State and Local Climate and Energy Program




State Energy and Environment Guide to Action:
Electric Utility Regulatory Frameworks and Financial Incentives

2022


Table of Contents

Preface and Acknowledgments

The U.S. Environmental Protection Agency (EPA) *State Energy and Environment Guide to Action* offers real-world best practices to help states design and implement policies that reduce emissions associated with electricity generation and energy consumption. First published in 2006 and then updated in 2015, the *Guide* is a longstanding EPA resource designed to help state officials draw insights from other states' policy innovations and implementation experiences to help meet their own state's climate, environment, energy, and equity goals.

As part of the 2022 update, each chapter reflects significant state regulatory and policy developments since the 2015 publication. *Guide* chapters provide descriptions and definitions of each featured policy; explain how the policy delivers energy, climate, health, and equity benefits; highlight how states have approached key design and implementation issues; and share best practices based on state experiences.

Unlike earlier *Guide* editions, which were released as a complete set of chapters comprising a single document, the 2022 update is being released in phases of collected chapters. This chapter is one of seven addressing state-level utility policies that support clean energy and energy efficiency:

- Overview of Electric Utility Polices
- Electricity Resource Planning and Procurement
- Electric Utility Regulatory Frameworks and Financial Incentives
- Interconnection and Net Metering
- Customer Rates and Data Access
- Maximizing Grid Investments
- Energy Efficiency Programs and Resource Standards

Guide chapters are available online on the *Guide to Action* webpage.

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Policy Description and Benefits

Summary

Utilities can build low-carbon, resilient grids, diversify their portfolio, lower costs, and meet customer needs through clean energy procurement, demand response, and energy efficiency programs that align with state policy goals for decarbonization and equitable access to electricity. However, some utilities may face financial disincentives towards adoption of these programs under existing state regulatory structure. State regulators can establish or reinforce several policies to help curb these disincentives, including addressing the throughput incentive and capital bias, ensuring clean energy program cost recovery, and defining shareholder performance incentives.

Electric utility regulatory frameworks and financial incentives can address barriers to energy efficiency, renewable energy, and distributed energy resources (DERs) that are inherent in traditional utility regulatory models. Legislatures and electric utility regulators (often called public utility commissions) in many states are refining or replacing traditional utility financial policies to encourage utility actions and programs aligned with state policy goals. These states are adopting regulatory frameworks and financial incentives including revenue decoupling, multi-year rate plans (MYRPs), performance-based regulation (PBR), and performance incentive mechanisms (PIMs).

The traditional utility regulatory model is cost of service regulation (COSR), which was designed to provide universal, safe, and reliable electricity at just and reasonable rates. However, while this model accommodates environmental laws and regulations, it was not designed to incentivize utilities to prioritize modern social and environmental objectives in their decisions and investments. The COSR structure allows utilities to increase revenue by selling more electricity (throughput incentive) and building more power plants and transmission lines (capital bias). Both features of the traditional regulatory model create powerful disincentives for utilities to promote customer adoption of energy efficiency or other DERs,[1] which can reduce electricity sales volume and lower the utility's capital expenditure needs. Although DERs offer a range of potential benefits including customer cost savings and air pollution and greenhouse gas emission reductions, the traditional regulatory model does not prioritize these benefits.

This chapter discusses state utility regulatory policies and financial incentives that address the throughput incentive and capital bias. This chapter also highlights states' use of regulatory frameworks to successfully remove these disincentives for investment in DERs and reward utilities for achievements in system operations, energy services, clean energy goals, grid resilience and other objectives aligned with policy goals. This chapter describes revenue decoupling, which removes the link between electricity sales and revenue, and is considered a best practice for eliminating the throughput incentive.[2] Seventeen states have some form of decoupling in place (ACEEE 2020). This chapter also discusses the MYRP, another mechanism that can be used to cap the revenue for a utility, removing the throughput incentive and encouraging cost reductions. In addition, this chapter highlights how a few states have adopted a PBR framework, which can directly tie some utility compensation, including rewards and penalties, to metrics called PIMs. PBR is a general term for a regulatory approach used by states to incentivize the pursuit of specific policy goals and public interest objectives, from the more traditional goals of safety and reliability to more contemporary goals such as equitable customer

[1] DERs are electric generation, demand response, energy efficiency, or energy storage systems located on the distribution system, typically close to load, used individually or aggregated to provide more value.

[2] The Regulatory Assistance Project (RAP) has multiple resources on decoupling that provide additional context, including the report "*Decoupling Design: Customizing Revenue Regulation to Your State's Priorities*" that provides detailed points of consideration for regulators to build a decoupling regime that achieves the state goals (RAP 2016b).

service, greenhouse gas emissions reductions, and community-wide access to electrification benefits (RAP 2020).

States use the following action steps to successfully design and implement electric utility regulatory frameworks and financial incentives that support clean energy and energy equity:

- Survey the current utility regulatory framework to determine utility service objectives and assess how incentives are shaping utility investments to meet those goals.
- Define objectives of utility service based on all of the state's statutory and executive goals and commitments regarding air quality, health, equity, and greenhouse gas emissions.
- Determine potential regulatory frameworks and financial incentives that would align utilities' financial interest with the objectives of the utility service.
- Engage a diverse set of stakeholders in an inclusive and iterative process to identify and establish metrics that can be used for reporting, tracking, benchmarking, and potentially tying utility compensation to the achievement of service objectives.
- Assess and revise policies as needed to ensure they result in the intended consequences.

The State Examples section of this chapter provides detailed information about the policy approaches used in Illinois, Hawaii, and Minnesota.

Benefits

Electric utility regulatory frameworks and financial incentives could result in a wide range of economic, social, and environmental benefits. These potential benefits include progress towards state renewable energy, energy efficiency, and equity goals, reductions in overall system and operating costs, and ensuring that the benefits from utility investments accrue to customers, including those historically underserved. This section expands on many of these benefits and identifies tools to quantify and communicate them. The Current Regulatory Landscape section of this chapter presents examples of states using regulatory frameworks and financial incentives, including PBR, to achieve these benefits.

Electricity System Benefits

Electric utility regulatory frameworks and financial incentives affect how utilities invest to meet the needs of the grid. As a result, they can positively or negatively affect clean energy deployment including utility-scale generation and storage, and smaller scale distributed technologies and practices including energy efficiency, demand response, electric vehicles, rooftop solar photovoltaics (PVs), and other DERs. Policies to remove the throughput incentive and capital bias and align utility financial incentives with state policy goals can offer many electricity system benefits. These policies and mechanisms can support DER adoption, reduce peak demand, support capital investment deferment, reduce utility costs, accelerate grid modernization, and improve grid management. These direct and indirect effects of utility regulatory frameworks and financial incentives ultimately benefit utility customers.

While traditional COSR typically discourages DERs, a revenue decoupling policy could eliminate the disincentive, and a comprehensive PBR framework with metrics designed around DERs can incentivize utility actions that lead to DER growth. With sufficient distribution system planning and grid integration, DERs offer many electricity system benefits such as providing grid flexibility, helping to reduce grid power losses of long-distance transmission, reducing peak demand, and enhancing electricity resilience.

Metrics and incentives within a PBR framework can be designed to provide energy system benefits, for example, by rewarding utilities for helping customers increase their efficiency, lower electricity use during peak times, or shift their usage to off-peak times, through mechanisms such as increased utility spending on energy efficiency, demand-response, or other DERs. These PBR mechanisms can help cost-effectively align generation and load, including shifting peak demand to times when surplus grid power is available. Some states that have successfully designed, implemented, and refined energy efficiency PIMs, such as Massachusetts and Rhode Island, are consistently among the top ranked states for highest demonstrated energy savings (RMI 2020).

Policies that accelerate adoption of DERs and reduce peak demand can contribute to electricity system and customer benefits such as capital investment deferment and system-wide cost savings. To the extent DERs can meet capacity needs, they reduce the need for large-scale investment in new fossil fuel power generation and therefore benefit customers through reduced costs (NARUC 2016). Utility financial structures that incentivize greater investment in energy efficiency and other DER programs can reduce demand for centralized fossil fuel power generation, new generation capacity, and upgrades to transmission and distribution infrastructure. In the short term, utility financial structures and incentive frameworks that ultimately result in increased DERs can help reduce wholesale electricity market prices and capacity market prices (NESP 2020). In the long term, utility frameworks that result in increased DER adoption can improve real-time grid management capabilities and reduce capital costs for generation resources and grid infrastructure. Specifically, some DER technologies help grid operators balance supply and demand in real time (AEE 2018). Additionally, utility regulatory framework policies that incentivize diverse portfolios of resources including utility-scale renewables and DERs can help utilities mitigate the risk of fuel price volatility. Increasing the penetration of a diverse portfolio of low- or no-emission resources may reduce the cost and risks for the utility and its customers, and amplify the benefits of compliance with existing and future environmental regulations.

Another potential benefit of aligning utility interests with broader public policy goals is increased grid infrastructure investment and modernization, which can produce a range of outcomes from reliability to emissions reductions. For example, policies that promote greater investment in flexible grid resources can result in specific grid management benefits. Electricity sector stakeholders are increasingly interested in using buildings and the transportation sector as flexible grid resources. PBR and PIMs can be used to support grid modernization. States can design incentives to support emissions reductions through grid optimization and smart grid infrastructure development. Transmission and distribution savings are included and non-wires alternatives such as storage technologies are eligible resources. All of these measures that reduce costs for the utility can ultimately benefit the ratepayers and lower energy burdens.

Environmental Benefits

Most of the environmental impacts of electricity are associated with fossil-fired power generation facilities, which can be lessened in a variety of ways using utility frameworks and financial incentives. Incentives, such as those designed to accelerate state progress on renewable portfolio standards (RPSs) or increase customer DER adoption to reduce overall and peak demand, have the potential to reduce peaking plant operations and resulting air emissions specifically in communities with environmental justice concerns where traditional fossil fuel power plants tend to be located. Reducing peak demand is good for air quality if the utility can avoid firing up fossil fuel peaker plants to meet peak load.

Utility incentives can also be tied directly to environmental goals by offering financial rewards for accomplishing specific emission performance metrics, such as achieving reductions in criteria pollutant emissions (e.g., nitrogen oxides, sulfur dioxide, and particulate matter) or greenhouse gas emissions (total carbon emissions or carbon intensity per megawatt-hour [MWh]).

Regulatory frameworks and incentives play a role in the pace and realization of the benefits of electrification of the building and transportation sectors. Electrification is projected to lower net emissions overall (Williams et al. 2021). Models have demonstrated that by 2050, even without new carbon policy, electrification can reduce economy-wide emissions from fossil fuel combustion by over 40 percent from 2005 levels. When paired with power sector decarbonization, electrification can reduce economy-wide emissions from fossil fuel combustion by nearly 74 percent below 2005 levels by 2050 (NREL 2017b). Some jurisdictions are using electrification programs to address air pollution sources, such as ports or buses, near over-burdened communities (CPUC 2019).

Achieving large-scale environmental and health benefits from DERs requires high levels of investment in energy efficiency and demand-side programs, including those that are ratepayer-funded through utilities. States with the most energy savings and emissions reductions from efficiency also have policies to support the utility's financial health, such as cost recovery, revenue decoupling, PBR, and shareholder incentives (ACEEE 2020).

Equity Benefits

Regulatory frameworks can align utility incentives with equity policy outcomes in customer service quality, electricity reliability, energy affordability, workforce development, and community job creation. State-approved metrics are used to track reliability and customer service by geography, income, or other relevant benchmarks. Affordability metrics can be designed to track the number of disconnects for nonpayment and average monthly residential bills. For example, the Minnesota Public Utilities Commission designated affordability as one of the desired outcomes for developing PIMs within the new PBR framework. In their 2019 order, the Commission established four affordability reporting metrics and directed the development of metrics to measure equity as it relates to reliability (MN PUC 2019a). In 2021, Washington State passed legislation to transform utility regulation toward MYRPs and PBR, requiring utility regulators to consider equity when approving MYRPs and affordability when creating PIMs (WA S.B. 5295 2021).

Quantifying and Communicating the Benefits

Environmental regulators, state energy office officials, and utility regulators can participate in discussions about aligning utility incentives with state environmental and health objectives. To support these discussions and help states and stakeholders analyze and quantify the environmental impacts, health benefits, and equity impacts of clean energy, EPA has a range of tools highlighted in the text box. For example, using EPA's tools like AVoided Emissions and geneRation Tool (AVERT), Co-Benefit Risk Assessment (COBRA), Energy Savings and Impacts Scenario Tool (ESIST), and Health Benefits Per Kilowatt-Hour (BPK), state air agency staff can bring information to energy and utility commission colleagues on how demand response and load shifting can lower costs and environmental impacts and assist in meeting each jurisdiction's air quality, equity, and energy goals. In addition, state energy office staff can highlight how incentives could target peak load reductions, which can assist in lowering peaks on days when pollutants such as ozone or particulate matter may be high and endangering public health. For underserved communities with high energy burdens, DERs offer a chance to lower bills, improve comfort and resiliency, and enable better health outcomes. Learning how a jurisdiction calculates the benefit-cost assessments for their programs will assist environmental regulators in learning how their goals and knowledge of environmental impacts of power generation can be leveraged to improve the jurisdiction's efficiency and DER programs and target them more efficiently to address community needs, environmental goals, and the costs of achieving those goals.

EPA Environmental Impacts and Health Benefits of Clean Energy Tools

EPA has a range of tools available to support states and stakeholders with analyzing and quantifying the environmental impacts and health benefits of clean energy, including but not limited to:

- **AVoided Emissions and geneRation Tool (AVERT)** is a tool designed to meet the needs of state air quality planners and other interested stakeholders. Non-experts can use AVERT to evaluate county, state, and regional emissions displaced at fossil fuel power plants by policies and programs that support efficiency and other clean DERs.
- **CO–Benefits Risk Assessment (COBRA)** is a health impacts screening and mapping tool that helps state and local governments estimate and map the air quality, human health, and related economic benefits of clean energy policies and programs.
- **Emissions & Generation Resource Integrated Database (eGRID)** is a comprehensive source of data on environmental characteristics of electric power plants in the United States. The interactive eGRID Explorer dashboard offers data, maps, and graphs on electric power generated, emissions, emission rates, heat input, resource mix, and more.
- **Energy Savings and Impacts Scenario Tool (ESIST)** is a customizable and transparent Excel-based planning tool for analyzing energy savings and costs from customer-funded energy efficiency programs and their impacts on emissions, public health, and equity. ESIST enables users to develop, explore, and share energy efficiency scenarios between 2010 and 2040.
- **Environmental Justice Screening and Mapping Tool (EJScreen)** is a resource that allows users to access high-resolution demographic and environmental information on a specified location. A key feature of EJScreen is the environmental justice indices, which combine the environmental and demographic information in the tool. EJScreen includes 11 environmental indicators, 6 demographic indicators, and 11 corresponding environmental justice indexes at a detailed level of mapping.
- **Health Benefits Per Kilowatt-Hour (BPK)** is a set of values that help state and local government policymakers and other stakeholders develop screening-level estimates of the outdoor air quality-related public health benefits of investments in energy efficiency and other clean DERs.
- **Power Plants and Neighboring Communities** is a mapping and graphing resource used to highlight power plant locations in or near communities at or above the 80th percentile of one or more of six key demographics.
- **Quantifying the Multiple Benefits of Energy Efficiency and Renewable Energy** describes methods, tools, and steps analysts can use to quantify these benefits so that they can compare costs and benefits and comprehensively assess the value of energy policy and program choices.

In addition to tools, EPA offers the detailed resource Quantifying the Multiple Benefits of Energy Efficiency and Renewable Energy: A Guide for State and Local Governments (EPA 2018). Also, EPA’s ENERGY STAR program supports state and local governments in communicating the value streams of efficiency under three pillars: enabler of growth, mitigator of risk, and protector of the public good, and offers resources to harness the power of storytelling (EPA n.d.).

Current Regulatory Landscape

Recently, states have adopted new public policies such as goals to reduce greenhouse gas emissions. Energy technologies have also changed with advancements in rooftop solar PV panels, battery storage, energy-efficient equipment, and new demand response mechanisms. These policy and technology changes create new challenges and opportunities for the electricity sector. States are using new regulatory frameworks and financial incentives as tools to overcome the limitations of the COSR framework and support solutions to electricity sector challenges such as decarbonization, energy efficiency, electrification, energy equity, rapid growth in DERs, and grid resilience. This section provides an overview of the barriers of the traditional regulatory model in supporting DERs, summarizes state adoption of regulatory frameworks and financial incentives for overcoming those barriers, and highlights examples of state experience with PBR.

Social, political, and market changes are contributing to rapid adoption of DERs on the distribution system. The current trends and projections indicate increasing penetration of distributed generation and storage systems on the grid (NREL 2021). Today, DER systems can respond to real-time grid needs (e.g., grid-connected smart water heaters) or supply power to the grid from customer-owned generation or storage (e.g., rooftop solar PV or storage). As customer demand grows for distributed technologies, utilities are figuring out how to manage these new power demands and resources on the distribution grid while maintaining safety and reliability. If proactively managed, this new architecture of the power grid could offer significant benefits (discussed in the Benefits section of this chapter). Despite quantifiable socioeconomic benefits of energy efficiency, renewable energy, and demand-side clean energy resources, some existing electric utility regulatory frameworks create impediments to higher levels of deployment and successful implementation of DERs.

Utility regulatory frameworks and financial incentives developed through an inclusive and iterative policy development process can help overcome some of the following known barriers to progress on clean and distributed energy:

- *Traditional utility business models may not encourage procurement of demand-side resources.* Throughput incentives and capital bias continue to create powerful disincentives for utilities to invest in demand-side resources.
- *Retail electricity rates do not accurately track electricity's real-time cost*. Low-volume residential and commercial customers do not typically see prices that reflect the time-varying marginal cost of producing energy. Commercial and industrial rates are more complex, but even those often do not directly track electricity's real-time cost and are slow to change over time as system needs evolve.
- *Some wholesale markets have rules designed around traditional centralized generation that limit the participation of certain DERs*. In some wholesale markets, barriers include lack of accommodation for aggregated DERs, outdated definitions of energy storage, and high exit fees (AEE 2019). The Federal Energy Regulatory Commission (FERC) has taken steps to remove market barriers, including issuing orders 745[3] and 2222.[4] The roles of demand response and energy efficiency had been limited to nonenergy markets for capacity and emergency demand response programs, and although these resources remain more common in capacity markets, some energy markets have consistent participation from demand response and energy efficiency resources, including the mid-Atlantic regional transmission organization PJM and Independent System Operator – New England (AEE 2021; NREL 2018).
- *Some utility customer groups lack access and awareness.* These barriers limit the success of utility programs, and the customer, environmental, and electricity system-wide benefits of DERs. Utility financial incentives can be designed to increase utility performance in developing and offering targeted programs that reach traditionally underserved communities. Offering programs designed to meet the needs of underserved communities can help to improve access to DERs and ensure the benefits of utility programs are realized by customers most in need.

State legislatures and utility regulators seeking to incorporate state goals not easily pursued within the traditional COSR model have adopted alternative regulatory frameworks and financial incentives. Table 1 provides an overview of states' use of regulatory approaches and financial incentives to support energy

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3 FERC Order 745 required wholesale market operators to allow energy efficiency and demand response to bid directly into energy markets (FERC 745 2011).

4 FERC Order 2222 allows aggregation of energy efficiency or demand response resources to overcome transaction cost and threshold size barriers (FERC 2222 2020). With Order 2222, DERs can compete with traditional utility-scale resources in capacity, energy, and ancillary service markets (NREL 2021).

efficiency outcomes, including PBR and PIMs, revenue decoupling, and other mechanisms. Each of these approaches to electric utility regulation and financial incentives is examined in the Designing an Electric Utility Regulatory Framework or Financial Incentive section of this chapter.

Table 1: Description and Summary of State Adoption of Electric Utility Regulatory Frameworks and Financial Incentives for Energy Efficiency

Type of Utility Business Model Policy		Policy Description	Number of States
Tie utility revenue to specific policy goal	Performance incentive mechanism (PIM)	PIMs are tools that regulators can use to track, monitor, and benchmark progress towards a defined policy goal. Utilities are financially rewarded or penalized based on goal achievement and may be used within a PBR framework.	29[a]
Mitigate disincentives for utility investment in energy efficiency and other DERs	Revenue decoupling	Decoupling is the regulatory separation of utility profits from electricity sales revenue. In general, decoupling fixes the amount of revenue needed by the utility to cover costs, and the price of electricity will fluctuate as costs vary to obtain the required revenue.	17
	Lost Revenue Adjustment Mechanism (LRAM)	LRAMs allow a utility to directly recoup the lost revenue associated with energy savings that result from energy efficiency or DER programs. The amount of lost revenue is estimated by multiplying the fixed portion of the utility's prices per kilowatt-hour (kWh) by the energy savings from energy efficiency programs or the energy generated from demand-side resources, which is then returned to the utility.	15

[a] Performance incentive is in place for at least one major electric utility in the state. In some cases, states with independent program administrators have performance incentives for the administrator rather than for the utilities.
Source of number of states: ACEEE 2020.

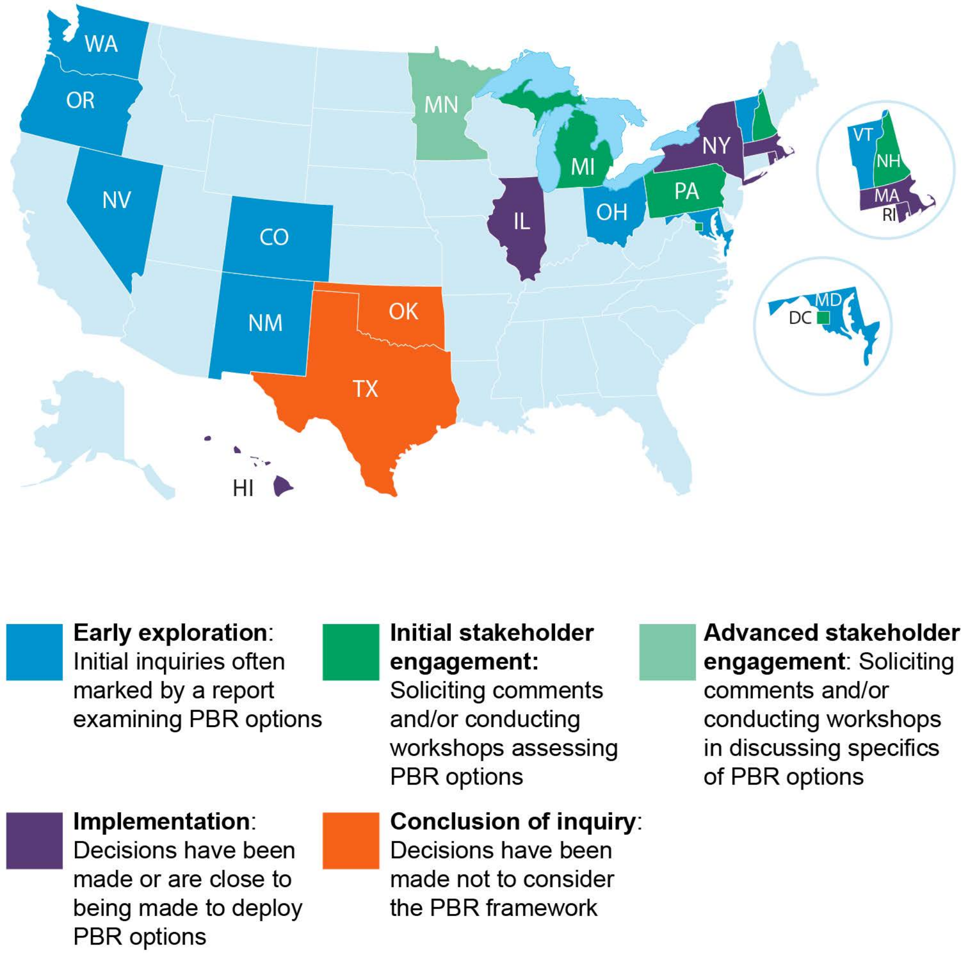
In addition to policies focused on energy efficiency, states have used PBR and PIMs to make progress on a range of state priorities and achieve the types of outcomes described in the Benefits section of this chapter. Figure 1 illustrates which states have explored implementing PBR and summarizes the status of each state's investigation (McCabe 2020). Examples of state PBR activity include the following:

- *Clean energy transition*. Colorado Public Utilities Commission investigated PBR as a tool to support the state's energy transition in response to state legislation[5] (CO PUC 2020).
- *Demand response and load shifting*. Minnesota Public Utilities Commission approved a PBR framework that includes metrics for demand response and load-shifting (MN PUC 2020a).
- *DER adoption.* Hawaii Public Utilities Commission is supporting customer DER interconnection and asset effectiveness by approving reporting metrics (HI PUC 2021).
- *System efficiency and peak capacity savings.* Rhode Island Public Utilities Commission approved a PIM for system efficiency that is measured using megawatts (MWs) of annual peak capacity savings and allows utilities to keep 45 percent of benefits from peak reductions (RI PUC 2018). New York Public Service Commission adopted program achievement-based and outcome-based earnings adjustment mechanisms (EAMs), including EAMs to reward utility energy efficiency and demand management programs that result in incremental annual energy savings, measured in gigawatt-hours (GWh), and incremental annual system peak demand reductions, in MW (NY PSC 2018).

[5] Colorado S.B. 19-236 and § 40-3-117, C.R.S.

- *Beneficial electrification*. Minnesota is pursuing PBR to accelerate electrification of the transportation, building, and agricultural sectors (MN PUC 2020a).
- *Customer electric vehicle adoption*. Two Colorado utilities submitted Transportation Electrification Plans (TEPs)[6] that included proposed PIMs to reward utility efforts related to customer electric vehicle adoption in its respective service territory. One TEP[7] proposed a utility award based on the value of avoided emissions, which would be calculated from the number of vehicle-related rebates awarded and a social cost of carbon value (CO PUC 2020).
- *Air emissions reductions*. Minnesota Public Utilities Commission ordered Xcel Energy to begin reporting multiple environmental metrics including total criteria pollutant emissions and criteria emission intensity (per MWh) as well as multiple carbon-specific metrics (MN PUC 2019c).

Figure 1: State Investigations of PBR



Wood Mackenzie Power & Renewables.
Source: McCabe 2020 with update to Hawaii by Abt Associates.

- *Energy efficiency savings for customer equity and affordability*. Hawaii Public Utilities Commission approved Hawaiian Electric's PIM designed to encourage activities that help low-to-moderate income (LMI) customers use and benefit from energy efficiency programming to shift demand and save energy by using utility tools, participating in new rate designs, and leveraging energy use data (HI PUC 2021).
- *Equity in electricity service reliability and customer service quality*. Minnesota Public Utilities Commission sought to improve equity by adopting metrics that track system interruption frequency (future metric) and customer complaints (initial metric) by geography, income, or other relevant benchmarks (MN PUC 2019c).

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[6] In 2019, to promote widespread customer adoption of electric vehicles, Colorado passed legislation requiring regulated electric utilities to file TEPs and granting authority to the Public Utilities Commission to approve utility investments that promote beneficial transportation electrification (CO S.B. 19-077 2019).

[7] Black Hills TEP is in Proceeding No. 20A-0195E (CO PUC 2020).

Designing an Electric Utility Regulatory Framework or Financial Incentive

Policy Options

Various regulatory mechanisms can be used to align utility business models with investments in cost-effective energy efficiency and other DERs. This section discusses several policy designs and regulatory mechanisms states have used to create incentives or remove disincentives for utilities to invest in DERs.

Aligning Utility Incentives with Environmental Goals

Several approaches used by states to realign utility financial incentives include PBR and PIMS, which are discussed in this section.

Performance-Based Regulation and Performance Incentive Mechanisms

Many state utility regulators have opened dockets to explore PBR, in some cases at the direction of state legislation. For example, Hawaii passed legislation in 2018 directing its state public utilities commission (PUC) to implement PBR and set a statutory deadline for implementation (HI S.B. 2939 2018). In some states, the utility regulator may require legislation to have authority to implement PBR and corresponding PIMs.

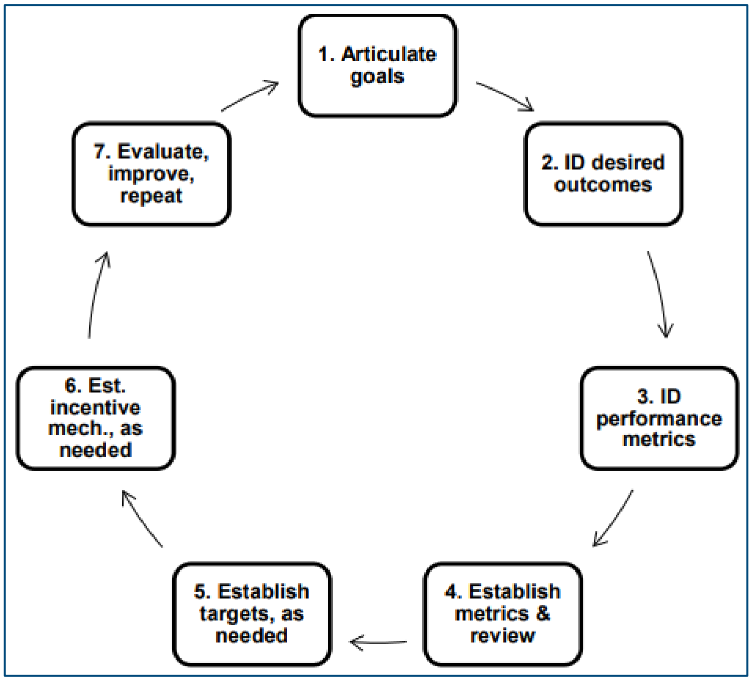
PIMs are metrics and algorithms to measure and track progress towards defined policy goals. PIMs may be used within a PBR framework to determine financial rewards or penalties for utility performance relative to regulator-specified objectives. There is a spectrum of how regulators are using PIMs, ranging from monitoring, tracking, and benchmarking progress, to offsetting the throughput incentive and capital bias, to supporting new policy frameworks that provide utilities greater incentives to achieve policy goals. A PIM can take the form of an addition to or subtraction from a return on equity percentage, a lower base rate of return with opportunities to add percentage, cash bonuses, or shared savings mechanisms (Shenot 2020).

Before PIMs are tied to utility compensation within a PBR framework, it often takes time to determine the correct metrics to accurately track the status of the objective as well as the necessary compensation level to achieve the desired change in utility operations. Effective PIMs are based on specific metrics or targets, sometimes set in authorizing legislation, that are directly affected by the conduct of the utility. Once regulators have determined the correct metrics, how they are connected to financial incentives can vary, from set monetary payment for specific achievements to a component of performance reviews of managers in the utility, where salary or promotion may be partially determined by the utility's progress towards the established performance targets (NREL 2017a). Creating effective PIMs requires transparent planning, objective analysis, and a collaborative stakeholder engagement process.

Figure 2 outlines a seven-step process proposed by the Minnesota Office of Attorney General (MN OAG 2017) in the context of the Minnesota PUC's efforts to identify and develop performance metrics and incentives for Xcel Energy's electric utility operations. These steps could be followed by utilities, regulators, and stakeholders to transform broad regulatory goals into robust performance metrics and subsequently add performance targets and incentive (penalty/reward) mechanisms as needed. This process commences with identifying regulatory goals, then seeks to identify desired outcomes, which in turn leads to the determination of possible performance metrics by which to measure the outcomes. This section discusses the steps that some states, including Minnesota, have used in their design process.

Articulating goals and identifying desired outcomes. Stakeholder engagement is critical from the beginning of the PIM design process, especially during goal-setting and identification of desired outcomes. Stakeholder engagement with community leaders, local governments, developers, and advocacy organizations are key to informed development of policy framework. With input from a range of stakeholders, the policy framework can incorporate and balance community needs, such as equitable access to clean energy and greenhouse gas mitigation from electricity infrastructure, with utility business needs. Clear understanding of the needs of utilities and customers can enable regulators to better identify and pursue specific, achievable goals. Many states are seeking to redesign their stakeholder engagement process to be more robust and inclusive of historically excluded stakeholders, such as low-income communities and communities with environmental justice concerns. Hawaii's PUC PBR development offers a model of a two-and-a-half-year collaborative and diverse stakeholder process. For the proceedings on the PBR design process, the PUC invited parties to help define goals and design policy mechanisms to support those goals, which focused on improving customer experience, utility performance, and societal outcomes such as emission reductions and resilience (HI PUC 2020). For more information on Hawaii's PBR, refer to the State Examples section in this chapter.

Figure 2: Policy Incentive Mechanism Design Process



Source: MN OAG 2017.

Identifying and establishing performance metrics. In the Minnesota process (Figure 2), the fourth step involves determining the reporting requirements for the metrics. This step could be used to increase utility accountability, thereby guiding utility behavior through incentives and corrective measures. The Ameren Illinois Company Performance Metrics, published annually, provides an example of utility-reported performance metrics (Ameren 2020). The report describes how the utility performed under each metric and identifies any extraordinary events that adversely affected the utility's performance. Metrics include the System Average Interruption Frequency Index, which relates to reliability, and minority- and female-owned business expenditures, which relates to workforce diversity. Some states have found it challenging to design appropriate metrics and to determine what type and how many to use to track progress towards regulatory goals. State electric utility commissions could consider providing some additional guidance on how to identify appropriate metrics. The Rhode Island PUC developed such guidance during the development and review of potential PIMs (RI PUC 2020).

Establishing targets, as needed. When states develop policies that reward utilities for improving performance, the performance is measured relative to a baseline, and the baseline performance may be used to better inform setting of future targets. In the absence of region-specific baselines, states may look to utilities in their regions to assess baselines and targets through benchmarking procedures. Different utilities may measure baseline performance differently because of varied geographies, generation mix, regional economic conditions and costs, and customer profiles, making comparisons of past performance of two separate utilities irrelevant or misleading. For example, in Hawaii's PBR decision, the utility regulator cited Hawaii's unique geography and resulting operating and regulatory environment in declining multiple benchmarking analyses proposed by stakeholders. In its place, a mechanism was adopted that ties annual revenue growth to inflation, offset by customer dividends to incent productivity gains and return cost efficiencies to customers (RMI 2021).

Establishing incentive mechanisms, as needed. This step may involve assigning a relative weighting factor to a metric or its associated incentive and analyzing information data and trends to assess the utility baseline. During the PBR design process, states may consider situations where regulatory guidelines such as PIMs may have the potential for being manipulated. For example, a regulation that seeks to reward a utility for additional actions would require careful assessment of the baseline utility operations in the absence of the regulations and possible future scenarios. This would help to ensure mechanisms do not reward utilities for activities or utility investments that have already been made.

Evaluate, improve, repeat. Step 7 of the Minnesota process (Figure 2) involves implementation and evaluation, which is discussed in its own section in this chapter.

Shareholder Performance Incentives

Targeted PIMs can also be used outside of larger PBR frameworks. For example, regulators could provide utilities the ability to earn a rate of return on specific operating expenses such as energy efficiency or other DER programs in recognition for the multiple benefits they can provide. Utilities could also be provided an opportunity to earn percentage adders on their base rate of return based on meeting specific targets. For example, Massachusetts uses a multifactor incentive mechanism based predominantly on energy savings. The incentive amount is a percentage of the budgeted efficiency spending over the plan period, contingent on the energy efficiency program administrator's achievement of a minimum performance threshold (ACEEE 2018). With such incentives, utilities can be rewarded with revenue stemming from prioritized programs. Independent auditing of the effectiveness of the energy efficiency or other DER program can inform the level of incentive. The savings that result from choosing the most cost-effective resources over less economical resources can be shared between ratepayers and shareholders, giving ratepayers the benefits of wise resource use while rewarding management for the practices that allow these benefits to be secured.[8] The chosen resources should balance both cost-effectiveness with equity considerations to ensure fair distribution of benefits and burdens.

Removing Disincentives for Utilities

Revenue decoupling and lost revenue adjustment mechanisms (LRAMs) are strategies to fully or partially remove a utility's throughput incentive. States have learned that some policy options for removing disincentives to energy efficiency have undesirable cost or equity implications. This section describes policy design options and lessons learned.

Revenue Decoupling

Revenue decoupling seeks to break the connection between revenue collected and the amount of electricity sold. Decoupling is distinct from a PBR framework with PIMs. Generally, decoupling fixes the amount of revenue needed for the utility to cover costs, allowing the price of electricity to fluctuate to obtain the required revenue. If the utility can reduce its costs during the term through energy efficiency, demand

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8 The utility industry uses the term "shared savings" in several ways. Alternative meanings include, for example, the sharing of savings between an end-user and a contractor who installs energy efficiency measures. Throughout this chapter of the *Guide*, "shared savings" refers to shareholder/ratepayer sharing of benefits arising from implementation of cost-effective energy efficiency or other DER programs that result in a utility obtaining economic benefit from those DERs.

response, or other system efficiencies, it will be able to increase its profits. Furthermore, if a utility's sales are reduced by other means, including customer DER deployment, weather, or economic effects, under-collections could be recovered from customers and the utility's revenues will not be affected. However, if sales are higher than expected, the resulting higher revenues would be returned to customers in the form of rate decreases. California offers a state example of decoupling; revenue requirements for utilities are fixed in rate cases, and subsequent adjustments are determined in periodic "attrition" cases. This example and technical guidance are provided in *Revenue Regulation and Decoupling: A Guide to Theory and Application* (RAP 2016a).

The effect of decoupling is symmetrical; unexpectedly higher sales and the resulting higher revenues will return money to customers. This approach eliminates the throughput incentive and does not require an accurate forecast of the amount of lost revenues associated with customer energy efficiency savings or DER deployment. It does, however, result in the potential for rate or price variation, reflecting an adjustment to the relationship between total utility revenue requirements and total electricity consumed by customers over the defined term. Such rate adjustments are a fundamental aspect of the rate design resulting from decoupling profits from sales volumes.

An example of decoupling is Idaho Power Company's Fixed Cost Adjustment (FCA). This FCA mechanism compares the authorized fixed-cost revenue requirement with weather-normalized sales and reconciles the difference for residential and small business customers on an annual basis. This annual adjustment of charges is based on observed changes in energy use per customer during the previous year. The FCA annually adjusts prices up or down based on actual changes in energy use per customer during the previous year thereby creating a mechanism to separate energy sales from revenue. This mechanism can therefore reduce financial disincentives for Idaho Power to invest in energy efficiency or distributed generation (RAP 2016a).

While decoupling is a critical step in optimizing energy efficiency benefits, states have found that decoupling alone is insufficient. Most states therefore add related approaches: assurance for energy efficiency program cost recovery and performance incentives to reward utilities for maximizing energy efficiency investment where it is cost-effective. Furthermore, states that seek aggressive energy efficiency and demand-side resource deployment typically have a suite of policies in place to direct utility investment, such as energy efficiency and clean energy standards. For more on other electric utility policies that promote clean energy and energy efficiency, refer to other chapters of the *Guide*.

Lost Revenue Adjustment Mechanisms

LRAMs allow a utility to directly recoup the lost revenue associated with energy savings that result from energy efficiency or DER programs. The amount of lost revenue is typically estimated by multiplying the fixed portion of the utility's prices per kWh by the energy savings from energy efficiency programs or the energy generated from customer DERs. This amount is then directly returned to the utility. Some states have adopted these policies, but experience has shown that LRAMs can result in utilities being allowed more lost revenues than the energy efficiency program saved because the lost revenues are often based on projected savings (ACEEE 2015b). Furthermore, because utilities still earn increased profits on additional sales, this approach does not fully remove the throughput incentive. Hawaii and Minnesota are among states that had LRAMs in the past and replaced them with decoupling policies (ACEEE 2015b).

Table 2 compares the pros and cons of decoupling and LRAMs. As the table illustrates, decoupling appears to be the most comprehensive approach among the policies that remove the throughput incentive and capital bias. Decoupling avoids the downsides of lost revenue and fixed-cost approaches. In addition to not burdening customers, decoupling provides more flexibility for addressing differences in short- and long-term costs.

Table 2: Upsides and Downsides to Selected Strategies to Remove Throughput Incentive

Revenue decoupling: **Removes link between amount of electricity sold and a utility's revenue. In general, decoupling fixes the amount of revenue needed to cover a utility's costs, and the price of electricity fluctuates to obtain the required revenue.**	
Upsides to this strategy • Reduces utility reluctance to promote energy efficiency, including building codes, appliance standards, and energy efficiency programs. • Stabilizes and shields utility revenues from fluctuations in sales. This could lower utility risk and cost of capital. • Does not require an energy efficiency program measurement and evaluation process to determine the level of under-recovery of fixed costs. • Low administrative costs relative to specific lost revenue recovery policies. • Reduces the need for frequent rate cases and corresponding regulatory costs.	Downsides to this strategy • Customer rates can be more volatile between rate cases, although annual caps can be instituted. • Where carrying charges are applied to balancing accounts, the accruals can grow quickly. • The need for frequent balancing or true-up requires regulatory resources; however, required resources are much less than those required to conduct more frequent rate cases.
Lost revenue adjustment mechanisms: **Enables utilities to recover lost revenue from energy sales reductions that result from energy efficiency or DER programs. Estimation of lost revenue is generally calculated by multiplying the fixed portion of a utility's prices per kWh with the energy savings from energy efficiency programs or the energy generated from DERs.**	
Upsides to this strategy • Removes disincentive to energy efficiency investment in approved programs caused by under-recovery of allowed revenues.	Downsides to this strategy • Does not remove the throughput incentive to increase sales. • Does not remove the disincentive to support other energy saving policies. • Complex to implement given the need for precise evaluation; can increase administrative costs. • Proper recovery (no over- or under-recovery) depends on precise evaluation of program savings.

Multi-Year Rate Plans

Another method to remove a throughput incentive for utilities and reduce costs is through MYRPs, also referred to as price cap regulation. MYRPs incentivize utilities to reduce costs by capping a utility's revenue for a set period, typically three to five years, and allowing the utility to keep savings achieved through financial efficiency. This arrangement reduces utilities' throughput incentive, encourages cost reduction and innovation, allows time for technology deployment, and reduces the burden on regulators' resources with less frequent rate cases, which can be lengthy and contentious. MYRPs are intended to help the utility focus on the business of providing ratepayers with responsive cost-effective service (LBNL 2016).

The Massachusetts utility Eversource Energy operates on a five-year rate plan, with annual adjustments tied to inflation, based on the U.S. Gross Domestic Product Price Inflation. Consumer protections built into this plan approved by the Massachusetts Department of Public Utilities allow for some savings to be shared with customers if the utility's expenses are much lower than predicted, based on a percentage threshold of projected return on equity (Synapse 2019).

Alternative Rate Structures

Shifting a greater portion of the utility's costs out of variable per-kWh charges to fixed customer charges is a policy option that can remove disincentives for utility investment in DERs but creates risks of undesirable distributional equity. Across all customer demographics, if a utility incorporates higher fixed customer charges to recoup lost revenue from DERs, the customer incentive to save energy or invest in DERs is reduced or eliminated. Additionally, for lowest-volume and lowest-income customers, higher fixed charges are regressive because they are a greater burden as a percentage of their bill. One study found that fixed charges "tend to increase bills for low-usage customers while decreasing them for high-use customers" (Synapse 2016). One review found that utility regulators in at least 34 states, affecting about 125 utility companies, took action to change fixed charges for small customers. Most actions resulted in higher fixed charges, including a few large increases. A few actions resulted in lower fixed charges (NRRI 2019).

Compared with using fixed charges to recoup utility costs or revenue losses, several alternative rate designs are more equitable and better align customer bills with what it costs the utility to provide those customers with electricity. These more equitable alternatives include allowing more frequent rate cases (without a comprehensive rate case), setting a minimum bill amount, establishing time-varying rates (e.g., time-of-use rates), establishing value of solar tariffs, and incorporating demand charges into rates (Synapse 2016). For more information on customer fixed charges and rate design, refer to the *Guide* chapter Customer Rates and Data Access.

Participants

Several stakeholders are typically included in the design of decoupling and incentive regulations:

- *State legislatures*. A legislature may direct a state utility regulator to initiate an incentive regulation investigation or to remove barriers to elements like periodic resetting of rates without a comprehensive rate case. Legislation can also provide funding and/or political support for incentive regulation. For example, in 2019 the Colorado legislature directed its PUC to investigate a PBR model to support the state's clean energy transition (CO S.B. 19-236 2019; CO C.R.S. § 40-3-117 2019). In response, in 2020 the PUC submitted its report on how PBR can align utility operations, expenditures, and investments with the policy goals of safety, reliability, cost-efficiency, cost-efficient DER expansion, and emissions reductions (CO PUC 2020). The PUC encouraged stakeholder participation in the investigation, including by hosting workshops. If a legislature has limited the ability of a utility regulator and utilities to institute or benefit from initiatives that support energy efficiency and demand-side resources, new legislation may be needed to address the barrier to clean DERs.
- *State utility regulators*. Electric utility regulators have significant responsibility to investigate and consider incentive regulations. Staff and commissioners oversee the process by which utility rates, programs, and incentives are determined. Utility regulators may have general authority to investigate and implement PBR or may have been given specific statutory direction. Utility regulators are the ultimate issuers of directives implementing incentive regulation for regulated utilities.
- *Consumer counsels/advocates*. Most states have an "Office of People's Counsel" or similar organization whose mission is to represent consumer interests in utility regulation and court proceedings. Typically staffed by attorneys and regulatory specialists, consumer advocate offices regularly intervene in rate cases and related proceedings to represent typical residential ratepayer interests. For example, the Oregon Citizens' Utility Board helps develop solutions, empowers consumers and engages stakeholders, and prioritizes advocating for disadvantaged communities, including on PBR.
- *State energy offices/executive agencies.* State policies on energy and environmental issues are driven by executive agencies at the behest of governors' offices. If executive agency staff are aware of the linkages between utility regulatory and ratemaking policies, it may be more likely that executive agency energy goals can inform successful utility energy efficiency and clean demand-side resources programs.

- *Energy efficiency and DER providers*. Energy efficiency and DER providers have a stake in incentive regulation initiatives because are they affected by measures that reduce throughput incentives and those that promote efficiency and DER investments. In some states, utilities contract with providers to implement the utilities' energy efficiency programs. In other states, energy efficiency providers such as Vermont's "Efficiency Vermont" serve as the managing entity for delivering energy efficiency programs. Efficiency and DER providers may be able to work closely with utilities to target the locations that maximize the benefits that DERs can bring by reducing distribution costs. DER developers can also benefit from net metering and other policies that reduce barriers to cost recovery.[9]
- *Utilities*. Vertically integrated utilities and distribution-only or distribution-transmission-only utilities are affected to the greatest degree by incentive regulation, as their approved revenue collection mechanisms are at the heart of incentive regulation issues. Utilities are the most active stakeholders in these policy discussions.
- *Environmental advocates*. Environmental groups and other non-governmental organizations are often active participants in electric utility regulatory proceedings because these policies can promote environmental benefits including emissions reductions. They participate in various stages of policy design.
- *Community advocates.* Organizations and individuals that represent communities most affected by resource cost and pollution can offer insights based on experience with relative merits and burdens of various options a utility regulator may be considering. They can propose and critique policies, identify equity-related concerns and opportunities, and specify benefits and harms to their communities.

Barriers and Constraints to Aligning Utility Incentives

Utility incentive mechanisms can successfully integrate clean energy and environmental goals. However, multiple barriers to aligning utility incentives with clean energy goals and other public policy objectives exist. Four major impediments to utility financial incentive policies are summarized in this section.

- *Utility financial integrity and ratepayer impacts.* In a report to the legislature summarizing the investigation of PBR as a tool to support the clean energy transition, the Colorado PUC warned that improper PBR design can financially harm the utility or negatively affect ratepayers (CO PUC 2020). It is important to balance utility rewards and incentives without over-compensation. Low values of incentives relative to the amount of investment required to meet the performance target may result in utilities choosing not to alter their behavior. Excessively large incentives could undermine customer benefits by disproportionately increasing rates. For example, a Texas PIM for energy (MWh) and peak demand (MW) savings was initially designed to allow utilities to earn 20 percent of program costs, with an available bonus if the utility achieved higher than 120 percent of the demand reduction goal. In 2011, the cap was updated to 10 percent of net benefits, which resulted in a doubling of incentive payments compared to the previous time periods. In response, some stakeholders raised concerns that the rewarded incentives were not reflective of program results, while others maintained that these incentives were essential since Texas utility providers did not have other mechanisms to recover lost revenues from energy efficiency programs. This example emphasizes the importance of considering other components of utilities' revenue models when sizing incentives (RMI 2020; ACEEE 2015a).
- *Time and resources.* Meaningful stakeholder processes take time. The process of developing and establishing PBR frameworks may take up to several years and may involve several iterations of revisions,

[9] For more on cost recovery for demand-side resources, refer to the *Guide* chapter Interconnection and Net Metering and *Guide* chapter Customer Rates and Data Access.

comments, and final decisions. For example, in 2020, the Hawaii PUC's Decision and Order No. 37507 approved a portfolio of new PIMs and metrics after a policy design process that began in 2018. The PUC issued specifics for the PIMs in a subsequent Decision and Order No. 37787 in 2021. Hawaii's PBR framework development was a collaboration among the Hawaiian Electric Companies, state and county government agencies, clean energy companies, and nonprofit organizations such as environmental advocates (HI PUC 2020; 2021).

- *Development of metrics and PIMs.* There are many ways to design metrics that track progress towards utility's alignment with clean energy goals (RMI 2020). For example, during the Rhode Island PIM development process, the Rhode Island PUC rejected six of the seven PIM proposals put forward by National Grid (National Grid 2018). The utility regulator cited multiple shortcomings including insufficient data to demonstrate net benefits, as the PIMs relied on unquantified benefits and metrics. Subsequent to the regulator's rejection of the proposal, the Rhode Island PUC clarified its policy on PIM design and use through a guidance document containing principles for a utility and stakeholders to follow in their design and for the PUC to use in their review of PIMs (RI PUC 2020). Another issue that demonstrates the complexities of PIM and metric development is the potential for PIM design to favor the utility. For example, if the baseline utility operations and performance are not well understood through available data, it would be unclear whether the incentivized investments or performance are ultimately "additional" to what would have occurred in the absence of the incentive. In its Three-Year Plan PIM Update, National Grid reported that one challenge for designing a PIM for codes and standards advancement is how to accurately estimate the influence of program technical assistance on the adoption of a new code amendment or standard to quantify how much would be attributable to the utility (National Grid 2020).
- *Lack of regulatory authority.* The state utility regulators, legislature, and utilities interact in different ways in each state based on state law and historical practice. In some cases, utility regulators are limited by their statutory authority, which can restrict their ability to weigh factors favored by many stakeholders, such as social or environmental impacts. In other states, the utility regulators are required by statute to consider such factors. Utilities may have certain requirements or limitations through either statute or a commission order, such as in states where the utility regulator requires utilities to receive authority to implement PBR from legislation.

Interaction with Federal Programs

Federal policy goals are often aligned with enhanced integration of clean energy resources and demand-side management. They may provide added incentives to utilities for integration of clean energy goals within utility planning and operations. One example of a federal policy that sought to influence state regulators to align utility financial incentives with customer energy efficiency outcomes is the American Recovery and Reinvestment Act (ARRA) of 2009. ARRA required states seeking federal stimulus funds from the Department of Energy's State Energy Program (SEP) to report to the U.S. Secretary of Energy on their state's status of implementation of utility incentive policies. States use SEP funding for a variety of programs, including clean DERs. Section 401 of ARRA required assurances from state governors that the state regulatory authority seeks to implement a "general policy that ensures that utility financial incentives are aligned with helping their customers use energy more efficiently and that provide timely cost recovery and a timely earnings opportunity for utilities" (FCC n.d.).

Interaction with State Programs

Incentive regulation is closely intertwined with almost all state-level energy policy involving electric and gas utility service delivery because it addresses the fundamental issue of how regulated utility providers recover costs. State environmental regulators, for example, can use PBR incentive structures to encourage utilities to choose the less, or least, pollution-intensive option. This may range from investing in customer energy efficiency or energy management that reduces peak demand, to accelerating renewable energy growth. Utility regulation through performance incentives, which can be used to accomplish a range of state environmental or social objectives, can potentially interact with many other state policies, such as:

- *Energy efficiency policies and programs.* When utility financial rewards are aligned with social and environmental goals, for example through PBR, utilities are incentivized to encourage customer energy efficiency and strive toward state energy efficiency resource standards (EERSs). EERSs set numerical, multiyear targets for total energy savings. EERSs drive efficiency investment and program planning from these top-down targets, often for periods of 5 to 10 years or more. A public benefit fund (PBF), also known as a system benefits charge, is one approach many states use to fund energy efficiency programs and achieve progress toward an EERS. PBFs may eliminate the need for—or provide another way of addressing—cost recovery. For more on energy efficiency policies for utilities, refer to the *Guide* chapter Energy Efficiency Programs and Resource Standards.
- *Renewable portfolio standards*. RPSs set targets for renewable electricity acquisition, which may include DERs. The Hawaii PUC in 2020 adopted the country's first PIM for renewable energy—the accelerated renewable portfolio standard or "RPS-A"—as part of a comprehensive framework of utility regulations to align Hawaiian Electric's financial interests with state clean energy goals and customer needs. The package of PBR mechanisms is designed to incentivize cost control efforts and offer rewards for improved system performance and greater equity in distribution of program benefits. Hawaii PUC-approved RPS-A creates revenue rewards and penalties per MWh for utility performance relative to annual targets (HI PUC 2020). The utility earns money by being ahead of schedule on the state RPS. This incentivizes utility providers to integrate higher levels of renewable energy relative to RPS targets, thereby encouraging increased penetration of renewable electric power in the grid.
- *Electricity planning and procurement policies*. These are an important complement to utility incentives because they can provide vertically integrated utilities (through use of integrated resource planning) and distribution-only utilities (through use of portfolio management) with a long-term planning framework for identifying the quantity and type of clean energy resources (refer to the Electricity Resource Planning and Procurement chapter of the *Guide* for additional information).

Implementation and Evaluation

This section covers implementation and evaluation of PBR. For utilities and policymakers seeking information on state implementation of a decoupling policy, refer to available case studies (RAP 2014). In addition, NREL offers decoupling policy analysis (NREL 2009).

During PBR implementation, the utility, utility regulator, and stakeholders observe and evaluate the system. Ideally, utilities use their implementation and evaluation processes to test and revise their PBR metrics, targets, and incentives based on how well they work in practice and in response to revising or changing goals and desired outcomes. Step 7 of Figure 2 reflects the iterative nature of PBR. Using a collaborative approach rather than dictating goals and targets to the utility, the PBR model allows utilities to first try and then refine different approaches until successful outcomes are achieved (NCSL 2019). New York provides an example of how a state implemented an EAM, a type of PIM, and made adjustments over time to hone the incentives, the measurement, and the outcomes (NY PSC 2016).

Reported metrics may be used as a preliminary step towards further evaluation and changes in implementation of PBRs—for example, the Minnesota PUC pursued the identification and development of PBR, relevant metrics, and PIMs to be implemented during the multi-year rate plan.[10] Subsequently, the PUC issued orders to establish PIM processes and performance metrics. Further details of Minnesota's initiative can be found in the State Examples section.

Verification approaches for PBR are unique to the outcome being tracked. States have used the following types of data sets to evaluate PBR (Shenot 2020):

- Reduction in indicators of ambient air pollution
- Customer load served by clean energy resources
- Share or amount of peak load reductions
- Customer service and system reliability indicators such as system outages.

In a Minnesota PBR proceeding, proposals for the calculation and verification of metrics ranged across multiple approaches. These included internal review, peer review, and annual audits for certain reliability metrics; criteria pollutant emissions reporting in accordance with federal and state requirements; and third-party verified carbon intensity data (Xcel 2019; MN PUC 2020b).

A significant recent development in utility program evaluation is that some states are starting to incorporate equity metrics into their measures of program success. Equity metrics can include measures of service affordability determined by decreasing disconnections and decreasing defaults on bill payment arrangements (LBNL 2021). Connecticut's Public Utilities Regulatory Authority has an ongoing stakeholder engagement process called the Equitable Energy Efficiency Proceeding, which will "develop metrics to track equitable distribution in a more meaningful way going forward" (CT DEEP 2020). In Hawaii, the state regulator decided some aspects of how it will measure and reward equitable distribution of benefits for utility-run programs (refer to the Hawaii State Example). In order to measure whether distribution of spending or benefits is equitable, utilities must first collect demographic data on program participants and make it accessible to

[10] Minnesota PUC docket E-002/CI-17-401.

evaluators (OR Low Income Utility Program Working Group 2018). Other states that have developed or implemented equity metrics include California and Oregon (LBNL 2021).

Action Steps for States

States can take the following steps to ensure utilities' interests are aligned with social and environmental priorities:

- Survey the current utility regulatory framework and determine what objectives the regulations prioritize. Traditionally, utility regulation prioritized objectives of universal service, safety, reliability, and affordability.
- Assess how the current utility regulatory framework incentives are shaping utility investments to find solutions to meet regulatory objectives. A traditional COSR often may incentivize utilities to maximize the volume of electricity sales (throughput incentive) and use capital-intensive solutions (capital bias).
- Survey statutory and executive goals and commitments regarding air quality, health, equity, and greenhouse gas emissions.
- Define new objectives of utility service based on the state's statutory and executive goals and commitments in addition to traditional regulatory concerns. Contemporary objectives can be related to DER integration, energy efficiency, carbon intensity reduction, and equitable participation in electrification or energy efficiency programs.
- Determine potential regulatory frameworks and financial incentive programs such as PBR and MYRPs that would align utilities' financial interest with updated objectives of the utility service.
- Determine what authority exists with the state regulators to change or implement changes to the current utility financial structure. Legislation may be required to implement certain incentive programs.
- If implementing a PBR, engage a diverse set of stakeholders by setting up an inclusive and comprehensive stakeholder process. An iterative process, such as the one adopted by the Minnesota PUC, can identify and establish metrics, targets, and eventually, financial incentives that can be used to meet utility service objectives.
- Assess all frameworks and direct incentive programs to ensure they are having their intended effect and continue to align the utility's interests with the state's policy priorities.

State Examples

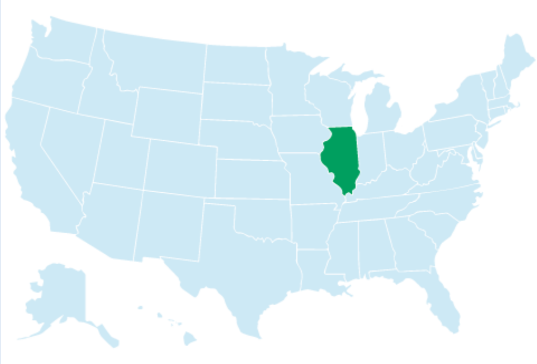
Illinois

Illinois has over a decade of experience exploring PBR and developing electric utility performance and tracking metrics, including those for air emissions reductions. The state legislature initiated the development of electric utility metrics in 2011 with the passage of the Energy Infrastructure Modernization Act (IL S.B. 1652 2011). The bill directed participating utilities to develop performance metrics to track improvements in service reliability and other indicators. The Act also included provisions that supported renewable energy and energy efficiency, initiated billions of dollars of investment in the electric grid, enabled peak time rebate programs by investment in smart meters, and increased funds for energy efficiency programs (ComEd 2012).[11]

Illinois advanced its commitment to use PBR as a utility regulatory framework in 2021 with the passage of the Climate and Equitable Jobs Act (IL S.B. 2408 2021). This Act established a statewide clean energy standard – 100 percent clean energy by 2050 – and directed the Illinois Commerce Commission (ICC) to transition to a PBR regulatory framework, aligning utility incentives[12] with the state policy goals of "protecting a healthy environment and climate, improving public health, and creating quality jobs and economic opportunities, including wealth building, especially in economically disadvantaged communities and communities of color."

The 2021 legislation set January 1, 2024, as the date of the transition from formula rates to performance-based ratemaking (IL S.B. 2408 2021). Under the new law, utilities have the option to submit a MYRP to the ICC, which will outline the financial reward or penalty based on status of achievement of performance metrics. When utilities choose the PBR option, they may submit annual performance evaluations and a Multi-Year Integrated Grid Plan to support the state's clean energy goals and comprehensive grid planning (IL S.B. 2408 2021).

Illinois Legislature Directed the Illinois Commerce Commission to Explore PBR and Develop Electric Utility Performance and Tracking Metrics



The Illinois state legislature directed the utility regulator to transition to a PBR regulatory framework that aligns utility incentives with the state policy goals of environmental protection, climate change mitigation, and facilitating economic opportunities in historically disadvantaged communities and communities of color. For more information, refer to the following resources:

- Energy Infrastructure Modernization Act of 2011, S.B. 1652
- Climate and Equitable Jobs Act of 2021, S.B. 2408
- ICC background on electric utility performance and tracking metrics
- ICC Performance and Tracking Metrics Workshop Summary report to the Commission, 2021
- Commonwealth Edison Company (ComEd) Performance Metrics Plan, 2022

Utilities that opt in are required to develop metrics for grid reliability and resiliency, peak load reductions attributable to demand response programs, supplier diversity expansion, affordability, interconnection response time, and customer service performance. ComEd, an IOU in the state, proposed performance and

[11] For more on peak time rebates and other time-varying rate structures, refer to the Customer Rates and Data Access chapter of the *Guide*. For more on energy efficiency programs, refer to the Energy Efficiency Programs and Resource Standards chapter of the *Guide*.

[12] The bill clarified that the PBR framework would apply to electric utilities serving more than 500,000 customers.

tracking metrics in its Performance Metrics Plan submitted to the ICC in 2022. Examples of ComEd's proposed metrics include emissions reduction, grid flexibility, cost savings, diversity and equity, and others (ComEd 2022).

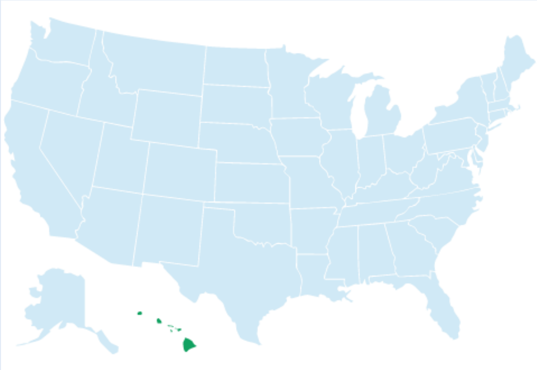
Hawaii

The Hawaii PUC has undertaken PBR to align utility goals with state clean energy and customer support objectives. In 2021, the PUC approved a finalized portfolio of new PIMs and metrics, which had been initially approved in 2020 (HI PUC 2021). In 2022, the PUC approved several additional PIMs (HI PUC 2022). The portfolio of mechanisms for Hawaiian Electric[13] aims broadly to improve customer engagement and interconnection experience, utility financial efficiency and DER asset effectiveness, greenhouse gas reduction, transportation electrification, generation reliability, and grid resilience (HI PUC 2020; 2022).

The suite of PIMs incentivize a range of outcomes, including the following (HI PUC 2020; 2022):

- *Rapid achievement of the state's renewable energy goals through the RPS-A PIM*. This PIM rewards Hawaiian Electric for adding renewables faster than scheduled under Hawaii's RPS mandate for 100 percent renewables by 2045.
- *Quicker interconnection for DER systems.* The Interconnection Approval PIM applies to small DER systems. This PIM rewards faster interconnection times for DER systems less than or equal to 100 kW, while penalizing slow interconnection timelines. The "IRS" PIM adopted in 2022 supports timely Interconnection of large-scale renewable projects.
- *Higher levels of procurement of grid services from customers through the Grid Services PIM.* This PIM rewards rapid acquisition of grid services capabilities from DERs.
- *Enhanced collaboration with Hawaii Energy, the third-party Public Benefits Fee Administrator, for improved energy use reduction efforts through the LMI Energy Efficiency PIM*. This PIM rewards delivering energy savings to LMI customers.
- *More efficient utilization of grid modernization infrastructure that is currently being procured and installed by Hawaiian Electric through the advanced metering infrastructure (AMI) Utilization PIM.* This PIM incents

Hawaii's PBR Framework Allows Utilities Financial Rewards for Speeding up Deployment of Renewables, Energy Efficiency, and Other DERs



In May 2021, the Hawaii Public Utilities Commission issued a decision and order establishing final details of a new PBR framework for the Hawaiian Electric Companies. The framework builds upon traditional regulation by adding mechanisms to advance equity and climate action through renewables, energy efficiency, and other DERs.

The following resources provide more information:

- Docket No. 2018-0088, Instituting a Proceeding to Investigate Performance-Based Regulation, 2018
- Press Release: Hawaii PUC Approves Portfolio of Performance Mechanisms for Hawaiian Electric, 2021
- Five Lessons from Hawaii's Groundbreaking PBR Framework, from Commission advisor and facilitator of the PBR stakeholder engagement process, 2021

[13] Three electric utilities that together provide electricity to 95 percent of the state's population are subsidiaries of Hawaiian Electric, which engages with the PUC as both Hawaiian Electric and as the Hawaiian Electric Companies (Hawaii State Energy Office n.d.).

acceleration of the number of customers provided with advanced meters enabled to support time-varying rates and next generation DER programs.

Measuring equitable distribution of benefits and burdens as a component of evaluating utility performance, as the LMI Energy Efficiency PIM does, helps align a utility's interests with the interests of its lowest-income customers. For the LMI Energy Efficiency PIM, the PUC has designated up to $2 million annually for rewarding the Hawaiian Electric Companies for performance. The LMI energy efficiency metrics include energy savings in both kilowatt-hours and dollars, peak demand reduction in both kilowatts and dollars, and participation levels in programs for affordability and accessibility in both number of customers and bill savings (HI PUC 2021).

The PUC's collaborative stakeholder process for establishing a PBR framework and specific PIMs could serve as a model for stakeholder processes in other states. Key stakeholders included Hawaiian Electric, the state's consumer advocate, local governments, clean energy companies, and consumer and environmental groups. In working groups and workshops, stakeholders reviewed, discussed, and compared various PBR proposals. Stakeholders then presented recommendations to the PUC (HI PUC 2020).

Minnesota

Minnesota has made progress toward PBR through a combination of legislation, orders from the Minnesota Public Utilities (MPUC), and stakeholder engagement processes. One area of MPUC's work in progress has been to identify performance metrics to track for Xcel Energy, the largest investor-owned electric utility company in Minnesota, with an eye towards tying the reported metrics to revenue through PIMs in the future. As of 2022, Xcel only reports the metrics to MPUC, and they are not tied to any financial compensation. Xcel proposed performance metrics in a rate case filing in 2015 which MPUC did not approve directly but sought to refine and improve through a proceeding[14] that began in 2017. In 2019, MPUC adopted the Minnesota Office of the Attorney General's seven-step PIM development process, described in the Designing an Electric Utility Regulatory Framework or Financial Incentive section in this chapter (MN PUC 2019a).

Between early 2019, when MPUC issued an order adopting a process to develop PIMs, and early 2020 when MPUC approved specific performance metrics' methods and reporting schedules, the agency gathered input through two stakeholder workshops and formal intervenor comments (MN PUC 2019a; 2020b). MPUC used a facilitator to help identify which performance metrics MPUC should use to evaluate utility performance across the outcomes of affordability, reliability, customer service, environmental sustainability, and strategic load reduction (MN PUC 2019a). Over 30 organizations were represented among the participants, including a ratepayer advocate, environmental advocates, companies in the energy and electric transportation industries, and local and state government agencies (Great Plains Institute 2019b; 2019a). About half of these organizations also submitted written intervenor comments to MPUC about performance metrics during early 2019 and participated in an Xcel-led stakeholder workshop later that year (MN PUC 2019b; 2020b).

While the approved metrics closely align with the comments filed by the Minnesota Department of Commerce and the Center for Energy and the Environment (CEE), the list reflects the meaningful stakeholder input, such as including a disconnection metric to measure affordability as the City of Minneapolis suggested. MPUC also included multiple measurements of strategic demand response: amount that is for load shaping, peak load shifting, and peak load reduction, as the Citizen's Utility Board suggested (MN PUC 2019b; 2019d).

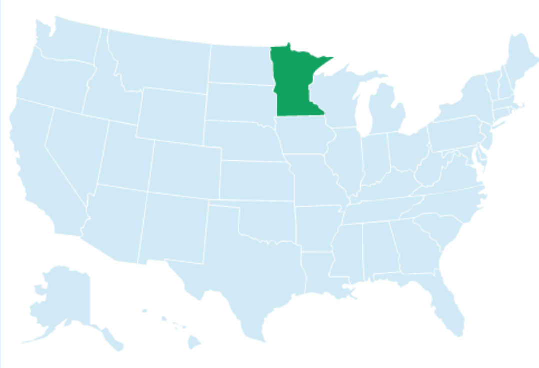
[14] Minnesota Public Utilities Commission Docket No. E-002/CI-17-401.

The process of refining Xcel's metrics and ways to measure and report them remained ongoing as of 2022, with a some metrics' methods for measuring and reporting approved by MPUC and other metrics' calculation methods still being designed by Xcel (MN PUC 2020b). Xcel began tracking many of the 28 metrics it committed to in 2020, as can be seen in the "Performance Metrics Annual Report" it filed with MPUC in 2021 (Xcel 2021).

Following are several of the performance metrics approved by MPUC that Xcel is tracking or is committed to tracking after finalization (some metrics are new; others Xcel had tracked prior to the Docket No. E-002/CI-17-401 (Xcel 2021)):

- Affordability
  - Average residential customer monthly bills (dollars per month).
  - Total residential customer disconnections for nonpayment (count per year).
- Environmental sustainability
  - Total carbon emissions by facility and for all sources (tons of carbon dioxide).
  - Criteria pollutant emission intensity per MWh for oxides of nitrogen, sulfur dioxide, and particulate matter (pounds per MWh).
  - Percent of managed charging customers' residential EV charging load occurring during off-peak hours, at residences enrolled in EV time-of-use rates (percent).
- Reliability
  - Customers experiencing long interruption duration (percent).
  - Power quality based on AMI data.
- Customer service quality
  - Call center response time (percent of calls answered within 20 seconds).
- Strategic demand reduction
  - Demand response, including capacity available (MW and MWh) and amount called (MW, MWh per year).
  - Demand response that shifts energy use from times of high demand to times when there is a surplus of renewable generation (MWh).
- Economic development impact
  - Workforce plan with data on plant closures to analyze attrition, skill gaps, and workforce impacts, and plan to address issues that result from plant closures (calculation method and units to be determined).

Minnesota's Comprehensive Performance Metrics Arose from Multiple Rounds of Stakeholder Sessions and Center on Customer Experience and Environmental Sustainability



The Minnesota Public Utilities Commission established a framework for developing PIMs and approved a set of metrics for Xcel Energy to track that range from customer experience to peak load shifting. As the regulator, utility, and stakeholders continue to work together, these metrics could become the foundation of financial incentives for the utility, although they were not tied to revenue as of mid-2022.

For more information, refer to:

- Performance Metrics Annual Report, Xcel Energy, 2021 (Docket No. E-002/CI-17-401)
- Order Establishing Methodologies and Reporting Schedules, 2020 (Docket No. E-002/CI-17-401)
- Staff Briefing Papers, 2020, on metric calculations and reporting requirements (Docket No. E-002/CI-17-401)

- Stakeholder listening
  - Development of a demand response incentive by working with the stakeholder group.

MPUC is developing an equity metric in a separate ongoing proceeding about Xcel's service quality (MN PUC 2019e). MPUC intends for this metric to measure locational reliability and customer service quality (MN PUC 2019d).

The timeline of accomplishments to get to this preliminary step towards PBR in Minnesota involves several different work streams at the utility regulator level, stemming from legislation supporting clean energy and energy conservation. Legislation in 2007 – the Next Generation Energy Act – set requirements for MPUC and regulated utilities to take action toward decoupling electricity sales from utility revenue and increasing investment in energy efficiency (MN S.F. 145 2007; NERP 2020). Following this, Minnesota passed legislation in 2011 that enabled MPUC to approve MYRPs, and in 2015 the legislature modified the statute to authorize MPUC to require that utilities include performance measures with their MYRPs (MN Stat. § 216B.16, subd. 19 2015).

Multiple utility dockets on decoupling, MYRPs, and performance metrics have advanced the alignment of Xcel's interests with environmental and consumer interests. After a stakeholder process about performance metrics that begin in 2014, Xcel Energy submitted within a rate case filing in 2015 a decoupling pilot project, a four-year rate plan, and performance metrics. MPUC approved the decoupling pilot in 2015 and it ran from 2016 through 2019, with the MPUC approving rate adjustment true-ups for Xcel in 2020 (MN PUC 2015; 2020c). In 2017, MPUC approved Xcel's four-year rate plan (MN PUC 2017). Also in 2017, MPUC opened a docket (E-002/CI-17-401) to develop performance metrics, standards, and incentives. Minnesota's decoupled ratemaking and performance metric outcomes continue to develop as of 2022.

Information Resources

Title/Description
American Council for an Energy-Efficient Economy. Snapshot of Energy Efficiency Performance Incentives for Electric Utilities (2019). This brief report summarizes approaches states in PIM design and provides state examples.
American Council for an Energy-Efficient Economy (2020). Performance Incentive Mechanisms for Strategic Demand Reduction. This peer-reviewed report discusses case studies and presents good practices for design and implementation of PIMs for strategic electricity demand reduction.
Energy Innovation Policy & Technology LLC. Going Deep on Performance-Based Regulation. (2022). This resource explores different studies on performance-based regulation that offer a deeper dive into performance-based regulation.
Lawrence Berkeley National Laboratory. Advancing Equity in Utility Regulation. (2021). This report describes regulatory approaches states have taken to address historical inequities in the electricity sector.
National Renewable Energy Laboratory. Revenue Sufficiency and Reliability in a Zero Marginal Cost Future. (2016). This article discusses existing marginal-cost-based price formation and other questions and describes the modeling work by NREL to help describe the impacts of a changing power system.
Regulatory Assistance Project. Electricity Regulation in the US: A Guide (Second Edition). (2016). This handbook is an overview of electric utility regulation in the United States, including describing the industry structure, regulation, ratemaking, transmission, planning, energy efficiency, emissions, low-income programs, and more.
Regulatory Assistance Project. Making a Clean-Energy Future an Equitable Future. (2020). This article explains different ways to ensure the clean energy future is more equitable, including improving access to energy, making energy more affordable, reducing environmental hazards, and putting people to work on clean energy. The report includes case studies from municipalities, states, and regions all working to make a more equitable clean energy future.
Regulatory Assistance Project. Revenue Regulation and Decoupling: A Guide to Theory and Application (2016). This technical report describes the fundamentals of electric utility revenue regulation and details about decoupling in theory, policy design, and application.
Rocky Mountain Institute. PIMs for Progress: Using Performance Incentive Mechanisms to Accelerate Progress on Energy Policy Goals, Rocky Mountain Institute. (2020). This report explains the benefits of performance incentive mechanisms (PIMs) and how they work. It uses examples of past PIMs and the results to help inform future PIMs.
Synapse Energy Economics, Inc. Caught in a Fix: The Problem with Fixed Charges for Electricity. (2016). This report explores why higher fixed charges are unfair and harmful practices and alternative solutions to fixed charges.
Synapse Energy Economics, Inc. The Ratemaking Process. (2017). This fact sheet describes the fundamentals of the ratemaking process for utility companies.

References

ACEEE. 2015a. “Beyond Carrots for Utilities: A National Review of Performance Incentives for Energy Efficiency.” Report U1504. American Council for an Energy-Efficient Economy. https://puc.nh.gov/EESE%20Board/EERS_WG/beyond_carrots_national_review_of_place.pdf.

———. 2015b. “Valuing Efficiency: A Review of Lost Revenue Adjustment Mechanisms.” American Council for an Energy-Efficient Economy. https://www.aceee.org/sites/default/files/publications/researchreports/u1503.pdf.

———. 2018. “Topic Brief, Snapshot of Energy Efficiency Performance Incentives for Electric Utilities.” American Council for an Energy-Efficient Economy. https://www.aceee.org/sites/default/files/pims-121118.pdf.

———. 2020. “The 2020 State Energy Efficiency Scorecard.” American Council for an Energy-Efficient Economy. https://www.aceee.org/sites/default/files/pdfs/u2011.pdf.

AEE. 2018. “Distribution System Planning Proactively Planning for More Distributed Assets at the Grid Edge.” Advanced Energy Economy.

https://info.aee.net/hubfs/Distribution%20System%20Planning%20FINAL%20-%2007-03-2018.pdf.

———. 2019. “Wholesale Market Barriers to Advanced Energy - And How to Remove Them.” Advanced Energy Economy. https://info.aee.net/hubfs/Wholesale%20Market%20Barriers_FINAL%20(1).pdf.

———. 2021. “The Benefits of Energy Efficiency Participation in Capacity Markets.” Advanced Energy Economy. https://www.aee.net/hubfs/The%20Benefits%20of%20Energy%20Efficiency%20Participation%20in%20Capacity%20Markets1.pdf.

Ameren. 2020. “Modernization Action Plan Multi-Year Performance Metrics 2021 Annual Report.” Ameren Illinois Company. https://www.icc.illinois.gov/industry-reports/ameren-performance-metrics.

CO C.R.S. § 40-3-117. 2019. *Colorado Revised Statutes 2019, Title 40: Utilities*. https://leg.colorado.gov/sites/default/files/images/olls/crs2019-title-40.pdf.

CO PUC. 2020. “Investigation into Performance Based Regulation in Colorado § 40-3-117, C.R.S.” Colorado Public Utilities Commission. https://drive.google.com/file/d/19T676Rcv4L78xq_4ksH-LMiLRUo39kY4/view.

CO S.B. 19-077. 2019. “Concerning Measures That Affect the Development of Infrastructure Used by Electric Motor Vehicles, and, in Connection Therewith, Establishing a Process at the Colorado Public Utilities Commission Whereby a Public Utility May Undertake Implementation of an Electric Motor Vehicle Infrastructure Program Within the Area Covered by the Utility’s Certificate of Public Convenience and Necessity.” General Assembly of the State of Colorado. http://leg.colorado.gov/sites/default/files/2019a_077_signed.pdf.

CO S.B. 19-236. 2019. *Concerning the Continuation of the Public Utilities Commission, and, in Connection Therewith, Implementing the Recommendations Contained in the 2018 Sunset Report by the Department of Regulatory Agencies and Making an Appropriation.* https://leg.colorado.gov/sites/default/files/2019a_236_signed.pdf.

ComEd. 2012. “Energy Infrastructure Modernization Act Transforming Illinois’ Electric Grid.” National Council of State Legislators. https://www.ncsl.org/documents/energy/McMahan_PPT.pdf.

———. 2022. “Commonwealth Edison Company Performance Metrics Plan.” Illinois Commerce Commission. https://www.icc.illinois.gov/docket/P2022-0067/documents/319663/files/556377.pdf.

CPUC. 2019. “CPUC Program Options to Promote Clean Energy and Reduce Air Pollution in AB 617 Environmental and Social Justice Communities.” California Public Utilities Commission. https://www.cpuc.ca.gov/-/media/cpuc-website/industries-and-topics/reports/ab617-report-final-11252019.pdf.

CT DEEP. 2020. “Integrated Resources Plan: Pathways to Achieve a 100% Zero Carbon Electric Sector by 2040.” Connecticut Department of Energy and Environmental Protection. https://portal.ct.gov/-/media/DEEP/energy/IRP/2020-IRP/2020-CT-DEEP-Draft-Integrated-Resources-Plan-in-Accordance-with-CGS-16a-3a.pdf.

EPA. 2018. “Quantifying the Multiple Benefits of Energy Efficiency and Renewable Energy: A Guide for State and Local Governments.” U.S. Environmental Protection Agency. https://www.epa.gov/statelocalenergy/quantifying-multiple-benefits-energy-efficiency-and-renewable-energy-guide-state.

———. n.d. “Understand the Three Pillars of Energy Efficiency.” U.S. Environmental Protection Agency. Accessed January 10, 2022. https://www.energystar.gov/eestorytelling/learn.

FCC. n.d. “American Recovery and Reinvestment Act of 2009.” Federal Communications Commission. https://www.fcc.gov/general/american-recovery-and-reinvestment-act-2009.

FERC 745. 2011. “Demand Response Compensation in Organized Wholesale Energy Markets.” Federal Energy Regulatory Commission. https://www.ferc.gov/sites/default/files/2020-06/Order-745.pdf.

FERC 2222. 2020. “FERC Order No. 2222, Participation of Distributed Energy Resource Aggregations in Markets Operated by Regional Transmission Organizations and Independent System Operators.” Federal Energy

Regulatory Commission. https://www.ferc.gov/sites/default/files/2020-09/E-1_0.pdf.

Great Plains Institute. 2019a. "Performance Metrics for Xcel Energy's Electric Utility Operations 2019 Stakeholder Engagement Process, Meeting 1 Summary Report (MN PUC Docket No. E-002/CI-17-401)." Great Plains Institute. https://efiling.web.commerce.state.mn.us/edockets/searchDocuments.do?method=showPoup&documentId={E0F3EE69-0000-C11F-87D9-7CC483469A77}&documentTitle=20194-151743-01.

———. 2019b. "RE: 2019 Stakeholder Engagement Process Meeting 2 Summary Report In the Matter of a Commission Investigation to Identify and Develop Performance Metrics, and Potentially, Incentives for Xcel Energy's Electric Utility Operations (Docket No. E002/CI-17-401)." Great Plains Institute. https://efiling.web.commerce.state.mn.us/edockets/searchDocuments.do?method=showPoup&documentId={C07CFE6A-0000-C510-81D9-EF20C745C8CF}&documentTitle=20195-153154-01.

Hawaii State Energy Office. n.d. "Utility Landscape in Hawaii." Hawaii State Energy Office. Accessed May 2, 2022. https://energy.hawaii.gov/developer-investor/utility-resources.

HI PUC. 2020. "Decision and Order No. 37507, in the Matter of Instituting a Proceeding To Investigate Performance-Based Regulation, Docket No. 2018-0088." Public Utilities Commission of the State of Hawaii. https://dms.puc.hawaii.gov/dms/dockets?action=search&docketNumber=2018-0088.

———. 2021. "Decision and Order No. 37787, in the Matter of Instituting a Proceeding To Investigate Performance-Based Regulation, Docket No. 2018-0088." Public Utilities Commission of the State of Hawaii. https://dms.puc.hawaii.gov/dms/DocumentViewer?pid=A1001001A21E17B53226E00118.

———. 2022. "Decision and Order No. 38429. In the Matter of Public Utilities Commission Instituting a Proceeding To Investigate Performance-Based Regulation. Docket No. 2018-0088." Hawaii Public Utilities Commission. https://dms.puc.hawaii.gov/dms/DocumentViewer?pid=A1001001A22F17B22248C03606

HI S.B. 2939. 2018. *Ratepayer Protection Act*. https://www.capitol.hawaii.gov/Archives/measure_indiv_Archives.aspx?billtype=SB&billnumber=2939&year=2018.

IL S.B. 1652. 2011. *Energy Infrastructure Modernization Act*. https://www.ilga.gov/legislation/97/SB/09700SB1652enr.htm.

IL S.B. 2408. 2021. "Climate and Equitable Jobs Act." Illinois General Assembly. https://www.ilga.gov/legislation/publicacts/102/PDF/102-0662.pdf.

LBNL. 2016. "Performance-Based Regulation in a High Distributed Energy Resources Future." Lawrence Berkeley National Laboratory. https://www.synapse-energy.com/sites/default/files/performance-based-reg-high-der-future.pdf.

———. 2021. "Advancing Equity in Utility Regulation: Future Electric Utility Regulation Report No. 12." Lawrence Berkeley National Laboratory. https://www.nclc.org/images/pdf/energy_utility_telecom/electric_and_gas/Rpt_adv_equity_util_reg.pdf.

McCabe, Ann. 2020. "PBR and DER in a Changing Regulatory World." December 7. https://pubs.naruc.org/pub/683DDAE6-155D-0A36-3113-A5455BED055D.

MN OAG. 2017. "In the Matter of a Commission Investigation To Identify and Develop Performance Metrics and, Potentially, Incentives for Xcel Energy's Electric Utility Operations, Docket No. E-002/CI-17-401, Comments of the Office of the Attorney General." Minnesota Attorney General's Office. https://www.edockets.state.mn.us/EFiling/edockets/searchDocuments.do?method=showPoup&documentId=%7bD0FB7A60-0000-C014-A75F-2227AE98D20F%7d&documentTitle=201712-138380-01%20o%20(state.mn.us).

MN PUC. 2015. "Findings of Fact, Conclusions, and Order, In the Matter of the Application of Northern States Power Company for Authority to Increase Rates for Electric Service in the State of Minnesota, Docket No. E-002/GR-13-868." Minnesota Public Utilities Commission.

https://efiling.web.commerce.state.mn.us/edockets/searchDocuments.do?method=showPoup&documentId={F0F2C116-A233-426F-8726-FCB2FD40A1A1}&documentTitle=20155-110264-01.

———. 2017. "Findings of Fact, Conclusions, and Order, Docket No. E-002/GR-15-826." Minnesota Public Utilities Commission. https://efiling.web.commerce.state.mn.us/edockets/searchDocuments.do?method=showPoup&documentId={ECF405E1-C848-4D03-BBE3-91BA3DD17B96}&documentTitle=20176-132748-01.

———. 2019a. "Order Establishing Performance-Incentive Mechanism Process, in the Matter of a Commission Investigation to Identify Performance Metrics, and Potentially, Incentives for Xcel Energy's Electric Utility Operation, Docket No. E-002/CI-17-401." Minnesota Public Utilities Commission. https://www.edockets.state.mn.us/EFiling/edockets/searchDocuments.do?method=showPoup&documentId={F0E82E68-0000-CF1F-93DB-4CE874187020}&documentTitle=20191-148970-01.

———. 2019b. "Staff Briefing Papers for August 16, 2019 Agenda, In the Matter of a Commission Investigation to Identify Performance Metrics, and Potentially, Incentives for Xcel Energy's Electric Utility Operation (Docket No. E002/CI-17-401)." Minnesota Public Utilities Commission. https://efiling.web.commerce.state.mn.us/edockets/searchDocuments.do?method=showPoup&documentId={80E76D6C-0000-CC11-A8B7-D95E549978EA}&documentTitle=20198-155009-01.

———. 2019c. "In the Matter of a Commission Investigation to Identify Performance Metrics, and Potentially, Incentives for Xcel Energy's Electric Utility Operation. Docket No. E-002/CI-17-401. Order Establishing Performance Metrics." Minnesota Public Utilities Commission. https://efiling.web.commerce.state.mn.us/edockets/searchDocuments.do?method=showPoup&documentId={0082456D-0000-CA1F-9241-23A4FFF7C2FB}&documentTitle=20199-155917-01.

———. 2019d. "Minutes -- August 16, 2019 Agenda, In the Matter of a Commission Investigation to Identify Performance Metrics, and Potentially, Incentives for Xcel Energy's Electric Utility Operations (Docket No. E-002/CI-17-401)." Minnesota Public Utilities Commission. https://efiling.web.commerce.state.mn.us/edockets/searchDocuments.do?method=showPoup&documentId={2041DB6D-0000-CD1C-9932-BE37EFFE442A}&documentTitle=201910-156701-01.

———. 2019e. "Notice – Staff Recommendation on Equity Metric, In the Matter of a Commission Investigation to Identify and Develop Performance Metrics, and Potentially, Incentives for Xcel Energy's Electric Utility Operations, Docket No. E002/CI-17-401." https://efiling.web.commerce.state.mn.us/edockets/searchDocuments.do?method=showPoup&documentId={607A616E-0000-CA10-955F-65C38308A1EA}&documentTitle=201911-157445-01.

———. 2020a. "Attachment B - Metrics as Ordered and Party Modifications, Docket No. E-002/CI-17-401." Minnesota Public Utilities Commission. https://www.edockets.state.mn.us/EFiling/edockets/searchDocuments.do?method=showPoup&documentId=%7b20CD3A70-0000-C856-896F-06F8435E25F3%7d&documentTitle=20202-160358-03.

———. 2020b. "Order Establishing Methodologies and Reporting Schedules, in the Matter of a Commission Investigation to Identify Performance Metrics, and Potentially, Incentives for Xcel Energy's Electric Utility Operation Docket No. E-002/CI-17-401." Minnesota Public Utilities Commission. https://efiling.web.commerce.state.mn.us/edockets/searchDocuments.do?method=showPoup&documentId={003B8471-0000-C210-BAEF-1348A8CCCEF3}&documentTitle=20204-162148-01.

———. 2020c. "Order Accepting Annual Report and Approving Revenue Decoupling Rate Adjustment Factors, in the Matter of Northern States Power Company's 2019 Annual Revenue Decoupling Mechanism Pilot Program Report (Docket No. E-02/M-20-180), and in In the Matter of the Application of Northern States Power Company for Authority to Increase Rates for Electric Service in the State of Minnesota (Docket No. E-002/GR-15-826)." Minnesota Public Utilities Commission. https://efiling.web.commerce.state.mn.us/edockets/searchDocuments.do?method=showPoup&documentId={40ACC275-0000-CA3F-801D-F2F2A6C328AF}&documentTitle=202011-168309-02.

MN S.F. 145. 2007. *Next Generation Energy Act*. https://www.revisor.mn.gov/bills/text.php?number=SF145&version=0&session_year=2007&session_number=0.

MN Stat. § 216B.16, subd. 19. 2015. *Multiyear Rate Plan*. https://www.revisor.mn.gov/statutes/cite/216B.16.

NARUC. 2016. “Distributed Energy Resources Rate Design and Compensation.” A Manual Prepared by the NARUC Staff Subcommittee on Rate Design. National Association of Regulatory Utility Commissioners. https://pubs.naruc.org/pub/19FDF48B-AA57-5160-DBA1-BE2E9C2F7EA0.

National Grid. 2018. “Application of the Narragansett Electric Company d/b/a National Grid for Approval of a Change in Electric and Gas Base Distribution Rates Amended Settlement Agreement, Docket 4770, Rhode Island Public Utilities Commission.” National Grid. http://www.ripuc.ri.gov/eventsactions/docket/4770-4780-NGrid-AmendedSettlement(Redlined)_8-10-18.pdf.

———. 2020. “National Grid 2021-2023 Three-Year Plan Performance Incentive Mechanism Update. Energy Efficiency Plan Presentation to Rhode Island Energy Efficiency & Resource Management Council (EERMC).” National Grid. http://rieermc.ri.gov/wp-content/uploads/2020/07/pims-and-cs-slides-combined.pdf.

NCSL. 2019. “State Policies for Utility Investment in Energy Efficiency.” National Conference of State Legislatures. https://www.ncsl.org/Portals/1/Documents/energy/Utility_Incentives_4_2019_33375.pdf?ver=2019-04-04-154310-703.

NERP. 2020. “Case Study: Minnesota Electricity Performance Based Rates” (Attached to Report ‘Performance Based Regulation Study Group Work Products’). North Carolina Energy Regulatory Process. https://files.nc.gov/ncdeq/climate-change/clean-energy-plan/PBR-Study-Group-Work-Products-FINAL.pdf.

NESP. 2020. “National Standard Practice Manual For Benefit-Cost Analysis of Distributed Energy Resources.” National Energy Screening Project. https://www.nationalenergyscreeningproject.org/wp-content/uploads/2020/08/NSPM-DERs_08-24-2020.pdf.

NREL. 2009. “Decoupling Policies: Options to Encourage Energy Efficiency Policies for Utilities.” National Renewable Energy Laboratory. https://www.nrel.gov/docs/fy10osti/46606.pdf.

———. 2017a. “Next-Generation Performance-Based Regulation: Emphasizing Utility Performance to Unleash Power Sector Innovation.” NREL/TP-6A50-68512. National Renewable Energy Laboratory and Regulatory Assistance Project. https://www.nrel.gov/docs/fy17osti/68512.pdf.

———. 2017b. “Electrification & Decarbonization: Exploring U.S. Energy Use and Greenhouse Gas Emissions in Scenarios with Widespread Electrification and Power Sector Decarbonization.” NREL/TP-6A20-68214. National Renewable Energy Laboratory. https://www.nrel.gov/docs/fy17osti/68214.pdf.

———. 2018. “Potential Roles for Demand Response in High-Growth Electric Systems with Increasing Shares of Renewable Generation.” National Renewable Energy Laboratory. https://www.nrel.gov/docs/fy19osti/70630.pdf.

———. 2021. “Storage Futures Study. Distributed Solar and Storage Outlook: Methodology and Scenarios.” National Renewable Energy Laboratory. https://www.nrel.gov/docs/fy21osti/79790.pdf.

NRRI. 2019. “Review of State Net Energy Metering and Successor Rate Designs.” National Regulatory Research Institute. https://pubs.naruc.org/pub/A107102C-92E5-776D-4114-9148841DE66B.

NY PSC. 2016. “Order Adopting a Ratemaking and Utility Revenue Model Policy Framework, Case 14-M-010.” New York Public Service Commission. https://nyrevconnect.com/rev-briefings/track-two-rev-financial-mechanisms/.

———. 2018. “2018 Outcome-Based EAM Collaborative Report. CASE 16-E-0060 - Proceeding on Motion of the Commission as to the Rates, Charges, Rules and Regulations of Consolidated Edison Company of New

York, Inc. for Electric Service." New York Public Service Commission. https://documents.dps.ny.gov/public/Common/ViewDoc.aspx?DocRefId={2587EB78-F95A-425F-A933-BF02C64205CF}.

OR Low Income Utility Program Working Group. 2018. "Low Income Utility Program Working Group Report." State of Oregon's Low-Income Utility Program Working Group. https://www.oregon.gov/gov/Documents/Low%20Income%20Utility%20Program%20Working%20Group%20Report_Dec2018_FINAL.pdf.

RAP. 2014. "Decoupling Case Studies: Revenue Regulation Implementation in Six States." https://www.raponline.org/knowledge-center/decoupling-case-studies-revenue-regulation-implementation-in-six-states/.

———. 2016a. "Revenue Regulation and Decoupling: A Guide to Theory and Application." Regulatory Assistant Project. https://www.raponline.org/wp-content/uploads/2016/11/rap-revenue-regulation-decoupling-guide-second-printing-2016-november.pdf.

———. 2016b. "Decoupling Design: Customizing Revenue Regulation to Your State's Priorities." Regulatory Assistance Project. https://www.raponline.org/knowledge-center/decoupling-design-customizing-revenue-regulation-state-priorities/.

———. 2020. "With the Shift Toward Electrification, Decoupling Remains Key for Driving Decarbonization." 2020. https://www.raponline.org/blog/with-the-shift-toward-electrification-decoupling-remains-key-for-driving-decarbonization/.

RI PUC. 2018. "In RE: The Narragansett Electric Company: D/b/a National Grid - Electric and Gas: Distribution Rate Filing, Docket No. 4770. In RE: The Narragansett Electric Company d/b/a National Grid Proposed Power Sector Transformation Vision and Implementation Plan, Docket No. 4780. Report and Order." Rhode Island Public Utility Commission. http://www.ripuc.ri.gov/eventsactions/docket/4770-4780-NGrid-Ord23823%20(5-5-20).pdf.

———. 2020. "Notice to Accept Comments on Draft Guidance Document, in Re: Guidance Document Regarding Principles to Guide The Development And Review of Performance : Incentive Mechanisms, Docket No. 4943." Rhode Island Public Utility Commission. http://www.ripuc.ri.gov/eventsactions/docket/4943_PIMs_Principles_Guidance_Doc_Notice_for_Public_Comment.pdf.

RMI. 2020. "PIMs for Progress." Rocky Mountain Institute. https://rmi.org/insight/pims-for-progress/.

———. 2021. "Five Lessons from Hawaii's Groundbreaking PBR Framework." *Rocky Mountain Institute* (blog). February 8, 2021. https://rmi.org/five-lessons-from-hawaiis-groundbreaking-pbr-framework/.

Shenot, J. 2020. "Performance-Based Regulation (PBR): An Overview." Regulatory Assistance Project. https://www.raponline.org/wp-content/uploads/2020/09/rap_shenot_pbr-intro_co-puc2020_aug_28.pdf.

Synapse. 2016. "Caught in a Fix: The Problem with Fixed Charges for Electricity." Prepared for Consumers Union. Synapse Energy. https://www.synapse-energy.com/sites/default/files/Caught-in-a-Fix.pdf.

———. 2019. "Multi-Year Rate Plans: Core Elements and Case Studies." Prepared for Maryland PC51 and Case 9618. Synapse Energy Economics. https://www.synapse-energy.com/sites/default/files/Synapse-Whitepaper-on-MRPs-and-FRPs.pdf.

WA S.B. 5295. 2021. "An Act Relating to Transforming the Regulation of Gas and Electrical Companies toward Multiyear Rate Plans and Performance Based Rate Making; Amending RCW 80.28.068 and 80.28.074; Adding New Sections to Chapter 80.28 RCW; and Creating a New Section." Legislature of the State of Washington. https://lawfilesext.leg.wa.gov/biennium/2021-22/Pdf/Bills/Senate%20Passed%20Legislature/5295-S.PL.pdf?q=20220712054417.

Williams, J., R. Jones, B. Haley, G. Kwok, J. Hargreaves, J. Farbes, and M. Torn. 2021. "Carbon-Neutral Pathways for the United States." *AGU Advances* 2 (1). https://doi.org/10.1029/2020AV000284.

Xcel. 2019. "Proposed Metric Methodology and Process Schedule on Performance Metrics and Incentives, Docket No. E002/CI-17-401." Document ID 201910-157094-01. Xcel Energy. https://efiling.web.commerce.state.mn.us/edockets/searchDocuments.do?method=showPoup&documentId={A025276E-0000-C611-824F-D1573C3FE154}&documentTitle=201910-157094-01.

———. 2021. "2020 Annual Report Performance Metrics and Incentives, in the Matter of the Commission Investigation to Identify and Develop Performance Metrics and Potentially, Incentives for Xcel Energy's Electric Utility Operations (Docket No. E002/CI-17-401)." Xcel Energy. https://efiling.web.commerce.state.mn.us/edockets/searchDocuments.do?method=showPoup&documentId=%7BD05E2479-0000-C71A-9A90-2F3283EF01A6%7D&documentTitle=20214-173702-01.

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