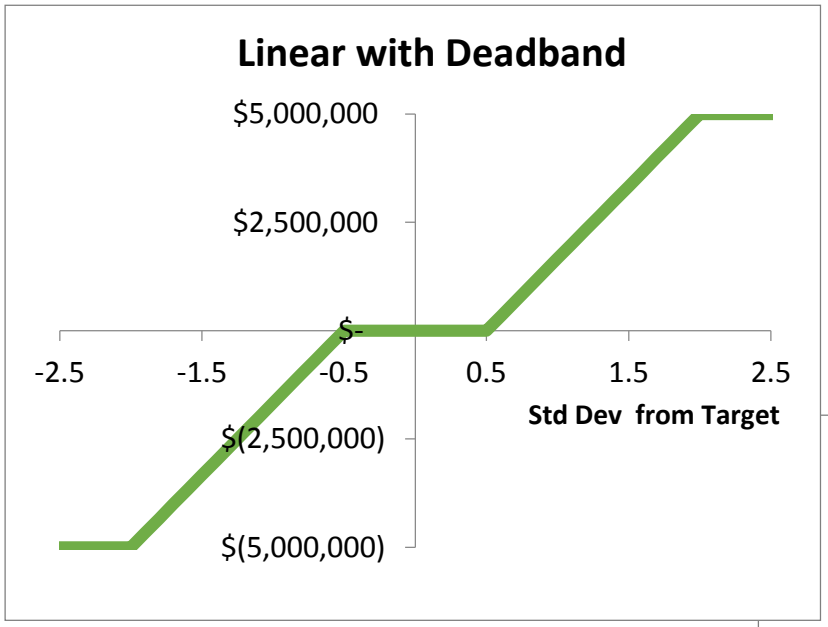
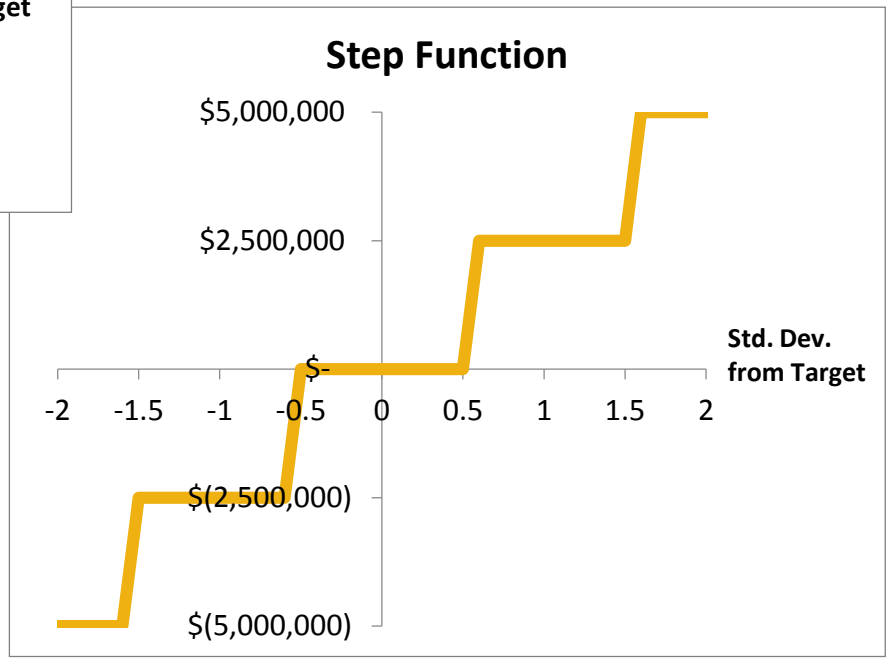
Appendix

Types of Incentive Formulas



Use deadbands to mitigate uncertainty

Avoid such cliff effects

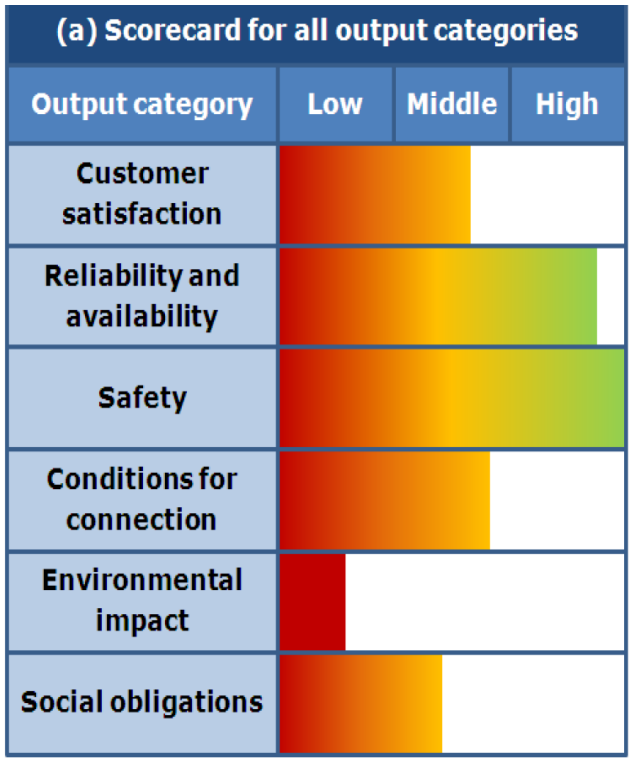


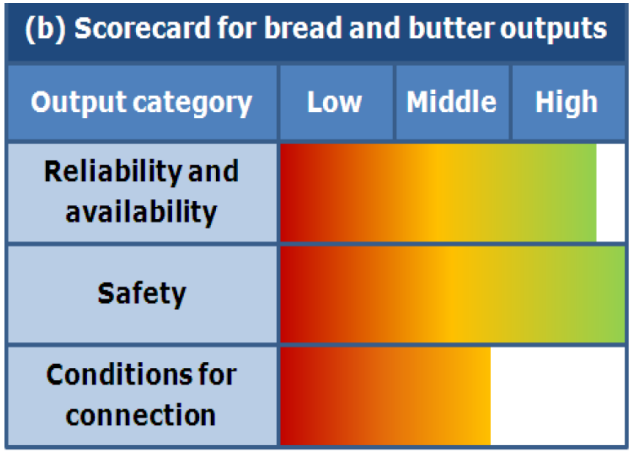
What units should financial incentives be in?

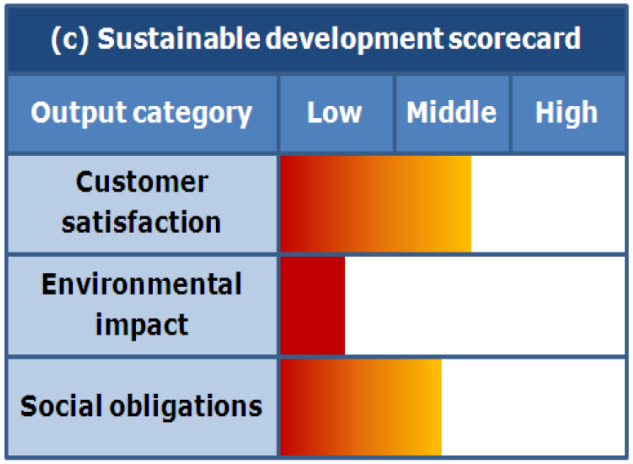
- ROE basis points (but can encourage maximizing rate base)
- Avoided costs (but can vary too much)
  - Example: energy efficiency rewards tied to avoided costs of energy are volatile
  - Example: Diablo Canyon windfall
- Percent of base revenues
- Percent of pre-tax earnings

RIIO

PIMs in RIIO


(a) Scorecard for all output categories
Output category
Low
Middle
High
Customer satisfaction
Reliability and availability
Safety
Conditions for connection
Environmental impact
Social obligations


(b) Scorecard for bread and butter outputs
Output category
Low
Middle
High
Reliability and availability
Safety
Conditions for connection


(c) Sustainable development scorecard
Output category
Low
Middle
High
Customer satisfaction
Environmental impact
Social obligations

Selected RIIO Outputs

- Environment:

Deliverable	Penalty or Reward	Metric and Target Description
Electricity losses	Discretionary **reward**	Utilities report annually on loss reduction activities undertaken, improvements achieved, and actions planned for the following year. Performance measured according to the effectiveness of actions taken to reduce losses, engagement with stakeholders, innovative approaches to loss reductions, and sharing of best practices with other companies.
Business Carbon Footprint (BCF)	**Reputational**	Annual reporting requirement on CO_2 equivalent emissions, actions taken to reduce emissions over the past year and their effectiveness.

RIIO Outputs, cont.

- Customer satisfaction and social obligations

Deliverable	Penalty or Reward	Metric and Target Description
Customer satisfaction survey	**Reward or penalty** up to 1% of annual base revenue	A survey is used to measure the satisfaction of customers who have required a new connection, have experienced an interruption to their supply, or have made a request for a service or job to be completed.
Complaints	**Penalty** of up to 0.5% of annual base revenue.	Complaints and their weightings are measured based on how long it takes to resolve complaints, percentage of repeat complaints, and number of Energy Ombudsman decisions that go against the utility .
Stakeholder engagement	**Reward** of up to 0.5% of annual base revenue.	Assessment of utilities' ability to understand and identify effective solutions for vulnerable consumers, as well as their ability to integrate this into core business activities.

RIIO Outputs, cont.

- Connections (including DG)

Deliverable	Penalty or Reward	Metric and Target Description
Time to Connect Incentive for Small Connections	**Reward** of up to 0.4% of annual base revenue.	Time taken from initial application received to connection completion.
Incentive on Connection Engagement (ICE) for Large Connections	**Penalty** of up to 0.9% of annual base revenue..	Each utility must submit evidence of how they have identified, engaged with, and responded to the needs of their customers.

Pitfalls to Avoid

Pitfalls to Avoid

Undue rewards or penalties

- Excessive rewards (or penalties) undermine the whole concept of incentive mechanisms.

Example: Rewards Based on Avoided Market Prices

Incentives that are tied to market prices may fluctuate significantly and provide utilities with a windfall. (*E.g., Palo Verde nuclear incentives, which spiked during California's electricity crisis.)*

- *Potential solutions:*
  - Use an incremental approach: start low and monitor over time.
  - Careful PIM design (e.g., shared savings, caps on financial incentives, other safety valves).

Pitfalls to Avoid

Costs Outweigh Benefits

- Value to customers of achieving target is less than the cost (including the cost of any shareholder incentives, regulatory cost, and project costs.)
- *Potential solutions:*
  - Set a cap on the costs that can be passed on to customers.
  - Ensure benefits are realized.

Example: Advanced Metering Infrastructure Incentive

Ensure customer savings are actually realized.

Shareholder incentives **+** actual project costs **<** actual customer savings

Pitfalls to Avoid

Unintended consequences

- An incentive for one performance area may cause the utility to under-perform in areas that do not have incentives.
- *Potential solutions:*
  - Focus on performance areas that are isolated from others.
  - Be cautious of implications for other performance areas.
  - Consider implementing a diverse, balanced set of incentives.

Regulatory burden

- PIMs can be too costly, time-consuming, or too much of a distraction.
- Can be a problem for utilities, regulators, and stakeholders.
- *Potential solutions:*
  - Streamline using existing data, protocols, and simple designs.
  - Reduce the amount of money at stake.

Example: Penalties for Energy Efficiency

Some states have found that implementing penalties for energy efficiency is not worthwhile, given the contentiousness of the proceedings.

Pitfalls to Avoid

Uncertainty

- Metrics, targets, and financial consequences that are not clearly defined reduce certainty, introduce contention, and are less likely to achieve policy goals.
- *Potential solutions:*
  - Carefully specify metric and target definitions, soliciting utility and stakeholder input where possible.
  - Adjust targets and financial consequences only cautiously and gradually so as to reduce uncertainty and encourage utilities to make investments with long-term benefits.

Gaming and Manipulation

- Utilities may have an incentive to manipulate results.
- *Potential solutions:*
  - Identify verification measures.
  - Consider using independent third parties (that are not selected or paid by the utility) to collect or verify data.
  - Avoid complex data analysis techniques that are difficult to audit and reduce transparency.

Example: California's Customer Surveys

Key Take-Aways

- The goal is to improve performance cost-effectively
  - Ideally, both utility and customers should benefit
  - Cost should never outweigh value to customers
  - PIMs may be best coupled with MRPs to provide cost containment incentives
- Setting a good PIM can be difficult
  - Requires significant stakeholder engagement, discovery process, and lots of analysis
  - Good baseline data is vital
- Financial incentives might not be needed
- Better information = better results
  - A key benefit of PIMs (or metrics) is the ability to better understand what is happening on the system