Non-Pipeline Alternatives: A Regulatory Framework and Case Studies

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ABSTRACT

Utilities have historically relied on infrastructure investments to address system needs and earn shareholder returns. Gas utility capital projects resolve new business requests, pipeline leaks and safety risks, and reliability issues among other investments. Gas assets have long lifespans that are recovered from ratepayers over decades. Consistent customer growth has allowed utilities to expand and upgrade their gas networks.

Non-pipeline alternatives (NPAs) are an emerging cost and risk mitigation tool that can provide gas utilities with an opportunity to reduce emissions, gas system costs, and customer risk by avoiding unnecessary infrastructure spending. An NPA is an investment or activity that defers, reduces, or avoids the need to construct or replace a pipeline. Rather than address system issues with more costly and long-lived traditional capital projects, utilities can leverage NPAs with demand-side (e.g., energy efficiency) or supply-side resources (e.g., on-system liquified natural gas peaking storage).

This paper begins with a review of NPA policies from four states with established NPA processes to identify similarities and differences in requirements. Then it discusses a framework – a sequential process that considers screening criteria, resource portfolio development, and portfolio evaluation criteria – that can be used by public utility commissions, state energy offices, utilities and stakeholders to identify and evaluate NPAs. This paper concludes by identifying actions policymakers can take to advance NPAs in their state.

Introduction

Gas system regulation are evolving in response to rapidly changing energy system needs, economics, and policies. The evolution of energy systems away from fossil fuels requires gas utilities to reevaluate capital spending approaches. The traditional gas utility investment model, which relies on the assumption of consistent growth in throughput and the amortization of capital projects over decades, is increasingly incongruous with trends in energy demand, including:

- Decarbonization targets or requirements;
- Incentives promoting the adoption of energy conservation and high-efficiency electric appliances;
- Cost-competitive building electrification as an alternative to natural gas, in some jurisdictions; and
- Growing public health concern with indoor natural gas combustion.

Forecasting capital project needs is one of the most significant challenges facing gas utilities. Gas assets, such as distribution pipelines, have projected lifespans of over seventy years,

and the costs of these assets are recovered across forty to fifty years. If demand does not materialize as forecasted, there is a risk that customers will pay for an oversized and costly gas system that does not reflect their needs. This may lead to stranded assets, which is a risk to both the utility and customers.

NPAs are an emerging cost and risk mitigation tool that can provide gas utilities with an opportunity to reduce emissions, gas system costs, and customer risk by avoiding unnecessary infrastructure spending. An NPA is an investment or activity that defers, reduces, or avoids the need to construct or replace a pipeline. Rather than address system issues with more costly and long-lived traditional capital projects, utilities can leverage demand-side NPA resources such as energy efficiency and electrification as well as supply-side NPA resources.

Review of Select NPA Policies

The project team reviewed NPA policies from four states[1] with established NPA processes (Colorado, New York, Rhode Island, and California) to identify similarities and differences (CO PUC 2022, NY PSC 2022, RIE 2024, CPUC 2022). These include:

- Definitions
- Policy purpose and filing requirements
- Integration with other proceedings
- Project suitability
- Cost thresholds
- Resource eligibility
- Benefit-cost analysis
- Equity
- Solution selection processes.

Definitions

While there is not a commonly accepted definition of an NPA at this time, Colorado, New York, Rhode Island, and California have similar definitions. Each of these states recognizes that both capital expenditures (i.e., investments) and programs like energy efficiency or demand response (i.e., activities) are NPA resources and that the goals of an NPA are to remove the need for a traditional gas delivery system investment, defer the investment, or reduce the size of the investment.

Public Policy Purpose and Filing Requirements

All of the states reviewed identified two public policies to support their interest in NPAs — reducing costs to customers and greenhouse gas emissions attributable to the gas utility. Observations on the state filing requirements include:

- California's public policy goals for NPAs also identify the use of NPAs as a tool for avoiding stranded gas utility assets as the state transitions away from the use of natural gas.

[1] For additional information on gas planning requirements for other states, see the National Association of Regulatory Utility Commissioners Task Force on Natural Gas Resource Planning.

- Colorado has more prescriptive utility NPA filing requirements than New York, Rhode Island, and California. However, in practice, gas utilities will likely have to include similar information, namely, the costs and benefits of both the pipeline and non-pipeline solutions.
- New York requires the utility to file a shareholder incentive mechanism (e.g., allows the gas utility to financially share in the project benefits) worth up to 30 percent of the net benefits of the NPA project in its application.

Integration with other planning proceedings

In Colorado, New York and Rhode Island, NPA analysis requirements are tied to gas planning (Nelson et al. 2023a). Linking these analyses together can be beneficial because gas plans typically include energy demand and infrastructure forecasts, customer counts and throughput forecasts, capital forecasts, supply and demand resource portfolios, and analysis of cost and risk. Considering gas planning and NPAs together provides regulators and stakeholders with an opportunity to understand the utility's intentions, analysis and if they have appropriately factor NPAs into their strategy.

Project suitability

The states reviewed have different criteria to determine if a utility must include an NPA analysis when considering gas investments. In all of the states, NPAs must be considered when the utility proposes a gas capacity expansion project, when the proposed project is over a cost threshold, and if the project meets other preliminary screening criteria (e.g., date of project implementation).

The states' rules focus on capacity expansion and new business projects, although in some states the utilities may still assess NPAs for reliability and safety projects. Colorado limits its NPA requirements to capacity expansion projects. New York and California recognize the opportunity for using NPAs to avoid capacity expansion but also identify other types of system investments. For example, New York requires gas utilities to examine NPA analysis as an option to avoid replacing leak-prone pipes, and California requires NPA analysis for any project that has significant air quality impacts.

Common to all of the states examined is an exemption for projects necessary for safety or an emergency. However, it is not clear based on the language of the exemptions how projects in any of the states are determined necessary for safety or are classified as an emergency.

Cost thresholds

Cost threshold requirements vary significantly among the states reviewed. Rhode Island Energy proposed to apply an NPA analysis for all projects that cost more than $500,000 (and meet other criteria) (RIE 2024). Colorado gas utilities must consider NPAs when the proposed projects exceed a minimum cost threshold, which depends on the size of the gas utility. California requires NPA analysis when a proposed project exceeds $75 million, a substantially higher threshold than the other states reviewed, and targets California's intrastate transmission system. New York does not have a defined cost threshold but determines the level of scrutiny for a project based on cost. Generally, the utilities have identified that proposed projects that cost less than $2 million are considered small, and subject to less scrutiny than proposed projects that exceed $2 million.

Eligible resources

All of the states evaluated allow demand-side resources to participate as part of an NPA solution and do not prohibit participation of supply-side resources (Table 1). Demand-side resources may include energy efficiency, building electrification, demand response, and other behavioral programs. Supply-side resources may include alternative fuels (i.e., renewable natural gas and hydrogen compressed natural gas (CNG), gas storage, and liquified natural gas (LNG). Given that one reason policymakers are seeking to use NPAs is to reduce emissions, there is an implicit (and in Rhode Island, explicit) expectation that demand-side resources will be heavily featured in an NPA solution.

Table 1: Summary of Eligible NPA Demand and Supply Resources by State (Nelson et al. 2023a)

	Demand side	Supply side
Colorado	Energy efficiency, demand response, and beneficial electrification	Recovered methane, green hydrogen, beneficial electrification, pyrolysis of tires, and other cost-effective technology that reduces emissions
New York	Energy efficiency, demand response, and electrification	Renewable natural gas, green hydrogen, and CNG injection (if aligned with state emission reduction goals)
Rhode Island	Cost-effective energy efficiency and conservation	Not defined but permitted
California	Not defined	Not defined but not prohibited

Benefit-cost analysis

Benefit-cost analysis (BCA) is a commonly used tool to determine if the benefits of a project are greater than its costs. Generally, a BCA with a value of greater than 1.0 produces net benefits and those with a value of less than 1.0 do not. It is well documented that the selection of costs and benefits included in the BCA significantly impacts the outcome of the analysis. (NSPM 2021).

Colorado and California have not settled on the types of benefits and costs that are used for evaluation, nor have they specified a discount rate. The higher the discount rate, the greater the short-term benefits and costs impact the outcome of the analysis. A lower discount rate means that long-term benefits, such as emission reductions, provide greater benefits.

New York and Rhode Island have adopted BCA components from the electric sector and are refining them for the gas space. Table 2 is a summary of all costs and benefits used by Colorado, Rhode Island, New York, and California.

In most of the states studied, a net positive BCA result qualifies an NPA project for implementation. A net negative result does not necessarily disqualify a project, as other

considerations, like project type and equity, play an important role in project evaluations. The New York PSC has stated that the BCA is just one of its many tools for evaluating proposals, indicating that it considers other quantitative and qualitative factors in its decision-making.

Table 2. Benefits and Costs Summary (Nelson et al. 2023a).

	Benefits	Colorado	New York	Rhode Island	California
Bulk System	Avoided Generation Capacity		✓	✓	
	Avoided Transmission Capacity		✓	✓	
	Avoided Energy	✓	✓	✓	✓
	Ancillary Service Costs		✓	✓	
	Avoided Transmission Costs	✓			
	Avoided Transmission Losses		✓		
Distribution System	Avoided Distribution Capacity		✓	✓	
	Ancillary Service Costs			✓	
	Avoided Distribution Costs	✓			
	Avoided Distribution Losses		✓		
	Avoided O&M		✓	✓	
Reliability/Resiliency	Distribution System Reliability Loss/Gain			✓	
	Distribution System Resiliency Loss/Gain			✓	
	Net avoided restoration costs		✓		
	Net avoided outage costs		✓		
Customer Level	Avoided O&M costs for participants	✓			
	Program participant benefits			✓	
	Program non-participant benefits			✓	
External Benefits	Avoided Greenhouse gas emissions costs	✓	✓	✓	✓
	Avoided Air pollutant emissions costs	✓	✓	✓	✓
	Avoided Water impacts		✓	✓	✓
	Avoided Land impacts		✓		
	Non-energy benefits		✓		
	Benefits to Disadvantaged Communities		✓	✓	

Equity

Many states are prioritizing equity in recognition of the energy system's disproportionate impacts on different types of customers or communities (Hanus et al. 2022). Most of the states reviewed[2] require consideration of NPA impacts on disadvantaged communities, but only California explicitly calls out the requirement to consider impacts on environmental and social justice (ESJ) communities in its NPA guidance. Specifically, if the proposed NPA project is located within an ESJ community, the utility must discuss whether it is possible to relocate the project, and, if so, take steps to locate the project outside the community. A Certificate of Public Convenience and Necessity application in California must also include a detailed statement explaining how the project is consistent with the goals of the California PUC's ESJ Action Plan, as well as a summary of outreach and engagement efforts with local communities likely to be impacted by the proposed project.

The New York's Climate Leadership and Protection Act requires disadvantaged communities to receive at least 35% of the benefits of spending on clean energy and energy

[2] Rhode Island does not have an equity requirement in general regulation or specifically for NPA evaluations.

efficiency programs, and the Colorado PUC is legislatively required to develop rules that "consider how best to provide equity, minimize impacts and prioritize benefits to disproportionately impacted communities and address historical inequities" (Colorado Senate Bill 21-272, 2021). Thus far, however, utilities do not appear to have specifically considered equity impacts in NPA assessments.

There is also growing interest among federal regulators to consider equity in their construction and operations processes. A proposed Pipeline and Hazardous Materials Safety Administration (PHMSA) Safety of Gas Distribution Requirements rule requires gas distribution utilities to "promote environmental justice for underserved and disadvantaged communities" (PHMSA 2021-0046). If the rule is adopted, distribution operators must consider the effect that distribution integrity management programs and asset condition remediation programs, potentially including NPA implementations, will have on underserved and disadvantaged communities.

Procurement and Programs

After a gas utility determines that an NPA is a cost-effective solution, two options to identify and acquire NPAs are competitive solicitations or develop an internal analysis of available resources. In competitive solicitations, solution providers submit a bid to the gas utility who – with oversight by the PUC – evaluates the bids based on a set of criteria. At this early stage in the development of NPAs, whether the utility identifies and develops the NPA or relies on the competitive market depends on the requirements and norms of the state. New York and Rhode Island, which generally emphasize the use of competition in the electric and gas markets, require gas utilities to use competitive solicitations to identify and develop NPA solutions.

The Colorado PUC states that it prefers acquiring clean heat resources most cost-effectively and instructed the gas utility to use competitive solicitations to the maximum extent practical. However, there isn't a requirement for the utility to use competitive solicitations for NPA development and acquisition.

NPA Framework

After reviewing four state's NPA requirements, the project team developed a framework identifying a sequential process that considers NPA screening criteria, resource portfolio development, and portfolio evaluation criteria (Figure 1). A high level summary of the three steps is below the figure. For more details on the three step process and framework, see Nelson et al. 2023b.

	Source	Definition
Preliminary Screening	Capital Projects Feasible for NPA Evaluation	Capacity expansion, new business, asset replacement, public improvement, and maximum allowable operating pressure projects are suitable for NPA assessments.
	NPA Project Threshold	Setting cost and timeline thresholds for small and large projects appropriately filters projects for NPA assessment.[4]
Portfolio Development	Eligible Resources	Resource portfolios should align with state climate targets. Demand-side solutions, including energy efficiency and electrification, produce the most societal benefits, but supply-side resources can be beneficial on a short-term basis.
	Project Solicitation Mechanism	Identifying a preference for competitive procurements to determine project costs, feasibility, and acquisition reduces resource costs, particularly for large projects.
Portfolio Evaluation	Evaluation Criteria	Evaluations should use benefit-cost analysis (BCA), but NPAs should not be required to produce net benefits. NPA net costs should be evaluated against traditional infrastructure net costs. Utility evaluation methodology with weighting, or a detailed narrative for evaluation criteria other than BCA, is critical in evaluating competitive procurement.
	Benefit-Cost Test	Creating a benefit-cost analysis handbook and primarily relying on the Societal Cost Test for NPA evaluations provides the best quantitative assessment of NPA portfolios.
Portfolio Evaluation	Equity	There are several opportunities for regulators to explore equity in planning. For example, utilities can begin to understand distributional equity by estimating and reporting the percentage of recipients receiving incentives that belong to priority populations (e.g., low-income customers, disadvantaged communities). Similarly, overlaying a map of proposed capital projects on a map of a priority population may allow for greater understanding of how the areas may be impacted by new infrastructure or NPA solutions. Finally, states can develop working groups to assess how best to evaluate and factor the impacts of infrastructure and NPA investments on disadvantaged communities. Several states across the country are developing programs that may provide lessons learned for other states.
Process Considerations	Reporting Requirements	Reporting on a specific cadence that meets the needs of the public utility commissions, customers, and utility in each jurisdiction provides significant benefits. Reporting both during the project implementation period and after the project concludes to verify assumptions and measure actual values is essential.
	Stakeholders	Ensuring a robust, transparent stakeholder process to better inform the Commission's evaluation is necessary for NPA project assessments. For NPA portfolios developed by the utility and not reliant on competitive procurement, allowing stakeholders to propose alternative assumptions for the BCA is essential.
	NPA Policy Design	Gas planning filing requirements are an appropriate fit for NPA regulations. In the absence of gas planning regulations, NPA filings benefit from the accompaniment of thorough and transparent utility forecasts for demand, gas price, and NPA resource cost and availability.
	Regulatory Policy Changes	A benefit-sharing mechanism which reduces the utility's bias for infrastructure-based solutions over an NPA can help align utility and societal objectives.

Figure 1. Overview of Three-Step NPA Framework (Nelson et al. 2023).

Step 1: Preliminary Screening

The first step in the process is to screen potential capital projects for NPA suitability. The screening process filters out potential NPA projects that are not technically possible. Screening criteria include preliminary implementation feasibility, safety considerations, cost, and the amount of time until the solution is needed.

NPA projects are first assessed for safety concerns that could render projects infeasible. Unplanned projects that must be resolved immediately for safety and reliability reasons are timebound and therefore unsuitable for NPA analysis.

Capital projects not impacted by the first set of constraints are then screened for cost. Projects that are large enough to justify the resources needed to perform a NPA evaluation pass this screen. The last preliminary screening criteria is timeline. NPA projects that are able to meet energy system needs in a timely manner, including time to perform the NPA analysis, pass this screen. Once this screening is complete, the NPA portfolio development can begin.

Step 2: Portfolio Development

After the utility identifies a project need and conducts its preliminary screen, the next step of the process is to develop the NPA resources portfolio. Demand-side resources reduce throughput and the utility's peak, or capacity, need. Supply-side resources add supply to the system to meet demand. Generally, no single demand-side NPA resource will replace a pipeline-based solution and a utility typically combines several resources into an NPA portfolio that can address the utility’s needs.

Two options gas utilities can use to identify and acquire NPAs are competitive solicitations or by developing an internal analysis of available resources. Competitive resource procurements engender competition that can drive down costs through innovative approaches to serve identified needs, while internal analysis can help reduce the cost of developing a portfolio for streamlined projects. Identified NPA resources are evaluated for compliance with state regulatory requirements, such as emissions impacts. Not all resources may comply with NPA requirements. For example, some states prohibit the use of propane as an NPA resource since the fuel typically increases emissions.

Once the utility has solicited compliant resources, it determines whether a portfolio can meet the technical project requirements. For the NPA portfolio to be viable, it must be able to resolve system issues while maintaining system reliability and safety. For example, if an NPA portfolio seeks to reduce design day peak load through demand-side resources, the portfolio must be able to achieve the required load reduction to be considered. If a project seeks to avoid a pipeline replacement when repairs are not feasible (often resulting in the decommissioning of a portion of the gas system), the portfolio must be able to provide customers with energy through electrification or another resource. Only projects with solutions that ensure system safety and reliability and meet technical project requirements proceed to the next step.

Step 3: Portfolio Evaluation

In the third step of the process, NPA resource portfolios that meet technical requirements are evaluated for cost-effectiveness, third-party qualifications, and distributional equity considerations. First, an NPA portfolio is quantitatively evaluated through a BCA in which

project net benefits are compared to the costs of the infrastructure solution. Criteria for evaluating third-party portfolios is the second component of the portfolio analysis, if applicable. In this step, utilities evaluate third-party NPA proposals (e.g., responses to a competitive solicitation) using transparent criteria such as bidder experience, safety or project viability. The last component of the portfolio analysis is evaluating if the project or portfolio costs and benefits are distributed equitably.[3]

Decision Tree

The three-step NPA framework is presented below as a decision tree (Figure 2). The decision tree simulates the process a utility would follow in the consideration of an NPA project. Each decision point filters a subset of projects that are not suitable for NPAs while those that remain progress further toward implementation. Only the projects that have successfully advanced through all three steps are implemented.

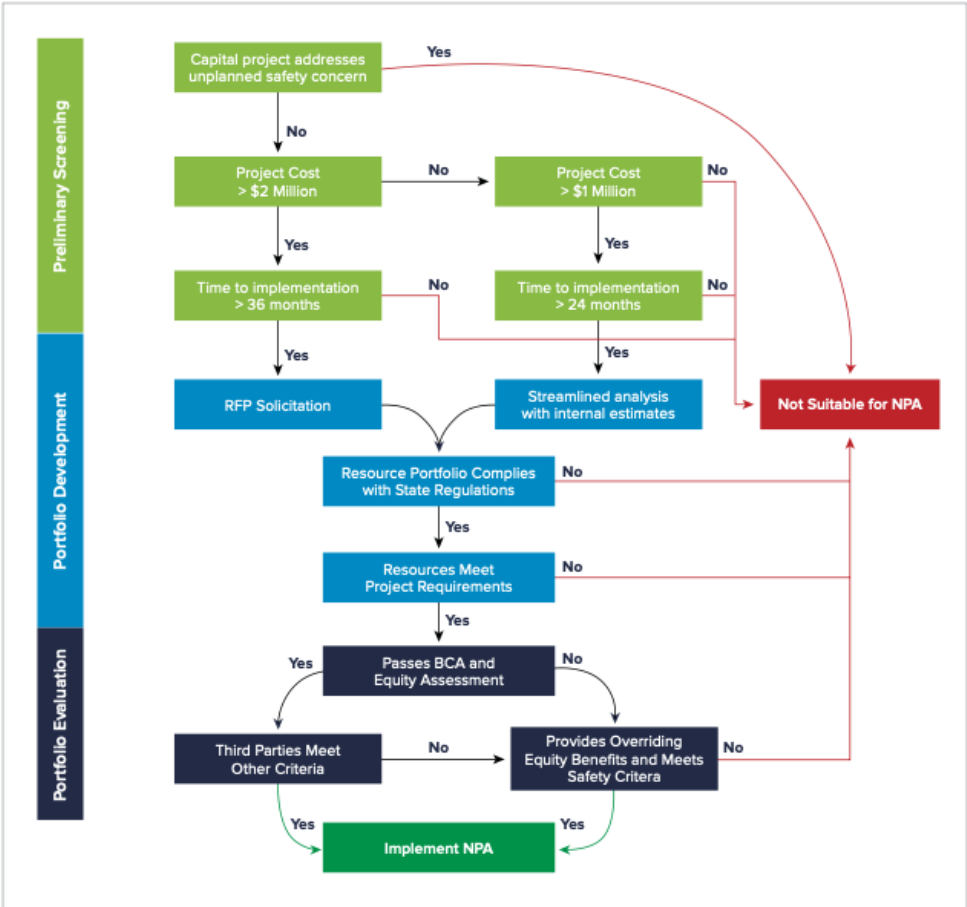

Figure 2. NPA Project Decision Tree for a Sample Utility (Nelson et al. 2023b)

[3] There are many dimensions to energy equity. The framework focuses on distributional equity. For more information on recognition, procedural, distributional and restorative equity, see the Energy Equity Project. https://energyequityproject.com/

Policy Options to Support NPAs

Gas utilities may not experience the sustained growth that enabled the industry to continuously expand its delivery system and may need to consider investments that minimize the risk to customers from a long-term decline in gas demand. To better align utility incentives with state policy and customer interests, policymakers may need to review their existing regulation and legislation and consider if it needs to evolve. Examples of actions that support NPAs include:

- *Consider current natural gas planning requirements and assess opportunities for increased transparency.* States can review their current natural gas planning requirements and assess if there is an opportunity for increased transparency or coordination. Planning requirements can include clear direction about NPA analysis, including what energy system needs can be mitigated with an NPA, eligible resources, cost and time thresholds, benefits and costs to include in the analysis, approaches to implement solutions, stakeholder engagement and how to incorporate equity in the analysis.
- *Integrate NPA analysis with natural gas and other relevant planning processes.* Incorporating NPA analysis into more robust gas planning can help PUCs and stakeholders comprehensively understanding the planned utility investments, system condition, and forecasts. Coordinating between electric and gas distribution system planning can provide a broader perspective that may help regulators understand the costs and benefits of short and long term energy investments in their state.
- *Include equity considerations when reviewing NPAs.* There are a variety of opportunities for states to incorporate equity into NPA analysis. For example:
    - *Data requirements*. PUCs could request that utilities provide estimates and report the percentage of recipients receiving natural gas or NPA incentives that are low-income and disadvantaged populations. Gathering baseline information that transparently shows where investments are occurring will help inform future decision-making. This information could also be represented visually through mapping tools.
    - *Working groups.* PUCs or utilities can develop working groups to assess how best to evaluate and factor the impacts of infrastructure and NPA investments on disadvantaged communities. Including members of the impacted communities in the development of working group is an opportunity to co-develop solutions with the communities.
    - *Existing resources.* Lawrence Berkeley National Laboratory recently published a guidance document for states on performing distributional equity analysis (Woolf et al. 2024). The document provides step-by-step guidance is to aid regulators and utilities in understanding if their DER investments are achieving distributional equity goals. Forthcoming resources include a database on state equity actions and a repository of U.S. Department of Energy funded research related to advancing equity in grid planning and operations.[4]
- *Require all benefits and costs be included in NPA analysis.* Including all relevant benefits and costs in the NPA analysis creates a robust analysis that allows for the comparison of all energy supply options to enable selection and implementation of a low-cost, affordable energy system.

[4] For more information see https://emp.lbl.gov/projects/equity-in-grid-planning-and-operations

- *Review existing utility financial incentives*. Utilities may not be incentivized to analyze and implement NPAs that reduce growth. Often, the existing regulatory framework incentivizes utilities to invest in capital infrastructure since shareholder returns are tied to the rate base. PUCs can review their current gas financial incentives and determine if they need to be realigned to achieve state and local goals. For example:
    - *Performance-based regulation*. Performance-based regulation (PBR) is a broad term encompassing alternative regulatory approaches that seek to align utility financial incentives with customer interests and societal needs. In the electricity sector, PBR is increasingly used to align utility revenue with policy goals that traditional regulation was not designed to support. PBR can be leveraged in the gas sector to reduce utility reliance on capital projects, reduce stranded asset risk, and contain costs.
    - *Performance incentive mechanisms (PIM)*. PIMs are regulatory tools that seek to align utility goals with social goals through an incentive and overlaps with PBR. PIMs are widely implemented in the electric sector and have increasingly been used to achieve greenhouse gas reductions. A PIM ties utility revenue to its performance in achieving specific policy goals, such as decarbonization, energy affordability, reliability, and energy efficiency.

Conclusion

NPAs can avoid capital infrastructure investments and can reduce the risk of stranded assets, ratepayer costs, and gas system emissions. This paper provided a summary of similarities and differences in NPA requirements in four states, and an overview of a framework to guide the development of an NPA process. Observations from NPA implementations in New York, Rhode Island, Colorado, and California provide opportunities to inform NPA guidance or regulations.

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