Cash Now, Current Later: Energy Investment in the AI Era

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Abstract

A long-standing question in accounting is whether long-term contracts should be recognized at completion or as work progresses, and whether that choice changes firm behavior. I study an accounting rule in the utility sector that governs asset recognition and related cash flows. Construction Work in Progress (CWIP) accounting moves the recovery of an asset's cost from after construction to during it, letting a utility bill customers for an asset while it is still being built. Using state-level CWIP adoptions in a staggered difference-in-differences design, I find that utilities respond by building more, starting construction sooner, and completing it faster. However, they also abandon more projects midway, run finished capacity below comparable plants, and keep older units in service longer, a pattern more consistent with over-investment than with investment at the right level. The response is strongest where the regulatory regime is laxer and where the pre-adoption wait for recovery is longest. Credit terms do not change, consistent with a shift in investment payoffs rather than an eased financing constraint. Operational outcomes also deteriorate, with higher outages and lower customer satisfaction. Overall, shifting cash recovery forward raises the volume and speed of investment but loosens the discipline governing which projects finish and how well they run. The results provide insight into the current wave of CWIP adoptions serving AI-driven electricity demand.

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1 Introduction

The rise of artificial intelligence is reshaping electricity demand in ways that have few historical precedents. Data centers, the physical infrastructure behind AI, consumed 183 terawatt-hours of electricity in 2024, roughly 1.5% of world consumption, and are projected to more than double that by 2030 (International Energy Agency, 2025). Meeting this demand requires large new investment in generation, and spurring that investment quickly enough to keep pace has become a pressing challenge for state regulators (Belfer Center for Science and International Affairs, 2026; Deloitte, 2025).

Since 2024, Missouri, Arkansas, and Oklahoma have passed laws designed to make their regulatory environments more favorable to utility investment (Mehta, 2025; OK Energy Today, 2025). A central change concerns when a utility can begin billing customers for a new asset. Traditionally, regulators let a utility recover the cost of a plant only after construction ends and the plant enters service; the outlays incurred while it is being built, including the cost of financing, accumulate on the balance sheet and are recovered later over the asset's service life. This resembles the completed-contract method in revenue recognition, under which a firm recognizes no revenue on a long-term project until the work is complete. Construction Work in Progress (CWIP) accounting moves recovery into the construction phase. Under CWIP, the utility begins collecting from customers (through higher electricity prices) as soon as construction spending begins and before the plant delivers any service, much as percentage-of-completion recognizes revenue as the work proceeds. Figure 1 contrasts the cash a utility collects on the same asset under the two regimes. In this paper, I ask how CWIP affects utilities' investment decisions and which channels drive their response.

At its core, CWIP is an accounting rule about timing. But for a regulated utility, accounting timing is cash timing. The price a utility charges is set by a formula based on the book value of its assets, so the date an asset is recognized as part of the asset base is the date the firm starts receiving revenue on it. CWIP therefore moves the utility's operating cash inflow forward. The dollars start arriving during construction rather than over the plant's service life. Regulators use CWIP primarily to encourage new capacity, so I focus on how the rule changes investment behavior.

It may seem obvious that CWIP raises investment, but the prediction is not automatic. Under traditional treatment the utility is not simply made to wait, because the costs it defers accumulate interest until they are recovered. If the utility can finance construction in the meantime, and if the accrued interest fully compensates it for waiting, then a dollar collected during construction and a dollar collected later with interest are worth the same, and moving the collection date should leave investment decisions unchanged (Rogerson, 2008; Rajan and Reichelstein, 2009; Nezlobin et al., 2012). Each condition can fail, and they can fail together. The utility may not be able to fund construction on those terms, so cash arriving during construction relaxes a financing constraint (Fazzari et al., 1988; Rauh, 2006). The allowed interest rate may also fall short of the return the utility requires, so collecting earlier makes the project more profitable. Whether CWIP changes how much utilities build, how fast, and how well the resulting capacity runs is therefore a question about how much each channel contributes.

The current wave of adoption is too recent to leave a measurable record, but an earlier wave offers a setting with the same structure. I draw on regulatory filings that cover the near-universe of U.S. investor-owned utilities. I identify the effect of CWIP using a staggered difference-in-differences design that exploits variation in the timing of CWIP adoption across states. States that enacted CWIP legislation between 2001 and 2023 form the treated group, with treatment assigned in the year of adoption. The control group consists of never-treated states, those that had not adopted CWIP as of the end of the sample period. The evidence reveals both intended and unanticipated effects of CWIP.

I find that CWIP raises investment, and it shows up in two places. On the books, the balance of construction work in progress rises by close to three percentage points of assets and capital expenditure rises with it, so utilities are committing more dollars to building. At ground level too, the construction record tells the same story. Treated utilities record more construction starts and add more megawatts of new capacity than utilities in never-treated states. Consistent with regulators' intent, utilities respond to CWIP by building more.

The results so far speak to how much utilities build, not how fast. Next, I look at how CWIP changes the way projects move through construction. A project runs from filing, to approval, to

the start of construction, to commercial operation. Results show that once a project is approved, treated utilities start construction sooner, the construction phase itself runs quicker, and on net the gap between a project's originally filed completion date and its actual completion shrinks by about 1.8 to 2.0 years. The acceleration does not seem to be an artifact of how utilities file, since they do not announce longer schedules that they then beat, so projects genuinely advance more quickly. Once recovery begins with the first dollar of construction spending, the reason to start sooner is plain.

Finding that utilities build more does not reveal whether CWIP moves investment toward an efficient level or tips them into over-investment. No benchmark pins down the efficient level of investment, so I look for evidence in the investment process itself. I ask what kind of capacity utilities build, whether they see their projects through, and how they run and retire what they own. The capacity they add is cheaper per kilowatt, not more expensive, which cuts against the classical worry that early returns push utilities toward capital-heavy investment (Averch and Johnson, 1962; Baumol and Klevorick, 1970). The plants themselves are not gold-plated. What changes is which projects survive. Treated utilities are about 8 to 15 percentage points more likely to cancel a project after construction has begun, and less likely to cancel one before. This shift suggests that projects once dropped in the planning stage are carried into construction and abandoned there instead. Utilities commit to construction quickly once approval is in hand and then walk away from more projects midway, a pattern that points to looser discipline over which projects are seen through.

The projects that are seen through show the same slack. Newly built capacity runs below comparable capacity elsewhere, at a capacity factor about 9 to 10 percentage points lower. Retirement changes as well. Formal retirement comes later and in larger pieces, and it comes after a plant has already stopped generating, so aging capacity stays on the books longer. Together these results say the utility is carrying more capacity than the load requires. Utilities do not build costlier plants. They build more of them, finish fewer, and run what they finish less. Some spare capacity is needed for peak demand and unplanned plant downtime, so the reading is not definitive. But the pattern fits over-investment better than investment at the right level.

Next, having found that CWIP changes investment, I turn from whether it does to why. The

benchmark above gives two conditions, and each one that fails is a channel. The first is financing. If utilities had been building below their own optimum because they could not raise the money for large, front-loaded projects (Fazzari et al., 1988; Hadlock and Pierce, 2010), then CWIP, by delivering cash during construction, should relax that limit. Relief should surface in the funds the utility generates internally, in the terms on which it borrows, and in the value the market places on its equity. The evidence does not support this channel. Revenue and cash collections rise after adoption, but so do operating expenses. On net, operating cash flow and net income do not rise, so the internal funds available for investment do not expand. Neither the credit rating nor the coupon on new debt moves. The one financing variable that responds is maturity. New debt is issued at shorter tenors, consistent with utilities matching debt to the earlier cash CWIP brings in. Shorter maturity reflects a change in the timing of financing rather than an increase in the amount of capital available. The market value of the parent rises with its CWIP exposure while the volatility of its equity returns stays flat. Both channels predict higher firm value, so this result does not separate them. The financing channel requires that utilities have more funds available for investment than before, and none of the funding results show that.

I turn next to the second condition. If the allowed interest falls short of the return the utility requires, CWIP raises the payoff to investing, since the utility earns its return on a larger asset base and earns it sooner. The response should then concentrate where the payoff moved most, and two cross-sectional splits test that. The investment response is larger in states with a laxer regulatory regime, which are more likely to allow a higher return.[1] It is also stronger where recovery is settled latest, in states that set the asset base from historical costs rather than forward projections. There the gap between approval and starting construction shrinks the most, and a larger share of the built capacity remains idle. Both splits are consistent with the incentive channel. The channel also accounts for the earlier results, which financing does not. Relaxing a constraint funds projects the utility already wanted to build. It does not explain why the projects it does build are ones it abandons midway and then runs below par.

Finally, if the incentive channel is at work, its costs should show up not only in how

[1] I use the term incentive in the contracting sense, as the payoff the regulatory formula writes on the utility's accounting base, and do not take a stand on agency frictions inside the firm.

utilities build capacity but in how they run it and in the alternatives they stop pursuing. Operating performance deteriorates, with customers experiencing more outages during major storms and residential satisfaction lower even after controlling for prices. Utilities also cut back demand-response programs, which serve peak load without new construction.[2] These outcomes are further removed from the CWIP regulation than the construction results, so I read them as consistent with the mechanism rather than as additional tests of it.

The current paper is subject to two limitations. The first is one of identification. If the same rising demand that leads a state to adopt CWIP also spurs utilities to invest, part of the post-adoption increase in building could reflect the demand shock rather than the rule. As a partial check, I test whether the response is stronger where pre-adoption demand was growing faster, and find no such pattern.[3] The second limitation concerns how to read the capacity results. Idle capacity and deferred retirement could reflect demand forecasts that failed to materialize rather than deliberate over-building. That ambiguity, however, leaves intact the point that matters for customers: under CWIP they pay for the capacity as it is built, whether it was built to excess or for demand that never arrived, and because treated and never-treated utilities face the same forecasting uncertainty, the difference between them still isolates the role of CWIP.

These findings speak to the wave of CWIP adoption now underway. The recent adoptions are too new to study the same way, so I compare today's adopters with the earlier ones without claiming a causal effect. The difference is already visible in what states plan to build. Where CWIP is available, utilities are planning large projects that customers pay for during construction. Where it is not, states plan little new utility-owned capacity, and power for data centers comes instead from independent producers who finance it themselves. Demand is growing in both sets of states. What differs is who carries the risk while the plants go up. That is what makes the earlier record worth attention. Today's adopters are large utilities approving CWIP on the basis of data center demand that is forecast rather than realized. Among the earlier adopters, the growth that prompted

[2]The scale of these programs is an equilibrium outcome, set jointly by the utility's supply of them and by customers' demand for them, so the decline need not reflect reduced utility effort alone.

[3]Online Appendix Table O.6.1 reports the underlying triple-interaction estimates. The test uses only the treated states and is underpowered, so I read it as consistent with CWIP rather than demand pressure driving the response, not as proof.

adoption often did not last. If realized demand falls short of the forecast, customers still pay for the capacity as it is built. The earlier wave does not show that CWIP fails to finance construction. It shows that CWIP moves the risk of a demand shortfall onto customers.

This paper makes three contributions. First, it contributes to the literature on accounting in regulated industries. Early work established that regulated firms face distinctive accounting incentives shaped by the political and regulatory process rather than the capital market alone (Watts and Zimmerman, 1978), and more recent work in banking has shown that sector-specific rules have real consequences for firm behavior that would be invisible without attention to institutional detail (Beatty and Liao, 2014; Bushman and Williams, 2012). This paper takes a first step in shedding similar light on the utility sector, a setting whose departure from the competitive market structure dominating accounting research is itself useful for identification. Natural monopolies face no competitive pressure, their revenues are set by regulators, and their decisions are governed by the regulatory framework rather than by market signals, so the setting isolates the effect of regulatory incentive design from the competitive forces that confound inference elsewhere. The findings show how a single cost-recovery rule simultaneously shapes investment, operating effort, and the quality of service customers receive, in a sector that accounts for a substantial share of U.S. fixed capital investment and serves as essential infrastructure for the broader economy.

Second, the paper contributes to the accounting literatures on investment and on cost basis. Theory on intertemporal cost allocation shows that the schedule by which an asset's cost enters prices or performance measures governs investment incentives (Rogerson, 1997; Rajan and Reichelstein, 2009), and empirical work on cost-based reimbursement, most extensively in healthcare, shows that firms respond to what the reimbursement base includes and how it is measured (Eldenburg and Kallapur, 1997). CWIP provides quasi-experimental variation in the timing with which outlays enter the return-earning base, the same margin the tax literature studies through expensing and accelerated depreciation, here transplanted to a setting where the "tax base" is the rate base and the "rate" is the allowed return. The results give field evidence on the full anatomy of such a recovery system: the timing of base entry (the CWIP adoption itself), the rate applied to the base (the response scales with the state's regulatory-regime score), and the policing of the base's scope (the

revenue expansion is muted where states restrict which costs may be billed to customers). To my knowledge, no prior setting has permitted evidence on all three margins of a cost-recovery system at once.

Third, the paper speaks to the contracting role of accounting. Beyond informing the market that prices a firm, accounting numbers enter the contracts that govern it, from debt covenants to managerial pay, a role long distinguished from the valuation role that dominates empirical work (Holthausen and Watts, 2001; Armstrong et al., 2010; Christensen et al., 2016). Regulated rate-setting is an unusually clean instance of that role: a utility's revenue is set by a formula written directly on its accounting base, so the recognition rule fixes the cash the firm collects, with no market inference in between. The rule I study shifts a single well-defined margin, when an asset begins earning, and the paper traces that shift through construction volume, construction timing, project abandonment, capacity utilization, financing structure, and the pricing of the firm's securities. The paper also speaks to the real-effects literature, which shows that measurement and disclosure rules change real decisions, most often through the market's inference from reports (Kanodia and Sapra, 2016; Roychowdhury et al., 2019). The evidence here shows that recognition timing has first-order real effects even when the accounting number is priced by contract rather than interpreted by the market.

Section 2 provides institutional background on the utility sector and develops the conceptual framework. Section 3 describes the sample, data, and identification strategy. Section 4 presents the main investment results, and Section 5 the additional operating-side results. Section 6 draws out the implications for the current data-center-driven wave of CWIP adoption, and Section 7 concludes.

2 Institutional Background and Conceptual Framework

2.1 Rate Setting and the Rate Base

Electric utilities operate as regulated monopolies across most of the United States.[4] In exchange for the exclusive right to serve a geographic area, they are subject to oversight by a state public utility commission, which sets the prices, commonly referred to as rates, they can charge customers. The core objective of the regulation is to replicate the outcome of a competitive market, prices that cover costs, including a fair return on invested capital, without allowing monopoly profits.

Revenues are typically set through a formal proceeding called a rate case. The utility files a request for a rate change, submitting detailed financial data on its costs and asset base. The commission reviews this filing, hears evidence from the utility, consumer advocates, and other parties, and issues an order setting allowed revenues. The allowed revenue is calculated using the following formula:

$$R = (RB \times r) + OE + D + T \tag{1}$$

where R is the total allowed revenue. RB is called the rate base, the value of capital assets on which the utility is allowed to earn a return (earn profit). r is the allowed rate of return, reflecting the blended cost of debt and equity. OE is operating expenses, D is depreciation, and T is taxes, all of which are recovered dollar for dollar with no profit margin. These revenues are then divided among customer classes to set per-unit prices.[5]

This framework creates a well-known incentive problem known as the Averch-Johnson effect

[4] In vertically integrated states, a single utility owns generation, transmission, and distribution and is subject to comprehensive state commission oversight on all three. In restructured or deregulated states, generation has been opened to competition, but transmission and distribution remain regulated monopolies subject to state and federal oversight. As of 2024, 13 states and DC operate statewide retail choice programs for residential customers, and Texas requires all customers inside the ERCOT footprint to select a provider. Four additional states limit choice to non-residential customers. The remaining states retain the traditional vertically integrated model in which the utility owns generation and recovers its cost through regulated rates (Borenstein and Bushnell, 2015). This paper includes utilities across both types of states, since CWIP legislation and the rate-setting principles described here apply to the regulated portions of restructured markets as well.

[5] Per-unit prices are derived by dividing the total allowed revenue requirement by projected electricity sales, measured in kilowatt-hours. The accuracy of this sales forecast matters in principle, but in practice it is not a major source of regulatory dispute. Utilities and commissions use historical consumption data adjusted for known changes in load, and errors in the forecast are typically corrected in the next rate case. The more consequential judgment is the size of the revenue requirement itself, which is where disagreements over rate base, allowed return, and cost recovery mechanisms such as CWIP tend to concentrate.

(Averch and Johnson, 1962). Because utilities earn a fixed profit margin on capital assets, they have an incentive to accumulate more capital even when doing so is not the most cost-effective way to serve customers. Beyond the level of investment, this incentive also distorts how utilities allocate resources. Activities that expand the asset base earn a guaranteed profit, while operational improvements do not, creating a systematic tilt in firm incentives toward capital accumulation over efficiency.

2.2 AFUDC and CWIP

Under traditional regulation, a utility that is building a new asset cannot earn a profit on that investment until it is complete and operational. This ties up capital that could otherwise be deployed elsewhere. To compensate for this, accounting rules allow utilities to capitalize the financing charge in the account called the Allowance for Funds Used During Construction (AFUDC). AFUDC is added to the book value of the asset being built and recovered from customers over the life of the asset once it is operational. This treatment is the regulatory analog of the completed-contract method, under which a firm recognizes no revenue on a long-term project until the work is complete. Completion is not the only condition for recovery. When the asset enters service, the commission also conducts a post-completion review of whether the spending was justified and the plant is actually needed, and it may disallow costs that fail that review. The utility therefore commits capital years before the regulator rules on whether it will be recovered.[6]

CWIP replaces this deferred recovery with current recovery. The utility adds construction costs to the rate base as it incurs them. It earns a profit on them immediately, much as the percentage-of-completion method recognizes revenue as the work proceeds. Because these costs now earn a cash return as they are incurred, the utility no longer capitalizes AFUDC on them. The financing charge is recovered in current cash rather than deferred into the asset's book value. Returning to the revenue requirement in Equation 1, CWIP increases RB during the construction period, which raises allowed revenue (and consequently the customer's bill) earlier. Figure 1 illustrates how this shifts the pattern of revenue collection from customers over the life cycle of

[6]The utility is not building blind. It usually obtains regulatory sign-off before starting and keeps the commission informed as work proceeds, so it has some read on how its costs will be treated. That advance signal lowers the disallowance risk but does not remove it, and the risk it bears is still higher than under CWIP, where the utility has already collected the cash.

a new asset, with CWIP front-loading cash inflows that would otherwise begin only once the asset enters service. The same post-completion review still applies, but under CWIP the utility collects before it is settled, so even if the chance of disallowance is unchanged, it is better off collecting first and refunding any disallowed amount later.[7]

2.3 The Impact of CWIP on the Firm

Whether CWIP changes real investment is not straightforward. Under AFUDC the utility is not simply made to wait, because the construction costs it defers accumulate a return until they are recovered. If recovery of that deferred balance is highly likely and the return fairly compensates the utility for waiting, then bringing the recovery date forward changes nothing real. This benchmark breaks if any of those conditions fails to hold. Two such mechanisms are a financing constraint and a change in the payoff to investing.

Under the financing channel, CWIP eases a cash constraint. Utility construction is lumpy and front-loaded in cash outlays. Under AFUDC the utility finances the whole construction period and recovers nothing until the plant enters service, so the financing need is largest when the project still earns nothing (Joskow, 1974). Whether this matters for investment depends on how the utility funds it. If a utility could raise outside money as cheaply as spending its own cash, the timing would not matter, because it could fund any worthwhile project when the need arose. Utilities do not face such frictionless markets. External finance is costlier than internal cash, so a utility short of cash passes up projects it would otherwise take (Myers and Majluf, 1984; Fazzari et al., 1988; Hadlock and Pierce, 2010). This shortfall binds hardest on the utilities least able to raise outside money, and they build below the efficient level. By delivering cash as construction spending is incurred, CWIP relaxes the constraint and lets a previously constrained utility take on work it could not otherwise fund. On this view CWIP corrects under-investment, and both the utility and its customers benefit. Because the projects it unlocks were worth building all along, this channel implies capacity that is prudently chosen and efficiently run. It predicts a response that concentrates among the utilities that were financially constrained beforehand, those with high leverage, thin internal cash, or limited

[7] CWIP statutes typically pair current recovery with clawback provisions, true-ups or refunds that return disallowed amounts to customers. But because the utility collects during construction and any refund comes later, the time value of money leaves it better off even when the amount refunded equals the amount originally collected.

access to capital markets, and a fall in the price of external funds as the constraint eases.

Under the incentive channel, CWIP changes not the utility's ability to invest but its payoff to investing. The regulatory formula lets capital earn a return, so a larger asset base increases the utility's profit (Averch and Johnson, 1962; Baumol and Klevorick, 1970). Under AFUDC the utility recovers a larger sum, but only later, the larger amount compensating it for the wait. CWIP lets it collect a smaller amount now instead. Building pays off whenever collecting now is worth more than the later AFUDC sum in present value. The comparison tips toward building under a laxer regulatory regime, which grants a higher allowed return. The utility then adds more rate base, starts sooner, and completes projects whether or not the anticipated demand has arrived. The projects it unlocks are more likely to be the ones closest to the margin, so the extra building is more speculative than what the utility would otherwise have chosen. Nezlobin et al. (2012) formalize this margin, showing that under rate-of-return regulation the schedule of cost recovery determines whether the regulated price ends up above, at, or below the long-run marginal cost of service, and CWIP is an extreme form of moving recovery earlier. I use the term incentive in the contracting sense, as the payoff the regulatory formula writes on the utility's accounting base, and do not take a stand on agency frictions inside the firm. This channel predicts a response that concentrates where the payoff moved most rather than where finances were tightest. The two channels are not mutually exclusive, and CWIP could ease a constraint and raise the payoff to investing at the same time.

2.4 The Early-2000s CWIP Wave

The focus of this study is the wave of CWIP adoption in the early 2000s and 2010s, when a number of states enacted or expanded CWIP statutes outside the nuclear construction era. The current, data-center-driven wave is too recent to study with the design used here, so I take this earlier wave as the setting and read it as a guide to the direction of CWIP's effects. The motivations for adoption varied but shared a common thread. Florida's 2006 statute was enacted amid projections of rapid residential and commercial load growth (Blackburn and Runkle, 2007). Virginia, South Carolina, and Georgia cited the need to finance new nuclear capacity and manage capital costs over long construction timelines (Bartelme, 2017). Mississippi, Louisiana, and the remaining states cited anticipated load growth and the need to attract large industrial investment, motivations that

closely mirror the data center recruitment arguments heard in Missouri and Oklahoma today.

In several of these cases, the demand forecasts underlying the investments did not materialize. Florida projected robust load growth that slowed sharply after 2008. Virginia's nuclear expansion plans were scaled back as demand fell below expectations. The result in both cases was that customers financed investments that were ex-post not needed. This is a risk that applies directly to the current wave. Data center demand forecasts are based on probabilistic models rather than actual consumption, leaving meaningful scope for overestimation (Mehta, 2025). The incentive structure is the same in both periods, which is what makes the comparison informative. I take up the current, data-center-driven wave, and how it differs from the historical one, in Section 6.

3 Sample, Data, and Identification

3.1 Sample Construction

Electric utilities in the United States vary along two organizational dimensions that jointly determine whether CWIP applies. The first dimension is ownership form. Utilities are either investor-owned (IOUs), state-owned, or cooperatives. IOUs operate on a for-profit basis and therefore are subject to comprehensive oversight by state public utility commissions, which set the prices they can charge and the returns they can earn. State utilities and cooperatives operate as non-profit organizations and therefore are subject to less regulatory oversight. The second dimension is function. A utility may distribute power, selling it to end customers, or it may only generate power for sale into wholesale markets at market prices. A utility is regulated only when it distributes power, because distribution is the monopoly part of the business. A generator that sells only into wholesale markets competes with other generators and therefore faces lighter regulation.

IOUs that operate only on the generation side form a separate group, the independent power producers (IPPs), who are not exposed to CWIP because they recover costs through wholesale market prices rather than a regulator-set rate base. CWIP applies at the intersection of these two dimensions, that is, to IOUs that distribute power, since they recover costs through a regulated process. I refer to this group as regulated utilities throughout the paper. State-owned utilities and cooperatives typically serve smaller and more rural areas that IOUs find less profitable, and they operate under different, non-profit objectives, so the CWIP cost-recovery mechanism does not apply

to them.

The investor-owned segment is organized in two tiers, with a small set of parent holding companies sitting above a larger set of operating utilities. The Edison Electric Institute counts 44 parent-company electric utilities in the United States at the end of 2023, of which 39 are publicly traded (Edison Electric Institute, 2024).[8] Southern Company illustrates the structure: it operates through separate subsidiaries including Georgia Power, Alabama Power, and Mississippi Power, each of which serves a distinct state and files independently with its state regulator. Approximately 75 percent of these operating utilities report retail sales in a single state. Because CWIP is adopted at the state level, the operating utility rather than the parent is the natural unit of analysis, and I refer to these operating subsidiaries as firms throughout the paper.

The analysis is organized around four units of observation, the parent company, the utility, the plant, and the generator. These nest within the corporate structure described above. A parent company owns operating utilities, each utility owns plants, and each plant is composed of individual generating units. All samples use a symmetric ± 5 year event window around the cohort adoption year unless otherwise specified. I motivate the window choice and report robustness in Section 3.3.

The cross-state design compares 53 regulated utilities in 13 treated states against 56 regulated utilities in 14 never-treated states, and the within-state design adds the independent power producers in the treated states, which are far more numerous but much smaller (roughly 56 megawatts of operating capacity each, against about 4,000 for a regulated utility).[9] The unconditional means preview the mechanisms developed below, though they do not yet net out the fixed effects and controls the difference-in-differences estimates apply. Treated regulated utilities carry a construction-work-in-progress balance roughly twice that of their never-treated counterparts (7.3 versus 3.8 percent of lagged assets), bring more total capacity into service (about 3,500 versus 2,200 megawatts), and build lower in the capital-intensity ordering (a rank of 1.9 versus 4.3, where lower denotes cheaper capacity per kilowatt).

[8] Separately, 177 investor-owned utilities filed EIA Form 861 for 2023, of which 144 both distribute power and report retail customers. Form 861 does not identify a utility's parent, so the two counts come from different sources and are not linked to one another.

[9] The sample splits into four cells defined by ownership form crossed with treatment status. Extra Material Table E.5.1 reports the composition of the three cells that enter the two main designs, and Table 1 reports descriptive statistics for the sample.

3.2 Data Sources

The empirical analysis draws mainly on regulatory filings that electric utilities submit to federal agencies, most of which I obtain directly from the Energy Information Administration (EIA). Plant and generator construction data are drawn from EIA Form 860 (the Annual Electric Generator Report), a census-level filing required of all U.S. electric power plants. For each unit, the filing records the year construction began, the proposed and actual in-service dates, and whether the project was canceled or suspended. It covers both regulated utilities and IPPs. Operational outcomes and demand-side variables come from EIA Form 861 (the Annual Electric Power Industry Report), filed by all electric utilities, which reports each utility's retail operations. Some items are reported for the utility as a whole and others separately for each state in which the utility operates.

The FERC Form 1 financial statements are the regulated-utility analog of a public company's annual 10-K report, filed for regulatory oversight rather than investor disclosure. I access them through the Public Utility Data Liberation (PUDL) project.[10] Generating-unit utilization comes from the Environmental Protection Agency's Continuous Emissions Monitoring System (CEMS), which records the hourly electricity output of fossil-fuel generating units larger than 25 megawatts.[11]

Additional data sources support specific subsections. Customer satisfaction scores are from the J.D. Power Electric Utility Residential Customer Satisfaction Survey. State-level regulatory variables are hand-collected from rate case notes issued by S&P Regulatory Research Associates (RRA), state regulator websites, the American Council for an Energy-Efficient Economy (ACEEE), the National Association of Regulatory Utility Commissioners (NARUC), and individual state renewable portfolio standard statutes.[12]

3.3 Identification Strategy

The design compares regulated utilities in treated states to regulated utilities in never-treated states, implementing a stacked difference-in-differences design (Baker et al., 2022; Cengiz et al., 2019; Barrios, 2021) that exploits the staggered timing of CWIP adoption across states. For each year in

[10] PUDL is a nonprofit initiative that cleans, standardizes, and publishes FERC data in analysis-ready formats. I apply additional cleaning to the raw PUDL output, including verifying data consistency with the original filings.

[11] I link CEMS to EIA-860 through a generator-level crosswalk. The linking and cleaning process is documented in Online Appendix O.2.1.

[12] ACEEE (`https://www.aceee.org`) publishes a state energy-efficiency scorecard and NARUC (`https://www.naruc.org`) publishes regulatory policy summaries.

which one or more states adopt CWIP, I construct a cohort consisting of all regulated firms treated in that year and a corresponding set of never-treated regulated control firms. The treated group consists of firms operating in states that enacted CWIP legislation between 2001 and 2023, as listed in Appendix B.[13] Treatment is assigned at the state level in the year of adoption, and a firm is considered treated from that year onward. Where a firm operates in multiple states and only some of those states adopt CWIP, treatment is assigned in the year any of the states implements CWIP. The control group comprises firms operating exclusively in never-treated states, i.e., states that had not adopted CWIP as of the end of the sample period in 2023. Always-treated firms, those in states that adopted CWIP before 2001, are excluded because they would contaminate the counterfactual. If CWIP has persistent effects, these firms have already adjusted to it, so comparing newly treated firms against them would understate the response. I use the following difference-in-differences specification. For unit i in cohort c in year t,

$$Y_{i,c,t} = \delta \left(\text{Treat}_{i,c} \times \text{Post}_{c,t} \right) + X'_{i,c,t}\gamma + \alpha_{i \times c} + \alpha_{t \times c} + \varepsilon_{i,c,t}, \tag{2}$$

where $\text{Treat}_{i,c}$ equals one for utilities in the treated regulated arm of cohort c and $\text{Post}_{c,t}$ equals one in years on or after the cohort's adoption year. The specification carries two sets of fixed effects. The first, $\alpha_{i \times c}$, is a unit-by-cohort fixed effect. The unit is whatever level the outcome is measured at, a generator, a plant, or a utility, and it is interacted with the cohort because a never-treated utility serves as a control in every cohort and so enters the stacked panel more than once. The interaction gives it a separate intercept in each cohort, so the comparison always runs within a cohort and never across them. It absorbs fixed differences between units, such as size, technology mix, and service territory. The second, $\alpha_{t \times c}$, is a year-by-cohort fixed effect. It absorbs anything common to all units in a cohort in a given calendar year, such as fuel prices, interest rates, and national demand conditions, and lets each cohort have its own year path, so a cohort adopting in 2007 is never measured against the conditions facing a cohort adopting in 2015. Standard errors are clustered at the utility-by-cohort level.[14] Identification comes from cross-state variation in adoption timing within the regulated arm. Because the comparison holds the regulated business model fixed

[13] I drop states treated in 2000 because I do not have pre-period data for them.

[14] Online Appendix O.3 reports standard errors clustered at the state level.

on both sides, treated and never-treated firms share the same cost-recovery structure, ownership form, and long-duration asset base.

Estimation windows are symmetric around the cohort's adoption year and span ±5 years unless otherwise specified. The ±5 window keeps a cohort's post-period from overlapping unrelated state-environment shocks, and the outcomes move quickly enough after adoption that the tighter window does not lose the response. I re-estimate the main specifications at ±10 and ±15 years in Online Appendix O.3, and the results are qualitatively similar for most outcomes.

I use a common set of controls, all measured at the state-year level. The state energy-policy controls are indicators equal to one when the state has the policy in force that year: a multi-year rate plan, a performance incentive mechanism, revenue decoupling, securitization, a restriction on recovering performance-based executive compensation, the use of a historical rather than a forward-looking test year for rate setting, an average rather than a year-end rate base, the election rather than the appointment of commissioners, a Republican governor, and full Republican control of the state legislature. Renewable portfolio standards enter through three variables, an indicator for a binding mandate, an indicator for a state with only a voluntary standard, and the binding target measured as a share of retail sales. They capture the parallel state-level push on generation mix, which is distinct from CWIP but correlated with adoption timing.

Specifications at the generator, plant, and utility-state level use these state-year values directly. At the firm level a utility may operate in more than one state, so each control is aggregated in one of two ways, depending on what it is meant to capture. The energy-policy indicators, covering multi-year rate plans, performance incentive mechanisms, decoupling, securitization, and compensation restrictions, equal one if any state in which the firm operates has the policy in force that year, because each marks whether the firm has access to a rate-setting mechanism, and access granted by one commission changes how the firm plans, finances, and pays across its system. The remaining controls, covering the test year, the rate base measurement, commissioner election, the two political variables, and all three renewable portfolio standard variables, enter as the share of the firm's electric revenue earned in states with the attribute, because these set the terms on which revenue is allowed and therefore bind in proportion to how much of the firm's business sits under

each regime. Detailed definitions of the policy and state-level controls are in Appendix C.

Demand controls include one-year lagged state-level electricity sales, which absorbs the demand-pressure variation that may drive both CWIP adoption and investment behavior, log state real GDP, log heating degree days, and log cooling degree days. At the firm level these are weighted by the firm's revenue share in each state.[15]

Every specification also includes a size control measured at its own unit of analysis. Generator-level specifications use the natural log of the generator's nameplate capacity, plant-level specifications add the log of the plant's total nameplate capacity and of the capacity owned by the utility, utility-state-year specifications use the log of the total nameplate capacity the utility owns, and the FERC Form 1 specifications use the log of total assets. All continuous firm-level variables are winsorized at the 1st and 99th percentiles to limit the influence of outliers.

4 Main Results

I organize the main results in five subsections. Section 4.1 establishes how CWIP changes the investment and construction decision. Section 4.2 examines the construction process, from proposal to completion. Section 4.3 then considers whether the investment behavior points to over-investment or a correction of prior under-investment. Section 4.4 asks what drives the investment response. Lastly, Section 4.5 sets out what the design cannot settle and what the results survive.

4.1 Impact on Investment

I begin by examining how much utilities invest. I start with financial-statement values, where a utility that is building more should report more spending on capital assets and more cost tied up in projects that are not yet in service. I estimate the cross-state design of Equation (2) on two such measures, and Panel A of Table 2 reports the estimates. The first is annual capital expenditure, scaled by lagged total assets, which records what the utility spent on capital assets during the year. It is 1.4 percentage points higher in treated utilities, significant at the ten percent level. Panel A of Figure 2 traces the same outcome in event time. The pre-adoption coefficients are flat and statistically indistinguishable from zero, and the increase appears only after

[15] Heating degree days (HDD) and cooling degree days (CDD) measure how far daily average temperature falls below or rises above a 65-degree Fahrenheit baseline, accumulated over the year. They are standard proxies for weather-driven electricity demand.

adoption, which supports the parallel-trends assumption the design rests on. The second measure is the construction-work-in-progress balance, also scaled by lagged total assets, which records the accumulated cost of construction the utility has begun but not yet placed in service. It is 2.9 percentage points higher.[16] The two measures capture different stages of the same behavior. Treated utilities spend more on capital, and more of what they have spent sits in projects that are still under way.

Next, I complement the financial-statement evidence by looking directly at the construction of electricity generating plants, the largest component of a utility's capital assets. I use EIA Form 860 data, which records construction timelines for each generating unit within a plant. The outcomes are the number of new construction starts, the megawatts of those new starts, and the utility's built capacity in year t, each measured for a utility in a state in a given year.[17] Panel B of Table 2 reports the estimates. Consistent with the financial-statement results, construction volume rises on all three measures. Treated regulated utilities record about 0.45 more construction starts per year, about 25 more megawatts of new starts, and about 219 more megawatts of built capacity after adoption. Taken together, CWIP raises investment both in the dollars the utility commits to construction and in the generating capacity it actually puts in the ground.

4.2 Construction Timing

Next, I ask if CWIP changes the construction process. A construction project passes through four milestones. The utility files for approval, the commission approves the project, the utility breaks ground and construction begins, and the plant reaches commercial operation.[18] The two accounting regimes differ in which milestone starts the cash inflow. Under traditional AFUDC accounting, recovery begins only when the plant reaches commercial operation. Under CWIP, it begins when the utility breaks ground. That difference pulls completion time in two opposing directions. Because AFUDC pays nothing until the plant operates, the utility has a strong reason to finish quickly and begin earning, whereas CWIP lets it earn during construction and so weakens that

[16] In untabulated results, two further financial-statement measures point the same way. Net utility plant in service per megawatt-hour sold and the year-on-year growth in production plant are both higher after adoption and statistically significant.

[17] Built capacity is the sum of the nameplate capacity of every generating unit the utility has in service in that year. Nameplate capacity is the maximum output a unit is rated to produce, measured in megawatts.

[18] Online Appendix O.8 lays out these four stages in detail and contrasts how AFUDC and CWIP recover construction costs at each one.

urgency. Taken alone, this would slow completion. But waiting for recovery also means the utility must fund the build out of its own constrained cash while earning nothing, and that financing pressure can itself hold up construction. CWIP delivers cash during construction and eases the pressure, which would speed the build. CWIP also changes when a project starts. Under AFUDC the utility recovers nothing until the plant operates, so it can pay to delay breaking ground until demand and construction-cost uncertainty resolve. CWIP begins recovery as construction proceeds and resolves that uncertainty in stages, so waiting is worth less and the utility commits sooner.

This analysis uses EIA Form 860 data, which records project milestones for individual generating units from proposal to completion. The unit of observation is the construction project, so a project enters once, and each outcome is restricted to projects observed at every stage. A project's timeline is fixed by when it was built rather than by the calendar year, so I date treatment by the year construction began. I modify Equation (2) as

$$Y_{i,c} = \delta \left(\text{Treat}_{i,c} \times \text{Const_Post}_{i,c} \right) + X'_{i,c}\gamma + \alpha_{u \times c} + \alpha_{s \times c} + \alpha_{t \times c} + \varepsilon_{i,c}, \tag{3}$$

where i indexes a construction project undertaken by utility u in state s with construction-start year t, and $\text{Const_Post}_{i,c}$ equals one for a project whose construction started in or after cohort c's adoption year. The terms $\alpha_{u \times c}$, $\alpha_{s \times c}$, and $\alpha_{t \times c}$ are utility-by-cohort, state-by-cohort, and start-year-by-cohort fixed effects. I also report each outcome twice, once with the utility-by-cohort fixed effect and once without it. With the fixed effect, the estimate comes only from how a given utility's own projects change after adoption. Without it, the estimate also picks up a change in which utilities are building. Reporting both is necessary because CWIP can move either margin. It can change how a utility builds, and it can change which utilities build at all. The columns without the utility fixed effect cluster at the state-by-cohort level.

I begin with the completion delay, the number of years by which a project's realized completion date runs past the date originally filed for it at approval. Columns (1) and (2) of Table 3 show that projects reach commercial operation about 1.8 to 2.0 years sooner under CWIP, so CWIP leads utilities to finish sooner. Panel B of Figure 2 traces the same outcome in event time and shows flat,

statistically insignificant pre-adoption coefficients.

Next, I examine which stage is driving the results. I split the project timeline at groundbreaking into two stages. The first stage is the post-approval gap, the time from approval to groundbreaking. Columns (3) and (4) show that it shrinks by about 0.34 to 0.78 years, so once a project is approved, treated utilities move into construction sooner. The second stage is the construction time, the time from groundbreaking to commercial operation. Columns (5) and (6) show that it is shorter as well, by about 1.3 to 1.9 years, but the estimate is statistically significant only in the column without the utility fixed effect. That pattern suggests the shorter build is not something a given utility achieves on its own projects. It is more likely to reflect a change in which utilities are building, and in what they choose to build, after adoption.

The faster completion could be a filing artifact rather than a real acceleration, since delay is measured against the schedule the utility itself filed at approval, and a utility that filed a longer schedule would post a shorter delay without building any faster. The planned duration does not move, so treated utilities do not file longer schedules. In untabulated results the interval between filing and approval does not differ either, so the result is not driven by quicker regulatory approval.

Read together, the results describe a compressed timeline. The completion delay falls whether or not the utility fixed effect is included, while the construction time falls only without it. It indicates that the earlier completion is pervasive, appearing both within a utility and across the set of utilities that build, while the shorter build after groundbreaking is concentrated among the utilities that begin building under CWIP rather than among those already building. On net, CWIP speeds projects along, and the evidence is strongest for the stages before groundbreaking.

4.3 Is It Over- or Under-investment?

The results so far show that CWIP raises the volume of construction and makes the process faster. More building does not by itself reveal whether CWIP pushes utilities toward over-investment or corrects earlier under-investment. I look into four dimensions of the investment and construction process to provide insights on the question. The first is the capital intensity of what is built. The second is where in the project timeline started projects are abandoned. The third is how intensively the new capacity runs once it enters service. The fourth is whether utilities keep their older assets

in service longer. None of the four is a welfare benchmark, but together they characterize what is being built and how it is used, and help indicate whether the extra building looks more like over-investment or not.

4.3.1 Capital Intensity

I first ask what kind of capacity the extra building adds. Because a utility earns its allowed return on every dollar of capital, the classical prediction is that regulated utilities over-capitalize, favoring more expensive, capital-intensive plant (Averch and Johnson, 1962). I measure capital intensity with a rank that orders generator technologies from the cheapest to the most expensive per kilowatt within the broader U.S. construction sample, running from one (cheapest) to eight (most expensive).[19] I estimate Equation (3) on this rank. Panel A of Table 4 shows that the rank falls by 1.90 toward the cheaper end, with treated regulated utilities averaging 1.9 against 4.3 for never-treated, a decline of about a quarter of the full scale and roughly seven-tenths of a standard deviation. The capacity added under CWIP is cheaper per kilowatt, not more expensive, so the buildout does not take the gold-plating form that the classical over-capitalization prediction implies.[20]

4.3.2 Project Cancellation

The results so far speak to projects that reach completion and say less about projects that are abandoned. A project can be canceled at either of two stages, before construction starts or after it is under way. I therefore split cancellations into two groups, projects canceled before groundbreaking and projects canceled after construction has begun. Relative to traditional AFUDC accounting, CWIP does not change the decision for the first group, because canceling before construction carries the same financial implication under both regimes, since CWIP recovery does not begin until construction starts. What CWIP changes is the cost of walking away once construction has started. Once a project breaks ground, the utility begins recovering its construction spending. If the project

[19]The rank is ordinal and encodes only the ordering of technologies by installed cost. Online Appendix O.9 re-estimates the specification using each technology's overnight capital cost per kilowatt in place of the rank, drawn from the EIA Annual Energy Outlook cost assumptions. Overnight cost is what a unit of capacity would cost to build if it could be built instantly, so it counts construction cost alone and excludes the financing charges that accumulate while the plant is being built. Valued at the 2003 and 2010 cost schedules, which are contemporaneous with the sample's construction decisions, treated utilities build capacity that is roughly $863 and $1,249 per kilowatt cheaper, corroborating the rank result.

[20]Under CWIP the build tilts toward cheaper natural gas and away from coal, the same shift toward cheaper capacity that the capital-intensity rank captures. The full estimates are reported in Online Appendix Table O.9.2.

is then canceled, the utility in some cases still recovers what it has already spent, and even where the commission later claws that recovery back, the utility loses less on a present-value basis than it would under AFUDC. CWIP therefore lowers the penalty for abandoning a project mid-construction, which may lead utilities to break ground on marginal projects that under traditional accounting they would have canceled before construction began.

I begin with cancellation after groundbreaking. I estimate Equation (3) unchanged, the same specification used for the construction-timing outcomes. Treatment is dated by the construction-start year, and *Const_Post* equals one for a project that broke ground in or after its cohort's adoption year. The outcome, *Cancel_after_construction*, equals one for a project that broke ground and was then canceled before reaching commercial operation. Each project contributes a single observation. Columns (1) and (2) of Panel B of Table 4 report the estimates. With the utility-by-cohort fixed effect, in column (1), treated regulated utilities are about 14.9 percentage points more likely to cancel a project mid-construction than never-treated regulated utilities. Without that fixed effect, in column (2), the estimate is about 8.1 percentage points and is no longer statistically significant. Both columns are positive, and the estimate is sharper in column (1), where the comparison runs among the projects of a single utility, those it broke ground on after adoption set against those it broke ground on before.

I next turn to cancellation before groundbreaking. The outcome, *Cancel_before_construction*, equals one for a project that was proposed but abandoned before ever breaking ground. Because these projects never break ground, no construction-start year exists for them, so I replace *Const_Post* in Equation (3) with *Prop_Post*, which equals one for a project proposed in or after its cohort's adoption year, and replace the start-year-by-cohort fixed effect with a proposal-year-by-cohort fixed effect. These columns rest on fewer projects. EIA Form 860 records a distinct proposal year for only about 40 percent of projects, against roughly 80 percent with a construction-start year, so the before-groundbreaking columns are estimated on about 1,100 projects against about 2,200 after.[21] Columns (3) and (4) of Panel B show that

[21] Because a proposal year is recorded for only part of the sample, these columns are estimated on a selected subset. If a proposal year is more likely to be recorded for projects that advanced further, the subset under-represents the projects most likely to be dropped in planning, which would attenuate the estimated decline rather than manufacture one.

treated regulated utilities that propose a project after CWIP adoption are markedly less likely to see it abandoned before groundbreaking than never-treated regulated utilities. The estimated magnitudes are implausibly large, so I read the sign of this result and not its size.

The two sets of columns imply that cancellation moves from before groundbreaking to after it, and I test that move more directly by asking, among projects that were canceled, at which stage the cancellation happened (Online Appendix Table O.5.1). For treated utilities the share of canceled projects that had already broken ground rises from 0.17 to 0.55 after adoption, while for never-treated utilities it falls slightly. Because it is computed only among canceled projects, this is descriptive rather than an estimate.

Taken together, the results describe a shift in when projects are abandoned. CWIP begins recovery at groundbreaking, so walking away after construction has started costs a utility less than it would under AFUDC. Projects that would once have been dropped in planning are instead carried into construction and abandoned there, after customers have begun paying for them.

4.3.3 Capacity Utilization

If CWIP leads utilities to build more capacity than the system needs, the newly built capacity should run less than comparable capacity. There is no direct measure of how idle a plant is, so I use two proxies built from EPA Continuous Emissions Monitoring System (CEMS) data, which records the hourly electricity output of fossil-fuel generating units larger than 25 megawatts. The capacity factor is the electricity a unit actually generated over the year divided by the electricity it would have generated had it run at full output the whole year, and it captures how hard the units run. The share of days operating is the fraction of days in the year on which a unit generated any power, and it captures how often the units run.[22] These two outcomes carry a wider event window than the rest of the paper. CEMS records a unit only once it is operating, and a plant built under CWIP does not reach operation until construction finishes several years later. A window of ± 10 years is what lets the post-adoption units appear in their operating phase.[23]

[22] Capacity factor is gross load, the total electricity the unit produced during the year, divided by nameplate capacity, the maximum output the unit is rated for, multiplied by the 8,760 hours in a year.

[23] The CEMS panel covers about half the utility clusters of the EIA panel, which further supports the wider window on the event-time counts.

Panel C of Table 4 reports the estimates from comparing the utilization of fossil generators that came into service under CWIP in treated regulated states with that of comparable generators in the control group. The capacity factor falls by about 9 to 10 percentage points and the share of days operating by about 3 to 4 percentage points. The average unit in the sample runs at about 35 percent of full output and generates power on about 53 percent of days, so the capacity factor falls by roughly a quarter and the share of days operating by under a tenth. The capacity-factor decline holds whether or not the utility fixed effect is included, so it is not driven by a few utilities. The share-of-days decline is significant only with the utility fixed effect.[24]

Lower utilization can arise in two ways. CWIP changes the mix of units a utility operates toward units that are built to run less of the time, or units of a given type run less than they otherwise would. Both are responses to CWIP, so the distinction is about how the lower utilization comes about rather than whether it is there. To separate them I add fixed effects for the fuel a unit burns and the kind of machine it uses to generate, reported in Online Appendix Table O.10.2. Holding generator type constant, the capacity-factor coefficient falls by about 60 percent and what remains is still significant at the 5 percent level, while the decline in the share of days operating disappears.

The two measures above ask how hard the units that are running actually run. A third measure asks instead whether the new capacity is running at all. It is the share of a plant's installed capacity flagged as standby or out of service rather than actively operating. It differs from the first two in what it is computed on. The utilization proxies track operating units year by year, while this measure is keyed to the build vintage of the capacity, comparing capacity brought online after CWIP adoption with capacity built before it. Columns (5) and (6) of Panel C show no increase. The idle share is small and statistically indistinguishable from zero. The lower utilization therefore shows up in how hard the operating units run, not in whole units being parked.

Taken together, the results indicate that the customers begin paying for this capacity while it is under construction, yet once it enters service it generates less electricity per megawatt of rated

[24] Aggregating utilization to the utility-year level gives the same reading. The utility-level estimates, reported in Online Appendix Table O.10.1, indicate that the lower utilization shows up across the utility's fossil generators, not only the newly built units.

capacity than capacity in states without CWIP. However, I cannot say what the right utilization rate is, since some spare capacity is necessary by design to meet peak demand and cover outages. The lower utilization may also reflect capacity built for forecast demand growth that did not materialize, rather than deliberate over-building.

4.3.4 Retirement Decision

The same incentive to build new capacity may also change asset retirement decisions. On one hand, CWIP could lead utilities to keep old plants in service longer. When financing is tight, retiring an old plant and building a replacement is one way to fund new capacity, because it frees the capital tied up in the old asset and avoids its rising upkeep. CWIP delivers cash during construction and loosens that pressure, so utilities can add new capacity without first retiring old assets. On the other hand, the earlier cash flow could instead speed retirement. The replacement can now be financed before the old plant is shut down, and retiring an old plant can help justify the new construction that CWIP rewards. The net effect on retirement timing is therefore an empirical question.

The sample is generators that retired during the analysis window. Panel D of Table 4 reports the estimates on three outcomes, the share of plant capacity retired in the event (the capacity retired in the event as a share of the plant's total rated capacity), the plant's operating capacity at retirement, and the age at retirement. The first two describe the retirement event itself. A larger share of the plant's capacity is retired at once, and the plant has less capacity still running at the moment the retirement is recorded.[25] Both point to plants that are wound down first and retired in a single step, rather than retired unit by unit while the rest of the plant keeps generating.

The third outcome speaks to timing. Generators in treated regulated states retire about 14 years older than those in never-treated regulated states. This estimate is the least stable of the three. It holds only in the column with the utility fixed effect and does not survive the wider event windows reported in Online Appendix Table O.3.1, so I read it as suggestive. What the three outcomes agree on is that formal retirement comes later and in larger pieces under CWIP, after a plant has already stopped generating. The assets stay on the books longer, though the evidence

[25] The latter result is driven by many generators recorded with zero capacity in the year preceding actual retirement. These units had stopped operating well before they were formally retired.

does not show them continuing to serve load.

4.3.5 Takeaway

In summary, I find that the capacity added under CWIP is cheaper per kilowatt, more of the projects that start are abandoned before completion, capacity utilization falls, and older assets are retired later and in larger pieces. Read together, utilities build more, build it cheaply, and run it less. That pattern looks like over-investment, but not the kind the classical prediction describes, since the extra capital goes into more units rather than into more expensive ones. These results speak to direction rather than to level. There is no benchmark for the right retirement age, the right share of capacity to retire, the right utilization rate, or the right cancellation rate, and some spare capacity is necessary by design. The idle capacity and the deferred retirements could also reflect demand forecasts that failed to materialize rather than deliberate over-building, and the design cannot separate the two. Because both arms face the same forecasting uncertainty, the comparison between them still isolates the role of CWIP. What the evidence shows is that CWIP moves utilities toward more capacity, built more cheaply, running less, and retired later. It does not show that the resulting level of capacity is too high.

4.4 What Drives It

Sections 4.1 through 4.3 establish that CWIP raises investment. This section asks what drives that response. Two accounting primitives could produce it. The first is a financing channel. CWIP could ease a binding financing constraint, converting deferred future cost recovery into current cash and relaxing a limit on internally generated funds. The second is an incentive channel. By changing when the utility recovers a construction dollar, CWIP changes the amount and timing of the investment a profit-maximizing utility chooses to make. The two subsections that follow test the financing channel and the incentive channel in turn.

4.4.1 The Financing Constraint

If CWIP relaxed a binding financing constraint, the relief should surface in three places, the utility's internally generated funds, the terms on which it borrows, and the value the market places on its equity.

I start by looking at accrual and cash income items. If the constraint eased, internally

generated funds should grow faster after adoption. Table 5 reports year-over-year growth rates of key financial numbers across the ±5, ±10, and ±15 year windows. The evidence is consistent with growth in the top line. Revenue growth is about 3.7 to 3.8 percentage points higher at the ±10 and ±15 windows. Cash revenue, which adds the change in receivables to operating revenues, grows almost as fast, by about 3.0 percentage points, consistent with CWIP letting the utility bill a return on construction balances earlier. Operating-expense growth rises by a comparable amount at the same time.[26] On the net basis, growth in operating income, net income, and cash flow from operations is indistinguishable from zero at every window. The higher top line does not carry through to the bottom line or to internally generated cash. This makes it less likely that CWIP eases a financing constraint by expanding the internal funds available for investment.

CWIP brings a utility's cost recovery forward into the construction period, which improves the timing of its cash flows and matters directly to its bondholders. Cash flows that arrive earlier should, other things equal, improve the terms on which the utility borrows. I look at three measures, the issuer's credit rating, the coupon at the time of issuance, and the maturity of new debt. The sample is limited to utilities covered by S&P, and I take each measure at the firm-year level, averaging across the utility's newly issued securities within the year.[27] The rating is the S&P long-term issuer rating on a 1 to 22 numeric scale, the coupon is the firm-year average fixed-rate coupon, and the maturity is the firm-year average term of newly issued debt.[28]

Table 6 indicates that the rating and the coupon do not move. The *Treat* × *Post* coefficient on the issuer rating is only 0.07 notches higher and is statistically indistinguishable from zero. The average fixed-rate coupon falls by 0.05 percentage points but is again statistically indistinguishable from zero. The absence of any change in rating or coupon is consistent with the growth results above. With no net cash-flow improvement, there is nothing for the credit market to reward.

The maturity of new debt does move after CWIP. Column (6) of Table 6 shows that

[26]This is not CWIP cost recovery flowing mechanically into expense, since construction spending is capitalized in the CWIP balance rather than run through operating expense.

[27]The results are robust to estimating the same three outcomes at the individual-security (bond-issue) level, with each debt issue entering as its own observation. Online Appendix Section O.13.2, Table O.13.2, reports these estimates. The maturity shortening survives, while the rating and coupon remain indistinguishable from zero.

[28]These firm-year averages give each new security equal weight. The coupon and maturity results are robust to weighting each bond by its face value, the original principal amount. The principal-weighted averages are reported in Online Appendix Section O.13.1, Table O.13.1.

treated regulated utilities issue markedly shorter-dated debt after CWIP, with the firm-year average maturity at issuance falling by 5.85 years. This runs against the usual pattern, in which regulated utilities are among the firms that borrow longest (Barclay and Smith, 1995). The shortening tracks CWIP's retiming of the utility's cash flows, since cost recovery now begins during construction rather than when the plant enters service. Issuing shorter-dated debt matches the term of the debt to that shorter horizon (Stohs and Mauer, 1996). Timing information of this kind shows up in the term of new debt, not in its coupon or the issuer's rating (Diamond, 1991; Goyal and Wang, 2013; Custódio et al., 2013). The shortening reflects the timing of the utility's cash flows, not a risk premium repriced in the term of the debt (Stohs and Mauer, 1996; Guedes and Opler, 1996).[29]

Lastly, I look at the equity side. Equity-market information is available only at the parent-firm level, since that is where the utility is listed. Because a listed parent typically owns subsidiaries in several states, treatment here is not a single adoption date but the parent's continuous exposure to CWIP, so I estimate a two-way fixed effects regression rather than the stacked difference-in-differences used elsewhere. For parent firm i in year t,

$$Y_{i,t} = \beta \, CWIP_exposure_{i,t} + X'_{i,t-1}\gamma + \alpha_i + \delta_t + \varepsilon_{i,t}, \tag{4}$$

where $CWIP_exposure_{i,t}$ is the share of parent i's sales quantity in CWIP-adopting states, α_i is a parent-firm fixed effect, δ_t is a year fixed effect, and controls are measured one year earlier.[30]

Table 7 presents the results. Parent equity value rises with CWIP exposure. Both annual returns and annual returns in excess of the S&P 500 are about 0.061 higher, while return volatility is flat. The combination is what makes the result informative. If the higher return were compensating shareholders for bearing more risk, volatility should have risen alongside it, and it does not. The pattern instead looks like a one-time upward revaluation of expected cash flows. That is what one would expect if the gain from rate-base growth accrues to shareholders rather than to bondholders,

[29] A natural alternative is that CWIP, as a change in the regulatory regime, raises the policy uncertainty the utility faces, which would push maturity the other way, toward longer-dated debt (Datta et al., 2019). The mechanism here runs the other way. CWIP resolves uncertainty about when the utility's construction cash flows arrive rather than adding to it, so it shortens rather than lengthens the financed horizon.

[30] The coefficient answers how the outcome changes as a parent becomes more CWIP-exposed, not what the effect of a single adoption is. The listed-equity sample is selected toward larger and more diversified holding companies. Construction of the exposure measure is detailed in Online Appendix Section O.2.4.

since CWIP shifts the risk of the construction program to ratepayers rather than to the utility's own investors. The revaluation is the first sign of the investment-incentive channel that Section 4.4.2 develops, specifically its return margin, rather than evidence that CWIP relaxes a binding financing constraint.

Taken together, the three pieces of evidence point the same way. None shows the relief a binding financing constraint would produce. Internal funds do not expand, the price of credit does not fall, and equity risk does not decline. What moves instead is timing. Debt maturity shortens and equity revalues upward, both consistent with CWIP pulling the utility's cost recovery forward rather than loosening a limit on the funds available to invest. The evidence that CWIP eases a binding financing constraint is therefore weak, and the equity repricing points instead to the investment-incentive channel that Section 4.4.2 develops.

4.4.2 The Investment Incentive

Another aspect that CWIP can change is utilities' payoff to investing.[31] The payoff moved on two dimensions, which I test separately. Each test asks whether the CWIP response is larger where the payoff moved more, so I add a triple interaction to Equation (2),

$$Y_{i,c,t} = \delta\left(\text{Treat}_{i,c} \times \text{Post}_{c,t} \times \text{Mod}_i\right) + \lambda\left(\text{Treat}_{i,c} \times \text{Post}_{c,t}\right) + X'_{i,c,t}\gamma + \alpha_{i\times c} + \alpha_{t\times c} + \varepsilon_{i,c,t}, \quad (5)$$

where Mod_i is the moderator for the margin being tested, δ measures how much larger the CWIP response is where the moderator is higher, and the remaining lower-order terms are included where the fixed effects do not absorb them. The two margins differ only in what enters Mod_i.

First is the return margin. A utility earns its allowed return on the allowed asset base, so CWIP should matter more in states whose regulatory regime allows a higher return.[32] If a profit-maximizing response to this return margin drives the buildout, the induced investment should concentrate in those states. Since the return margin bears on how much the utility builds, I test it on the cross-state investment and operating-cost responses.

[31] Incentive here is meant in the contracting sense, as the payoff the regulatory formula writes on the utility's accounting base, not as a conflict of interest inside the firm.

[32] I do not measure the allowed rate of return directly. A utility's allowed return is recorded only in the years its commission decides a rate case, so the series is too sparse to use as a moderator, and I use the regulatory regime as a proxy for how generous the allowed return is likely to be.

I measure the regulatory regime using the S&P Global RRA (Regulatory Research Associates) state regulatory ranking, a nine-level ordinal grade oriented so that higher values denote a more utility-favorable environment. I standardize the grade to have mean zero and unit standard deviation, and for utilities operating in more than one state I weight state grades by retail electricity sales. This standardized grade is the moderator Mod_i in Equation (5), so the coefficient of interest is $\textit{Treat} \times \textit{Post} \times \textit{RRA}$, which measures how much larger the CWIP response is where the regulatory regime is one standard deviation more favorable.[33]

Table 8 shows that the triple is positive and significant for both investment measures, capital expenditure scaled by assets and the construction-work-in-progress balance scaled by assets. The $\textit{Treat} \times \textit{Post}$ coefficient at the average regime score becomes indistinguishable from zero on both, indicating that the average investment response of Section 4.1 concentrates in states whose regulatory environment is favorable to utilities.

On the operating-expense side, the same triple on per-unit production operation-and-maintenance expense is negative and strongest at the wider windows. In the more favorable-regime states the post-adoption increase in operating cost per megawatt-hour is not merely smaller but reversed, so the operating-cost consequences of the buildout concentrate in the less favorable environments.[34] Capital earns a return and operating cost does not, so the utility has most reason to favor capital over operating effort exactly where the return on capital is richest. Growth in revenue, total operating expense, and net income does not respond to the regime score (Table 8), so favorable-regime utilities are not simply larger or faster-growing.

I turn next to the timing margin. CWIP also shortens the interval between construction spending and rate recovery. Before CWIP that interval could be long enough that waiting to break ground was worth more than starting sooner, since holding off let the utility learn about demand and construction cost before committing (Teisberg, 1993; Dixit and Pindyck, 1994). This margin bears on when projects proceed rather than on their scale, so its effect should concentrate in states where

[33]The regime index is not a proxy for CWIP itself. Across the fifty-one state jurisdictions, a CWIP indicator explains about 4.5 percent of the variation in the regime score (Online Appendix Table O.2.1).

[34]At the average regime score, per-unit production operation-and-maintenance expense rises after adoption (Online Appendix Table O.15.1). The moderator pattern is not driven by the sold-megawatt-hour denominator, since retail sales volume shows no differential response to the regime score.

the pre-adoption recovery lag was longest. I proxy that lag with the state's historical-test-year policy, which sets rates from actual past-year costs rather than projected costs, and Mod_i in Equation (5) is an indicator for those states.

Table 9 shows that the timing margin loads on the pre-construction stages of the project. The years between approval and ground-breaking fall by an additional 1.4 years in historical-test-year states, and the overall completion delay from proposal falls by an additional 2.3 years.[35] In these same states a larger share of the capacity built under CWIP ends up in standby or out-of-service status, while year-to-year utilization does not move, consistent with a shorter approval-to-commitment window pulling marginal projects into construction (Online Appendix Table O.11.1).

Each moderator moves the outcomes of its own margin and is silent on the other's, which is hard to reconcile with a single omitted factor moving everything at once. A hold-up alternative, in which utilities under-invest because they fear opportunistic ratcheting of allowed returns once capital is sunk, would predict the CWIP response to concentrate in the least utility-favorable states, and the RRA-triple pattern goes the opposite way. What little of the financing story remains is itself a timing-margin response.

4.5 Robustness and Limitations

States do not adopt CWIP at random. If the same rising demand that leads a state to adopt also spurs its utilities to build, part of the post-adoption increase in construction reflects the demand shock rather than the rule. The state policy and demand controls cannot absorb a shock that arrives with adoption timing. As a partial check I ask whether the response is stronger where demand was growing faster before adoption, and find no such pattern (Online Appendix Table O.6.1). The test uses only the treated states and is underpowered, so it is consistent with the rule rather than demand pressure driving the response, but it does not settle the question.

A sharper answer holds the state and year fixed. EIA Form 860 also covers independent power producers, which generate for wholesale sale, do not distribute power, and are not rate-regulated,

[35] Both estimates survive dropping Michigan, the largest single-state historical-test-year observation in the treated block.

so CWIP does not reach them even in an adopting state while they face the same local conditions. Comparing regulated utilities to them within a state and year absorbs any shock common to both and leaves identification to the differential response of the regulated arm (Online Appendix O.4). On the outcomes both designs can estimate, the two agree, with more construction starts, the same negative sign on capital intensity, and more cancellation after groundbreaking. Independent power producers do not file FERC Form 1, so the financial outcomes have no within-state counterpart at all. The generator data do cover them, but an independent power producer chooses its fuel and retires a unit on the basis of wholesale electricity prices rather than on what a commission will allow into the rate base, so it is a poor counterfactual on those two margins as well. I therefore read the financial, fuel-mix, and retirement outcomes off the cross-state design alone.

Two further checks appear in Online Appendix Table O.3.1. Because CWIP is assigned at the state level, I re-estimate every main specification clustering at the state level, which leaves the point estimates unchanged and the inference nearly so. I also re-estimate at seven, ten, and fifteen event years. The capital-intensity, utilization, and mid-construction cancellation results hold their sign and significance at every window, as does the construction-work-in-progress balance. Capital expenditure keeps its sign throughout but is significant only in the main specification, so the construction-work-in-progress balance is the sturdier of the two investment measures. Among the retirement outcomes, the capacity of the retiring plant is significant at every window and the share of the plant retired keeps its positive sign throughout, while the retirement age does not survive, which is why Section 4.3 reads it as corroborating rather than leading.

5 Operational Side Effects

Section 4 establishes CWIP's first-order effect on the investment margin. A full account of CWIP weighs these investment effects against what they cost the customers who fund them. This section takes a step toward that cost-benefit view by asking how CWIP changes a utility's operations. The operating-cost margin already shows one such change, with per-unit production expense rising after adoption (Section 4.4.2). I turn to three further operating-side outcomes that customers experience directly, power outages, residential customer satisfaction, and demand-response program activity, in that order.

The conceptual basis for these tests is the accounting asymmetry that runs through the investment results. Under CWIP, construction spending earns a regulated return from the first day of construction, while operating spending is recovered dollar for dollar with no return. A utility responding to that asymmetry has a weaker incentive to spend on the operating margin, whether by running the existing generating units hard, funding the demand-side programs that substitute for new capacity, or investing in the service quality that customers experience. This prediction rests on the multitask literature, which shows that when a manager's rewarded and unrewarded tasks compete for the same effort, effort flows to the task the measure rewards (Holmström and Milgrom, 1991; Feltham and Xie, 1994). Cost-based reimbursement in other regulated industries shows the same pattern. Hospitals paid on cost shifted resources toward reimbursed cost pools and reversed course once payment became prospective (Eldenburg and Kallapur, 1997). On this view, CWIP adoption should be followed by an erosion of effort on the operating margins that earn the utility no return, in ways customers can feel. New investment can also complement operations, which cuts the other way. Replacing old, inefficient units with newer and more reliable ones lowers maintenance and improves service (Abel and Eberly, 1994). If the capacity CWIP induces retires the least reliable units a utility runs, operating outcomes may improve rather than erode. Whether CWIP helps or hurts the operating margin is therefore an empirical question.

5.1 Power Outages

Outages are the most direct operational outcome a customer experiences. The two industry-standard measures are the System Average Interruption Duration Index (SAIDI), the total minutes a typical customer spends without power in a year, and the System Average Interruption Frequency Index (SAIFI), the number of separate interruptions a typical customer experiences in a year. Each is reported in two versions. The first excludes major event days, which cover extreme weather events and other extraordinary disruptions, and so measures outages under normal operating conditions. The second includes them and measures outages under stress.

I estimate Equation (2) at the utility-state-year level, using the four winsorized log outcomes as dependent variables. The outage data span 2000 through 2024, combining the Lawrence Berkeley National Laboratory 2000–2012 utility reliability compilation with EIA Form 861 for 2013 onward.[36]

[36]The Berkeley compilation reports SAIDI and SAIFI at the utility-state level for 218 investor-owned utilities from

Panel A of Table 10 reports the results. The coefficient on Treat × Post is positive and significant at the one percent level for SAIFI including major event days (column 3), and small and statistically indistinguishable from zero for the other three outcomes. Overall, the evidence indicates that CWIP is associated with more frequent outages when the system is under stress, roughly 28 percent more interruptions per customer on major event days, while showing no association with how long those outages last or with outage frequency under normal conditions.

5.2 Residential Customer Satisfaction

Higher bills and better service pull residential satisfaction in opposite directions. Residential customers pay more per unit sooner, which should lower how they rate their utility. Against this, the additional construction CWIP induces can raise service quality if it replaces older units with newer and more reliable capacity, which would raise satisfaction. Whether satisfaction falls or rises is therefore an empirical question. I measure customer experience with the J.D. Power residential customer-satisfaction survey, the standard residential satisfaction index, measured on a 1,000-point scale and available from 2006. I estimate Equation (2) at the utility-state-year level, restricted to investor-owned distribution utilities. Panel B of Table 10 reports the results. The coefficient on Treat × Post is negative and significant at the one percent level. This corresponds to a decline of approximately 12 points in satisfaction, roughly one-quarter of a within-sample standard deviation. The point estimate is essentially unchanged by the control vector and by adding state-by-cohort fixed effects, and it grows to approximately 23 points under the wider event-time window.

One reading attributes the decline to higher bills during the construction period rather than to service quality. To gauge this channel, Column (3) adds the log of implied residential price (residential revenue divided by residential megawatt-hours sold). Because implied price is itself an outcome of CWIP cost recovery, conditioning on it isolates the share of the satisfaction decline that flows through residential bills. The coefficient on Treat × Post shrinks from approximately −11.94 to −10.66, so higher bills account for roughly 11 percent of the decline under the ±5 window; that share rises to roughly 18 percent at the wider window and roughly 21 percent over the full

2000 through 2015. I name-match its utility labels to the EIA utility identifier and keep 2000–2012 to avoid mixing sources with the EIA Form 861 series that begins in 2013. The graft adds approximately 2,100 utility-state-year cells of pre-2013 outage data that were previously missing from the master panel. The matching workflow is documented in `Code/19_Rely/`.

sample. Most of the decline therefore does not run through the bill, though the bill's share grows over the longer windows. Implied price measures revenue per unit sold rather than the total dollar amount a customer pays, so part of the bill channel is not captured here. I read the satisfaction decline as a description of how customers respond to CWIP, not as a welfare judgment or a separate identification claim.

5.3 Demand-Response Programs

Demand-response programs are an alternative tool utilities can use to manage electricity demand. Under these programs, utilities work with their customers, generally industrial customers, offering discounts and concessions for shifting electricity use to off-peak hours and adopting energy-efficient equipment. They are the canonical operating-side substitute for new capacity, since a kilowatt of avoided peak demand is a kilowatt the utility does not need to build. Regulators have long favored them as a cheaper way to meet peak load than building new generation (Joskow and Marron, 1992; Vollaard and van Ierland, 2009). Because program costs are recovered as operating expense and earn no return, CWIP raises the relative cost of managing demand rather than building for it. The prediction is therefore less demand-side effort.

I estimate Equation (2) on a utility-year panel from EIA Form 861, with three outcomes, an indicator for operating any program (DRP_d), customers enrolled scaled by lagged total customers ($DRP_customers$), and energy-efficiency savings scaled by lagged sales ($Energy_Savings$). Panel C of Table 10 reports the results. The extensive and intensive margins move differently. On the extensive margin, the coefficient on DRP_d is statistically indistinguishable from zero, so treated utilities do not shut their programs down. On the intensive margin, both measures fall. Enrollment declines by approximately 0.051, about five percentage points of the lagged customer base, and energy savings fall by approximately 0.020, about two percentage points of lagged sales. Read together, the two margins say that utilities keep their demand-response programs formally in place while devoting fewer resources to enrolling customers and producing measurable savings, the demand-side counterpart to the operating-cost increase in Section 4.4.2.[37]

[37]The decline could instead reflect customer-side factors, such as lower awareness or income, rather than reduced utility effort. That is less likely here: enrollment reflects both the utility's recruitment effort and customers' willingness to participate, and the demand controls and firm-by-cohort fixed effects absorb the economic conditions most likely to move customer demand on their own. A decline that lands precisely around CWIP adoption points to reduced

Taken together, these results trace the operating-side footprint of a rule designed to ease the financing of capital. The same redefinition of the cost basis that relaxed the constraint on construction spending is associated with a quieter retreat from the demand-side programs that substitute for capacity and a measurable decline in how residential customers rate their utility. None of this is load-bearing for the identification in Section 4, but it sharpens the question the conclusion takes up: whether the capacity CWIP induces is investment the system needed or building for its own sake.

6 Implications for the Data-Center-Driven CWIP Wave

Several states have seen a surge in electricity demand driven by data centers and AI computing. Since this demand is geographically concentrated, the strain falls on particular local systems rather than on the national grid.[38] Missouri is a case in point. It already buys power from neighboring regions to cover what it cannot generate, and data centers that run around the clock would widen that gap (Grumke, 2025). By one estimate, a third to a half of the large data centers due to come online in 2026 will be delayed, with limited power a leading cause (Boudreau, 2026). States have responded differently. Some have moved to turn new data centers away. In 2026 New York became the first state to impose a one-year moratorium on large new data centers, and residents of Monterey Park, California, voted to ban them outright (Reuters, 2026). Others have chosen to accommodate the load. Virginia and some others make large new customers bear their own connection costs, while Missouri, Arkansas, Oklahoma, and others have made CWIP available for new construction since 2024, arguing that utilities cannot otherwise commit to rapid capacity expansion. Appendix A.1 gives a brief case study of Missouri. The historical CWIP wave studied in this paper offers a useful point of comparison for this new wave. These adoptions are too recent to study with the design used above, so I treat the historical wave as a source of insight into the current one rather than a precise forecast of how it will unfold.

The historical wave is informative here because the current one begins from a similar place. The earlier adopters authorized CWIP amid rising demand, and today's adopters face the same pressure from data centers and AI computing, differing mainly in scale and in building against

utility effort rather than customers withdrawing from programs the utility is actively promoting.

[38] Roughly half of U.S. data-center capacity sits in just five regional clusters.

anticipated rather than realized growth. If the current wave follows the same course, utilities in the new CWIP states would expand capacity quickly and at a lower cost per unit, lean on natural gas as the fastest option to bring online, and begin projects they are also readier to abandon. Because that capacity is paid for by customers while it is built, a demand shortfall would leave customers, not the utility, covering capacity that sits underused if the anticipated load never arrives. The same incentives that reward building over operating could also weigh on how well the capacity is run once it is in place.

The announced pipeline already shows the investment side taking shape. Panel A of Table 11 reports the capacity that regulated utilities have planned or begun building and can recover through CWIP, measured against each group's 2024 peak demand. Two groups of states are driving the current wave. The first-time adopters (Arkansas, Missouri, and Oklahoma) authorized CWIP for the first time in this wave. The re-uppers (Indiana, Kansas, and North Carolina) already had CWIP statutes from the earlier wave and, rather than legislating it anew, broadened or reactivated that authority for the data-center buildout.[39] Each group plans new capacity equal to roughly 4 percent of peak, close to the 4.5 percent of the long-standing CWIP states. What stands out is the type of capacity. Almost all of the first-time adopters' planned capacity is natural gas, at 98 percent, and more than half of the re-uppers' is, at 56 percent. So it is not only how much these states plan to build but what they plan to build that resembles the earlier wave. Like the historical adopters, they are turning to gas, the quickest capacity to bring online.[40]

The never-treated states are the opposite of the adopters just described. Without CWIP, they leave new capacity to the market. They plan almost no customer-funded capacity, at 0.8 percent of peak.[41] Their data-center build runs instead through independent power producers, at 23 percent

[39]These current-wave actions all fall after the paper's 2000–2023 estimation window and leave the main analysis untouched. Arkansas, Missouri, and Oklahoma had no CWIP through 2023 and serve as never-treated control states, so their first-time adoption is a post-sample event that does not contaminate the control group. Indiana, Kansas, and North Carolina adopted CWIP in the earlier wave (2002, 2008, and 2007). Their treatment status derives from those adoptions, and the current-wave expansion, being post-sample, adds nothing to it.

[40]Virginia is the exception among the CWIP states. As the current data-center epicenter it plans the largest regulated build, at 16 percent of peak, but that capacity is offshore wind built under a state clean-energy mandate rather than gas.

[41]Most of the large never-treated states have deregulated their generation, so their near-absence of a customer-funded pipeline reflects that shift rather than the lack of CWIP alone. The small never-treated group comprises five small systems, so its percent-of-peak figures are illustrative rather than representative.

of peak in Panel B. Private developers decide when demand justifies new capacity and carry the risk of building it themselves. Across the two panels, the pipeline sorts by who finances construction. Independent producers are building in every group, including the CWIP states. What the CWIP states add is a customer-funded pipeline on top, billed to customers while it is built. The gas is concentrated in that regulated channel, not in the merchant build. Where CWIP is absent, the customer-funded channel is nearly empty and new capacity follows demand through independent producers on their own balance sheets.

The pattern indicates that the demand is common to all of these states. What differs is who bears the risk while the capacity is built. That risk is what the current wave carries forward. The new adopters are authorizing capacity largely against anticipated demand. The historical treated states adopted amid demand that was already rising. The concern is not that CWIP fails to finance construction. The concern is that CWIP puts the risk of a demand shortfall on customers, who pay for capacity while it is built whether or not the load ever arrives. For regulators weighing CWIP today, that is the trade-off the historical wave makes visible. The rule speeds capacity into construction, but it does so by shifting the risk of overbuilding onto customers. Whether the announced pipeline turns into sustained demand is the central open question for the current wave, and one I take up in the conclusion.

7 Conclusion

This paper studies how Construction Work in Progress changes the investment behavior of regulated electric utilities. CWIP is an accounting rule that lets a utility begin earning a return on a plant while it is still under construction, before the plant serves any customers. I use the state-level adoptions between 2001 and 2023 in a stacked difference-in-differences design, and read the earlier wave as a guide to the direction of effects rather than as a literal forecast. CWIP is associated with more building. Treated utilities raise their capital spending and record more construction starts and more megawatts of new capacity than utilities in never-treated states. The building also moves faster. Once a project is approved, construction starts sooner and the construction phase runs quicker, so the gap between a project's originally filed completion date and its actual completion shrinks by about 1.8 to 2.0 years. Whether the extra building moves investment toward an efficient

level or past it is harder to judge. The capacity utilities add costs less per kilowatt, not more, which cuts against the classical concern that a guaranteed return on capital leads utilities to over-capitalize. But the way they build and run that capacity points the other way. Treated utilities abandon more projects once construction is under way, run what they build about 9 to 12 percentage points below the utilization of comparable capacity elsewhere, and defer the retirement of their oldest and largest plants. More capacity enters service, less of it generates, and older capacity stays in service longer, a combination that points more to over-investment than to building at the right level. I read that as a statement about direction, not a welfare judgment, since there is no benchmark for the right level of capacity and some reserve is necessary by design.

The investment response is more consistent with CWIP raising the payoff to investing than with its easing a financing constraint. Revenue and cash collections rise after adoption, but net income and operating cash flow do not, and the credit market leaves the issuer's rating and the price of its debt unchanged. What moves is the structure of financing, not its availability. Utilities issue shorter-dated debt that matches the earlier cash CWIP brings in, and the equity value of their parent companies rises with CWIP exposure without more return volatility. Shareholders capture the upside of a larger rate base, while the risk of a failed project or absent demand passes to the customers who fund construction. Consistent with the return margin of the incentive channel, the buildout concentrates where the state's allowed return is most favorable and fades where it is lean. Consistent with the timing margin, the wait between approval and groundbreaking shortens where the pre-CWIP spend-to-recovery interval was longest, and some of the capacity brought forward this way ends up under-utilized. The same asymmetry reaches operations, because CWIP rewards capital but not the effort of running the plants or serving customers. Residential satisfaction falls by about 12 points on the 1,000-point J.D. Power scale after adoption, utilities let their demand-response programs erode rather than closing them, and customers experience more outages during major storms where CWIP is in force. I present these operating results for a fuller picture, not as core evidence for the investment findings.

For the policy debate, the results reframe what CWIP delivers. States adopting it to attract data centers and meet AI-driven demand are betting both that construction will accelerate and

that the acceleration will serve customers well. The evidence supports the first and cautions on the second. CWIP does finance construction, but it does so by paying utilities to build and by shifting the risk of a demand shortfall onto customers, who pay during construction whether or not the load arrives. The earlier adopters authorized CWIP against expected load growth that, on average, did not materialize, and the current wave is betting on a forward demand shock without even that track record. The debate over CWIP has largely turned on whether it eases a financing constraint. The evidence here suggests the more consequential questions are what the incentive channel, through both its return margin and its timing margin, leads utilities to build, and who bears the risk when demand falls short.

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A Case Studies

I present two case studies that together illustrate the regulatory dynamics driving the current CWIP wave. The first examines Missouri that has pursued linked data center recruitment and CWIP reform strategies. The second examines a contested rate proceeding at Oklahoma Gas and Electric (OG&E) that captures the broader policy debate surrounding CWIP.

A.1 Missouri - Attracting AI Infrastructure

The Kansas City metropolitan area has emerged as one of the most consequential sites of AI infrastructure investment outside traditional coastal technology clusters. Meta completed its first Missouri data center, a $1 billion facility in Kansas City, in August 2025, and Google announced a separate $1 billion investment in Clay County in March 2024. Several larger campuses have since been announced, including a proposed $100 billion, six-building hyperscale complex known as "Project Kestrel."[42]

Missouri's Department of Economic Development was courting ten additional data center prospects with peak electric demands reaching as high as 2,000 megawatts, roughly sixty times the peak demand of the utility's largest single customer as recently as 2024, and comparable to the full output of Ameren Missouri's Labadie coal plant.[43] Serving large new 24/7 loads without new in-state generation was not feasible; attracting those loads without credibly committing to generation expansion was, in the view of state officials, equally infeasible.

Missouri followed with Senate Bill 4, signed by Governor Kehoe in April 2025, which authorised CWIP and explicitly repealed the voter-enacted ban of 1976, a measure Missourians had adopted by referendum in direct response to CWIP-financed nuclear construction. Representative Hurlbert, who carried the bill in the House and represents a district that is home to Meta's Kansas City facility, cited lost large industrial projects due to inadequate power supply as the immediate motivation. [44]

[42]Meta, "Meta's Kansas City Data Center and Upcoming AI-Optimized Data Centers," August 2025; Economic Development Corporation of Kansas City, "Data Center Projects in Kansas City," February 2025; FOX4 Kansas City, "The Cost of AI: How Kansas City's Data Center Boom Could Affect Water, Electricity Rates," January 2026.

[43]STLPR, "Data Centers Have Already Paid Ameren Missouri $28M. If They Come, Everyone's Bills Could Rise," October 20, 2025.

[44]Missouri's Governor Kehoe received approximately $400,000 in campaign contributions from utility companies according to the Energy and Policy Institute. Similarly,the legislator who carried North Carolina's near-simultaneous

A.2 The OG&E Case - Proponents and Opponents in Practice

The Oklahoma Gas and Electric (OG&E) case provides a useful window into how supporters and opponents frame the CWIP debate in practice. OG&E filed an initial capacity request before the new CWIP law took effect, withdrew it once the law passed, then refiled to claim CWIP treatment. While opponents argued this amounted to retroactive application of the statute, the fact that OG&E was willing to restart the entire regulatory process to obtain CWIP treatment signals that the company viewed the financial benefits as substantial enough to outweigh the legal risk and procedural cost of doing so.

OG&E and its supporters argued that CWIP lowers the cost of building new generation by reducing financing costs during construction, and that this benefit ultimately flows to customers through lower total project costs. They pointed to the utility's documented capacity shortfall, with its 2024 Integrated Resource Plan projecting a gap of 1,096 megawatts by 2028 growing to 2,592 megawatts by 2034, as evidence that new investment was urgently needed.[45] Importantly, OG&E did not argue that it was financially unable to proceed without CWIP, but rather that CWIP would lower the overall cost of the project and that customers would be better off as a result. The Oklahoma Attorney General supported this view, arguing the new law made CWIP approval mandatory once the statutory conditions were met.

Opponents, led by AARP[46] and the Oklahoma Industrial Energy Consumers (OIEC), challenged both the economics and the fairness of CWIP. On economics, they argued that customers would not see any net savings for at least 25 years and that the utility was financially healthy enough to proceed without it. On fairness, they raised a concern that customers who relocate before the assets complete their useful life would pay CWIP charges without ever receiving the benefit. The OCC commissioners, who had opposed the legislation from the start, declared it "only benefits the utility company at the expense of the ratepayer" and "goes against 100 years of ratemaking principles."[47]

CWIP bill was a former executive at Duke Energy. These associations do not demonstrate legislative capture, but they illustrate the structural informational advantage utilities hold in regulatory proceedings.

[45] *OK Energy Today*, "OGE Wants Preapproval for Power Expansion and Work in Progress," May 28, 2025.

[46] In utility proceedings AARP intervenes on behalf of residential customers, particularly seniors on fixed incomes who are most exposed to bill increases.

[47] Oklahoma Corporation Commission, public statement of Chair Kim David, May 2025; KGOU, "Oklahoma's

B CWIP Adoption Status by State

The following table classifies all U.S. states by their CWIP adoption status. Panel A presents states classified as Treated, defined as those that enacted CWIP legislation between 2001 and 2023, along with a brief description of the regulatory context surrounding each enactment. Panel B lists Never-Treated states, defined as those that had not adopted CWIP as of the end of the sample period in 2023. Panel C lists Always-Treated states, defined as those where CWIP authorization predates 2001. Always-treated states are excluded from the main difference-in-differences analysis because there is no pre-treatment period available for these firms within the sample window.

Panel A: Treated States (CWIP adopted 2001–2023)

State	Year	Background
Florida	2006	Enacted SB 888 directing the Public Service Commission to establish CWIP mechanisms.
Colorado	2007	Enacted SB 07-100 requiring current recovery of a utility's WACC on the balance of CWIP for transmission facilities.
Louisiana	2007	In 2007, the Louisiana Public Service Commission established precedent through a rulemaking order in Docket No. R-29712
Nevada	2007	Public Utilities Commission of Nevada are allowed to grant CWIP on case by case basis.
North Carolina	2007	Enacted CWIP authorization through SB 3, which bundled CWIP provisions with broader clean energy requirements.
South Carolina	2007	South Carolina authorized CWIP through the Base Load Review Act (Act 16 of 2007) to support financing of two new nuclear units at the V.C. Summer Nuclear Station, one of the most cited cautionary examples of CWIP-financed overinvestment.
Kansas	2008	Kansas authorized CWIP through SB 586, primarily to support nuclear power plants.
Michigan	2008	Enacted CWIP authorization through PA 286, allowing recovery of financing interest on construction work in progress in base rates.
Mississippi	2008	Mississippi authorized CWIP through SB 2793, the Baseload Act, to support Mississippi Power's financing of the Kemper County Energy Facility.
Georgia	2009	Georgia enacted the Georgia Nuclear Energy Financing Act (SB 31) specifically to support Georgia Power's financing of two new nuclear units at Plant Vogtle.
Idaho	2009	Idaho enacted SB 1123, under which a utility can apply to the PUC for a binding order setting CWIP treatment in advance of construction.
Indiana	2002	Indiana passed Senate Bill 29 in 2002, authorizing CWIP for coal gasification and clean energy facilities.
South Dakota	2012	In 2012, the South Dakota legislature authorized phase-in rate plans, which let a utility begin recovering the financing cost of a plant addition before it enters service, subject to Public Utilities Commission approval obtained before construction starts. Black Hills Power was the first utility to use the mechanism, filing in December 2012 for the Cheyenne Prairie Generating Station.

Continued on next page

Largest Utility Company References Criticized Bill in OCC Application," July 25, 2025.

Appendix B continued

Panel B: Never-Treated States (no CWIP as of 2023)
Alaska, Arizona, Arkansas, California, Connecticut, Hawaii, Missouri, Montana, New Hampshire, Ohio, Oklahoma, Pennsylvania, Rhode Island, Wyoming. These states had not enacted CWIP authorization for investor-owned utilities as of the end of the sample period. The absence of CWIP reflects either an explicit legislative or commission decision against it. These states form the preferred control group in the main analysis, as their utilities were not exposed to CWIP at any point during the sample period.
Panel C: Always-Treated States (CWIP predates 2001)
Alabama (1967), Delaware (1970), District of Columbia (1947), Illinois (1973), Iowa (1975), Kentucky (1958), Maine (1976), Maryland (1923), Massachusetts (1990), Minnesota (1975), Nebraska (1990), New Jersey (1972), New Mexico (1999), New York (1971), North Dakota (1965), Oregon (1974), Tennessee (1972), Texas (1900), Utah (1976), Vermont (1972), Virginia (2000), Washington (1976), West Virginia (1999), Wisconsin (1974). These states established CWIP authorization through early legislation or commission precedent, primarily during the nuclear construction era of the 1960s and 1970s. Because these states have CWIP in place throughout the entire sample period, there is no pre-treatment period available for the difference-in-differences design, and they are excluded from the main analysis. They are used as an alternative control group in robustness tests reported in the appendix.

C Regulatory Control Variables

This appendix describes the state-level regulatory policy variables included as controls in the main analysis.

C.1 Multi-Year Rate Plans (*MYP_ d*)

Multi-year rate plans allow state public utility commissions to set utility rates for a fixed period of multiple years, typically two to four, without requiring the utility to file a new rate case in each intervening year. By providing greater revenue certainty over a longer horizon, multi-year plans reduce the regulatory lag that utilities face under annual rate cases and may independently encourage investment by making future cash flows more predictable.

C.2 Performance Incentive Mechanisms (*PIM_ d*)

Performance incentive mechanisms condition a portion of a utility's allowed earnings on measured outcomes against specified benchmarks, which may include reliability targets, energy efficiency program performance, customer satisfaction scores, or carbon reduction goals. States with strong PIMs can therefore exhibit lower operating expenses, better reliability, and higher DSM activity independent of CWIP.

C.3 Revenue Decoupling (*Decoupling_ d*)

Revenue decoupling breaks the direct link between a utility's revenues and the volume of electricity it sells, typically by adjusting rates between rate cases to ensure the utility recovers its authorized revenue regardless of whether sales are higher or lower than forecast. Decoupling is specifically designed to remove the disincentive that utilities face under traditional volumetric pricing to invest in demand-side programs, since efficiency reduces sales and therefore revenues under traditional regulation.

C.4 Securitization (*Sec_ d*)

Securitization allows utilities to recover specific categories of costs, including those arising from project write-offs or storm damage, by issuing asset-backed securities that convert future regulatory receivables into immediate cash. This reduces the risk that a failed or delayed construction project will leave the utility in financial distress, since costs can be ring-fenced and refinanced at lower rates rather than recovered slowly through rate cases. Securitization may therefore independently encourage utility investment by lowering the effective cost of project failure and enabling faster financial recovery after major events.

C.5 Compensation Restriction (*Comp_ d*)

Comp_ d indicates whether the state prohibits the recovery of performance-based executive compensation, such as bonuses tied to financial metrics like net income, through the utility's allowed revenues. In states with such restrictions, utilities cannot pass the cost of incentive pay directly to ratepayers, meaning that a larger share of executive compensation must be funded from shareholder returns rather than from the rate base. Executives in these states therefore have their compensation more directly linked to operational and financial performance outcomes.

C.6 Test Year and Rate Base Measurement (*Historical_ Test_ Year_ d*, *Rate_ Base_ Average*)

Historical_ Test_ Year_ d equals one when the state sets rates using a historical test year, in which allowed revenues are based on costs already incurred, rather than a forward-looking test year based on costs expected in the future.

Rate_ Base_ Average measures the share of states in which the firm operates that set rates on an average rate base over the test period, rather than on the year-end balance. The distinction

affects how fully recent plant additions enter the recoverable base, and therefore the return a utility earns on its most recent investment.

C.7 Commissioner Election (*Election_ d*)

Election_ d captures the share of states in which public utility commissioners are elected by voters rather than appointed by the governor or legislature. The method of commissioner selection affects the independence of the regulatory process and the incentives commissioners face when setting rates and approving utility investments.

C.8 Political Environment (*Governor_ R*, *State_ Control_ R*)

The share of states in which the firm operates governed by a Republican governor and the share with full Republican state legislative control are included to control for the political environment that shapes regulatory appointments, legislative priorities, and the overall orientation of state policy toward utility investment.

C.9 Renewable Portfolio Standard (*RPS_ d*, *RPS_ Target_ Pct*, *RPS_ Voluntary_ d*)

A renewable portfolio standard is a state-level mandate that requires utilities and other load-serving entities to procure or generate a specified and rising percentage of retail electricity from qualifying renewable sources, with non-compliance penalties. The RPS indicator equals one in state-years for which an active RPS with a binding annual target is in force. *RPS_ Target_ Pct* captures the stringency of that mandate, measuring the binding target as a share of retail sales in the year, weighted by the firm's electric revenue share across the states in which it operates. *RPS_ Voluntary_ d* equals one when the state has only a voluntary, non-binding renewable portfolio standard or goal rather than an enforceable mandate, distinguishing states that signal a renewables preference without imposing compliance penalties. RPS programs are the principal state-level instrument acting on generation mix during the 2001–2023 wave.

C.10 State-Level Lagged Electricity Sales (*Lag_ State_ Sales*)

This variable is the one-year lag of total state-level retail electricity sales in megawatt-hours, summed across all distribution utilities reporting to EIA Form 861 in the state. It enters every specification as a state-level demand-pressure control.

D Variable Definition

Variable	Definition
Panel A: Utility-Year Level. Source: FERC-1 unless noted.	
Capex	Capital expenditure scaled by lagged total assets
CWIP	Construction-work-in-progress balance for the electric segment, scaled by lagged total assets
Net_Plant (per MWh Sold)	Net utility plant in service divided by lagged megawatt-hours of electricity sold (FERC-1, EIA-861)
Prod_PPE_Growth	Year-on-year growth rate of production property, plant, and equipment
Construction starts	Number of generating units owned by the utility that began construction in year t (EIA-860)
MW started	Nameplate capacity, in megawatts, of generating units owned by the utility that began construction in year t (EIA-860)
MW built (stock)	Total nameplate capacity, in megawatts, of the utility's built generating units in year t (EIA-860)
Production O&M	Power-production expenses of electric O&M divided by lagged megawatt-hours of electricity sold
Operating expense growth	Year-on-year growth rate of total operating expenses
Operating income growth	Year-on-year growth rate of operating income, defined as operating revenues minus total operating expenses
Net income growth	Year-on-year growth rate of net income
Cash revenue growth	Year-on-year growth rate of cash revenue, defined as operating revenues adjusted for the change in accounts receivable
Cash flow from operations growth	Year-on-year growth rate of cash flow from operations
DRP_d	Indicator equal to one if the utility operated any DRPs in a given year (EIA-861)
DRP_customers	Number of customers enrolled in DRPs scaled by lagged total number of customers (EIA-861)
Energy_Savings	Megawatt-hours saved through demand response programs in year t scaled by utility's megawatt-hours quantity sold in year $t-1$. I multiply it by 100. (EIA-861)
Ln(Total_Assets)	Natural log of total assets
Leverage	Total debt divided by total assets
ROA	Net income divided by lagged total assets
Revenue growth	Year-on-year growth rate of total electricity sales revenues
Tangibility	Net plant in service divided by total assets
Dividends_d	Indicator equal to one if the utility paid dividends in a given year
Panel B: Utility-State-Year Level. Source: EIA-861 unless noted.	
Customer_Sat_Score	J.D. Power residential customer satisfaction score, measured on a 1,000-point scale, aggregating assessments of power quality, billing, communications, and corporate citizenship (J.D. Power)
Ln(Price_Res)	Natural log of the implied residential price, defined as residential electricity revenue divided by residential megawatt-hours sold (dollars per megawatt-hour)
Ln(Sales_MWh)	Natural log of total retail electricity sales in megawatt-hours by firm i in state s in year t
Ln(Total_Capacity)	Natural log of total nameplate generating capacity in megawatts owned by firm i in state s in year t (EIA-860)

Continued on next page

Appendix D continued

Variable	Definition
Ln(SAIDI)	Natural log of the System Average Interruption Duration Index, defined as total customer-minutes without power in year t divided by the number of customers served by firm i in state s. Reported in two versions, "w/ MEDs" includes major event days (storms and other extraordinary disruptions, following the utility's own IEEE 1366 threshold) and "w/o MEDs" excludes them. Data are from the Lawrence Berkeley National Laboratory 2000–2012 reliability compilation for years through 2012 and EIA Form 861 for 2013 onward.
Ln(SAIFI)	Natural log of the System Average Interruption Frequency Index, defined as the number of separate customer interruptions in year t divided by the number of customers served by firm i in state s. Reported in the same "w/ MEDs" and "w/o MEDs" versions as SAIDI and drawn from the same combined Berkeley + EIA Form 861 panel.
Panel C: Plant-Year Level. Source: EIA-860 unless noted.	
Cancel_before_construction	Indicator equal to one for generator spells that were proposed but abandoned before groundbreaking, and zero for spells that reached construction (whether they were later canceled or completed). Defined on the sample of spells with an observed proposal year.
Cancel_after_construction	Indicator equal to one for generator spells that broke ground and were then canceled before reaching commercial operation, and zero for spells that broke ground and reached commercial operation. Defined on the sample of spells with an observed construction-start year.
Generator_size	Natural log of Capacity of the generating unit in megawatts at the time construction began
Plant_size	Natural log of the total capacity of all generating units at the plant in megawatts at the time construction began. Used as the firm-size control in the plant-year standby specifications (EIA-860).
Post-approval gap	Number of years between commission approval and the start of construction (groundbreaking).
Construction time	Number of years between the start of construction (groundbreaking) and the date the unit reaches commercial operation.
Planned duration	Originally expected duration of the project in years, as filed at the time of approval (originally expected completion year minus the project start year).
Completion delay	Realized commercial-operation year minus the originally filed expected-completion year; positive values indicate the unit reached operation later than originally planned.
Capital-intensity rank	Integer ordering of a generator's technology by capital cost per kilowatt from the EIA Annual Energy Outlook 2010 cost table, from one (cheapest) to eight (most expensive): (1) gas combustion turbine, (2) oil, (3) gas combined cycle, (4) wind, (5) hydro, (6) coal, (7) solar, (8) nuclear. A generator is classified as gas combined cycle only above a 300 MW nameplate threshold. (EIA AEO, EIA-860)
Age at retirement	Age of the generating unit in years at the time it retires, computed as the retirement year minus the year the unit entered service
Share of plant retired	Nameplate capacity retired in the event as a share of the plant's total nameplate generating capacity
Plant capacity at retirement	Natural log of one plus the operating nameplate capacity of the plant (in megawatts) at the time a generator at the plant retires; i.e., ln(1 + plant operating capacity).

Continued on next page

Appendix D continued

Variable	Definition
Capacity factor (CEMS)	Annual gross load divided by nameplate capacity in megawatts times 8,760 hours, for fossil generating units larger than 25 megawatts. Aggregated to the utility-year as a capacity-weighted average. (EPA CEMS, EIA-860)
Share days operating	Fraction of days in the year on which a fossil unit larger than 25 megawatts generated any power, from CEMS hourly records. Aggregated to the utility-year as a capacity-weighted average. (EPA CEMS, EIA-860)
Share idle built	Share of a plant's installed nameplate capacity that is held in standby or out-of-service (but not retired) status, at the plant-year level and across all fuel types. The numerator is the nameplate capacity of units flagged as standby or out of service; the denominator is the plant's total installed nameplate capacity. (EIA-860)
Panel D: Treatment Variables. Source: Multiple unless noted.	
Treat	an indicator equal to one for firms operating in at least one CWIP-adopting state
Post	an indicator equal to one for years at or after the year of CWIP adoption in the treated state
Const_Post	an indicator equal to one for generator spells whose construction-start year falls in or after the state's CWIP adoption year, and zero for spells whose construction started before adoption (EIA-860)
Prop_Post	an indicator equal to one for generator spells whose proposal year falls in or after the state's CWIP adoption year, and zero for spells proposed before adoption. Used in place of *Const_Post* when the outcome is defined on the sample of spells that never broke ground (EIA-860)
RRA	The utility's regulatory-return regime score, built from S&P Global's Regulatory Research Associates state ranking (a nine-level ordinal grade oriented so that higher values denote a more utility-favorable regulatory environment), fixed at its 2011–2013 baseline average and z-scored across states. For utilities operating in more than one state the state grades are weighted by retail electricity sales. (S&P RRA, EIA-861)
Panel E: State-Level Policy Controls. Source: Multiple.	
The indicators *MYP_d*, *PIM_d*, *Decoupling_d*, *Sec_d*, and *Comp_d* equal one at the utility-state level if the state has the policy in year t, and at the utility level if any state in which the utility operates does. *Election_d*, *Historical_Test_Year_d*, *Rate_Base_Average*, *Governor_R*, *State_Control_R*, *RPS_d*, *RPS_Target_Pct*, and *RPS_Voluntary_d* are measured at the utility-state level and enter at the utility level as the firm's electric-revenue-weighted share across its states. Appendix C defines each policy in full.	
Panel F: Demand Controls. Source: EIA unless noted.	
GDP_real	Natural log of real state GDP
CDD	Natural log of cooling degree days in state s
HDD	Natural log of heating degree days in state s
Lag_State_Sales	One-year lag of total state-level retail electricity sales in megawatt-hours, summed across all distribution utilities reporting to EIA Form 861 in state s (EIA-861)
Panel G: Credit Ratings, Coupon, and Maturity. Source: S&P.	
S&P LT Rating	S&P long-term issuer credit rating mapped to a 1-22 numeric scale, higher values denoting stronger creditworthiness

Continued on next page

Appendix D continued

Variable	Definition
Average maturity	Firm-year average maturity at issuance on the utility's outstanding fixed-rate debt, in years
Average coupon	Firm-year average coupon on the utility's outstanding fixed-rate debt, in percentage points
rated_d	Indicator equal to one if the listed parent firm carries an S&P long-term issuer rating, lagged one year
Panel H: Equity Returns and Volatility. Source: CRSP.	
ann_ret	Annual stock return of the listed parent firm in year t
ann_ex_ret	Annual stock return of the listed parent firm in year t, in excess of the S&P 500 return
ret_vol_ann	Annualized standard deviation of the listed parent firm's monthly stock returns in year t
idio_vol_ann	Annualized idiosyncratic volatility of the listed parent firm's stock returns, lagged one year
Panel I: Financing-Channel Firm Controls. Source: FERC-1 unless noted.	
Leverage_LT	Long-term debt divided by total assets
Ln(Long_Term_Debt)	Natural log of long-term debt
ST_Leverage	Short-term debt (notes payable) divided by total assets
Op_Margin	Operating income divided by total revenue
Loss_d	Indicator equal to one if income before extraordinary items is negative
Cash_Share	Cash and equivalents divided by total assets
Current_Ratio	Current assets divided by current liabilities
Int_Coverage	Interest coverage, computed as income before extraordinary items plus interest on long-term debt, divided by interest on long-term debt
Cap_Lease_Share	Capital-lease obligations (current plus noncurrent) divided by total assets
SalesGrowth_Vol	Five-year trailing standard deviation of sales growth
OCF_Vol	Five-year trailing standard deviation of cash flow from operations scaled by total assets
CWIP_exposure	Share of a listed parent firm's total megawatt-hour sales originating in CWIP-adopting states in year t (EIA-861)
log_at	Natural log of the listed parent firm's total assets, lagged one year (Compustat)
sale_g	Year-on-year growth in the listed parent firm's sales, lagged one year (Compustat)
tang_at	Net property, plant, and equipment divided by total assets, lagged one year (Compustat)
n_analysts	Number of equity analysts covering the listed parent firm, lagged one year (IBES)

Multiple includes S&P RRA, ACEE, and NARUC reports

Figure 1: Revenue inflow with CWIP vs Without CWIP

This figure illustrates the difference in revenue inflow to a utility under traditional regulation and under CWIP over the life cycle of a new asset. The vertical line marks the point at which the asset enters service and begins delivering electricity to customers. Under traditional regulation (black line), the utility receives no revenue from the new asset during the construction period. Revenue begins only once the asset is operational and is recovered gradually over the asset's useful life through customer bills. Under CWIP (blue line), the utility begins collecting revenue from customers during the construction phase, before the asset delivers any service. Revenue continues after the asset enters service but at a lower level than under traditional regulation, since a portion of the costs has already been recovered during construction. The figure illustrates that CWIP shifts cash collection forward in time, reducing the financing burden during construction at the cost of requiring customers to pay before receiving any service. The figure is adapted from a S&P Regulatory Research Associates (RRA) note.

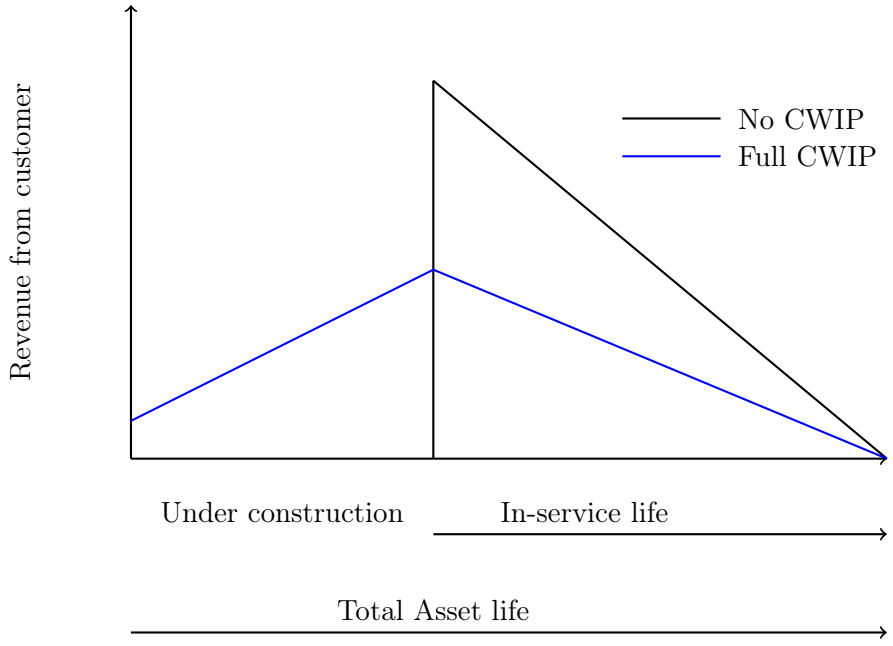
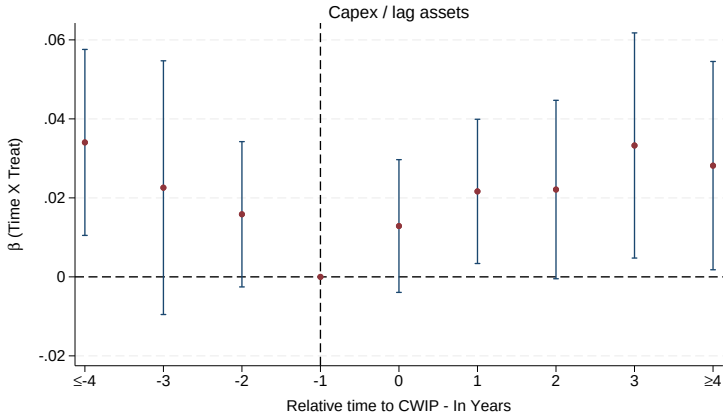


Figure 2: CWIP, Investment Intensity, and Construction Delay: Event Studies

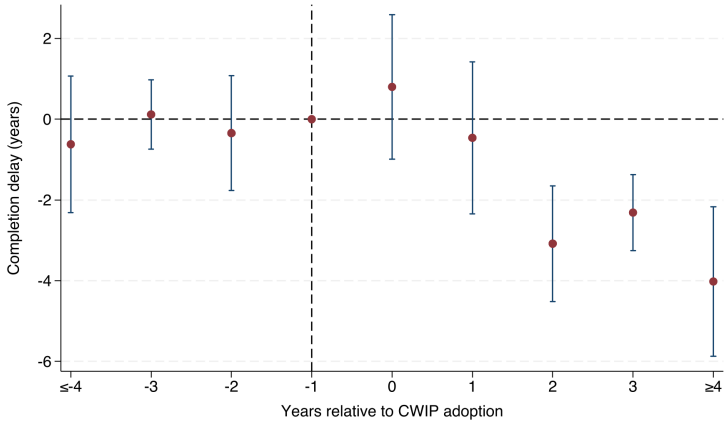
This figure plots the event-time coefficients β_k from an event-study analog of the cross-state stacked difference-in-differences specification in Equation (2),

$$Y_{i,c,t} = \sum_{\substack{k=-4 \\ k\neq -1}}^{4} \beta_k \left(\text{Treat}_{i,c} \times D^k_{c,t}\right) + X'_{i,c,t}\gamma + \alpha_{i\times c} + \alpha_{t\times c} + \varepsilon_{i,c,t},$$

estimated separately for each panel. $\text{Treat}_{i,c}$ equals one for units in the treated regulated arm of cohort c and zero for the never-treated regulated controls. $D^k_{c,t}$ is an event-time indicator equal to one when event year t is k years from cohort c's CWIP adoption year and zero otherwise, with the endpoints ($k \leq -4$ and $k \geq 4$) accumulating the more distant event years; the year before adoption ($k = -1$) is omitted and serves as the base period. $\alpha_{i\times c}$ is a unit-by-cohort fixed effect, $\alpha_{t\times c}$ an event-year-by-cohort fixed effect, and $X_{i,c,t}$ the vector of state-level policy and demand controls. The plotted β_k coefficients trace the treated-versus-control difference in each event year relative to the year before adoption, so the pre-adoption coefficients test whether the two groups followed parallel trends before adoption. In Panel A the dependent variable is annual capital expenditure scaled by lagged total assets, the unit i is the utility, and standard errors are clustered at the utility-by-cohort level. In Panel B the dependent variable is completion delay, the realized completion year minus the originally filed completion year in years, with positive values indicating a delay, the unit i is the generator construction spell, and standard errors are clustered at the state-by-cohort level. The bars are 95% confidence intervals. Variable definitions are provided in Appendix D.



Panel A: Capital Expenditure (Scaled by Lagged Total Assets)



Panel B: Completion Delay Relative to Initial Estimate (Years)

Table 1: Descriptive Statistics

This table reports the number of non-missing observations (N), mean, and standard deviation for the principal analysis variables. To keep the descriptive statistics consistent with the regression evidence, each statistic is computed on the estimation sample of the corresponding regression. *Reg, Treated* and *Reg, Never-Treated* are the treated and never-treated regulated utilities compared in the cross-state design; *IPP, Treated* are the independent power producers that form the within-state comparison group in treated states. The remaining cell of the underlying decomposition, never-treated independent power producers, enters neither estimation sample and is omitted. The financial rows leave the *IPP, Treated* columns blank because FERC Form 1 is not filed by independent power producers. Variable definitions are provided in Appendix D.

	Reg, Treated			Reg, Never-Treated			IPP, Treated		
	N	Mean	SD	N	Mean	SD	N	Mean	SD
Financials (utility-year; FERC Form 1)									
Levels									
CWIP	195	0.073	0.069	364	0.038	0.035			
Capex	195	0.083	0.039	364	0.069	0.038			
Net_Plant (per MWh Sold)	195	183.87	65.27	364	208.08	179.80			
Production O&M	195	43.99	13.55	364	42.61	19.65			
Growth rates									
Prod_PPE_Growth	192	0.071	0.127	246	0.036	0.228			
Revenue growth	195	0.033	0.104	364	0.012	0.117			
Operating expense growth	195	0.030	0.111	362	0.010	0.132			
Operating income growth	195	0.083	0.226	361	0.064	0.281			
Net income growth	190	0.079	0.439	352	0.065	0.451			
Cash revenue growth	195	0.037	0.103	363	0.011	0.119			
Cash flow from operations growth	193	0.265	1.004	358	0.225	0.875			
Construction volume (utility-year; EIA Form 860)									
Construction starts	478	0.383	1.406	541	0.580	3.847	6,139	0.113	0.723
MW started	478	87.2	374.5	541	15.1	86.6	6,139	5.2	47.3
MW built (stock)	478	3,468.0	4,654.0	541	2,209.1	2,777.5	6,139	184.5	458.8
Generator construction (generator spell; EIA Form 860)									
Post-approval gap	305	0.187	0.533	590	0.119	0.420	978	0.191	0.754
Planned duration	286	2.007	2.093	548	1.195	1.258	925	1.042	1.250
Construction time	235	1.319	1.309	454	1.744	1.405	787	1.080	0.595
Completion delay	204	0.451	1.391	414	1.604	1.986	557	0.713	1.274
Capital-intensity rank	305	1.898	1.773	581	4.272	2.863	953	2.355	2.149
Generator retirement (retired generator; EIA Form 860)									
Age at retirement	157	11.280	7.962	102	12.275	9.515	180	16.694	11.463
Share of plant retired	125	0.187	0.209	77	0.244	0.280	124	0.162	0.202
Plant op. cap. at retire (MW)	157	428.5	760.8	102	249.7	410.5	180	31.4	72.4

Table 2: CWIP and Investment

This table reports estimates of the effect of CWIP adoption on investment outcomes using the following *cross-state* design comparing treated regulated utilities to never-treated regulated utilities:

$$Y_{i,c,t} = \delta \left(Treat_{i,c} \times Post_{c,t} \right) + X'_{i,c,t}\gamma + \alpha_{i \times c} + \alpha_{t \times c} + \varepsilon_{i,c,t},$$

where $Treat_{i,c}$ equals one for utilities in the states treated in cohort c's adoption year, $Post_{c,t}$ equals one in event years on or after the cohort's adoption year, $\alpha_{i \times c}$ is a unit-by-cohort fixed effect, and $\alpha_{t \times c}$ is year-by-cohort fixed effect.

Panel A reports firm-level investment outcomes, capital expenditure scaled by lagged total assets and the construction-work-in-progress balance scaled by lagged total assets. Panel B reports utility-year construction-volume outcomes inclusing the count of new construction starts, the megawatts of new construction starts, and the total megawatts of the utility's built capacity. *, **, and *** denote significance at the 10%, 5%, and 1% levels. All variable definitions are provided in Appendix D.

Table 2 (Continued): CWIP and Investment

Panel A: Firm-level investment

	Capex	*CWIP*
	(1)	(2)
Treat × Post	0.014*	0.029**
	(1.78)	(2.55)
Ln(Total_Assets)	-0.054***	-0.021
	(-3.24)	(-1.08)
Leverage	0.085*	0.057
	(1.87)	(0.82)
ROA	0.119*	0.002
	(1.68)	(0.02)
Dividends_d	0.002	0.002
	(0.67)	(0.46)
Revenue growth	-0.009	-0.014
	(-1.04)	(-1.17)
Tangibility	0.015	0.061*
	(0.65)	(1.86)
CDD	-0.012***	0.001
	(-2.83)	(0.22)
HDD	0.008	0.034
	(0.46)	(1.38)
GDP_real	-0.091**	-0.149**
	(-2.39)	(-2.28)
MYP_d	0.029**	0.057***
	(2.12)	(3.20)
PIM_d	-0.001	0.010
	(-0.22)	(1.38)
Decoupling_d	0.008	0.001
	(1.61)	(0.10)
Sec_d	-0.005	-0.016
	(-0.59)	(-1.17)
Comp_d	0.015**	0.014
	(2.46)	(1.61)
Election_d	-0.012	0.029
	(-0.33)	(0.58)
Historical_Test_Year_d	0.061***	0.000
	(3.36)	(0.01)
Governor_R	-0.022***	-0.047***
	(-4.12)	(-7.04)
State_Control_R	0.031***	0.083***
	(4.42)	(7.81)
Lag_State_Sales	-0.003	0.024
	(-0.09)	(0.58)
RPS_Target_Pct	0.367***	0.465**
	(3.27)	(2.25)
RPS_d	-0.012*	-0.028***
	(-1.75)	(-2.70)
RPS_Voluntary_d	0.001	0.024
	(0.03)	(0.73)
N	885	885
Adj. R-squared	0.554	0.383
Unit of Analysis	Utility-Year	
Utility × Cohort FE	Yes	Yes
Year × Cohort FE	Yes	Yes
Clustering	Utility × Cohort	

Table 2 (Continued): CWIP and Investment

Panel B: Construction volume

	Construction starts (1)	*MW started* (2)	*MW built (stock)* (3)
Treat × Post	0.446**	24.666***	218.625**
	(2.150)	(2.710)	(2.260)
MYP_ d	0.443	216.056	88.741
	(0.570)	(1.090)	(0.330)
PIM_ d	0.301	49.126*	105.599
	(1.270)	(1.840)	(1.360)
Decoupling_ d	0.221	12.611	-226.471***
	(1.180)	(0.830)	(-2.610)
Sec_ d	0.061	9.467	24.257
	(0.230)	(0.230)	(0.110)
Comp_ d	0.901	-16.396	187.838***
	(1.480)	(-1.020)	(3.390)
State_ Control_ R	0.079	-37.162**	-309.747***
	(0.270)	(-2.110)	(-4.170)
Governor_ R	-0.043	21.940***	95.001**
	(-0.540)	(2.790)	(2.550)
CDD	0.153***	11.891	4.886
	(2.640)	(1.180)	(0.250)
HDD	1.287	68.698	202.081
	(1.030)	(0.460)	(0.930)
GDP_ real	-1.759	58.447	-66.807
	(-0.980)	(0.650)	(-0.150)
Lag_ State_ Sales	-1.527	24.777	-283.519
	(-1.150)	(0.330)	(-0.600)
RPS_ d	-1.366**	-31.552	38.767
	(-2.370)	(-1.540)	(0.640)
RPS_ Target_ Pct	28.123**	224.217	56.433
	(2.140)	(1.010)	(0.060)
RPS_ Voluntary_ d	-0.249	-29.324	411.722***
	(-1.010)	(-1.160)	(3.600)
Ln(Total_ Capacity)	0.476*	15.430***	1,057.658***
	(1.790)	(2.840)	(7.220)
N	3,138	3,138	3,138
Adj. R-squared	0.273	0.158	0.972
Unit of Analysis		Utility-State-Year	
Utility × Cohort FE	Yes	Yes	Yes
State × Cohort FE	Yes	Yes	Yes
Year × Cohort FE	Yes	Yes	Yes
Clustering		Utility × Cohort	

Table 3: CWIP and Construction Timing

This table reports estimates of the effect of CWIP adoption on construction-stage durations. The *cross-state* design compares treated regulated utilities to never-treated regulated utilities in event-time cohorts:

$$Y_{i,c,t} = \delta\left(Treat_{i,c} \times Const_Post_{c,t}\right) + X'_{i,c,t}\gamma + \alpha_{i\times c} + \alpha_{t\times c} + \varepsilon_{i,c,t},$$

where $Treat_{i,c}$ equals one for utilities in the treated regulated arm of cohort c, $Const_Post_{c,t}$ equals one for spells whose construction-start year falls on or after the cohort's adoption year, $\alpha_{i\times c}$ is a unit-by-cohort fixed effect, and $\alpha_{t\times c}$ is an event-year-by-cohort fixed effect.

The dependent variables are the realized operational year minus the original filed plan ("Completion delay"), the gap in years between regulatory approval and groundbreaking ("Post-approval gap"), the time from groundbreaking to completion ("Construction time"), and the originally planned project duration ("Planned duration"). The control vector X comprises generator size together with state-level regulatory, political, and economic covariates. *, **, and *** denote significance at the 10%, 5%, and 1% levels. All variable definitions are provided in Appendix D.

	Completion delay		Post-approval gap		Construction time		Planned duration	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Treat × Const_Post	-1.780**	-1.979***	-0.778*	-0.336*	-1.914	-1.338**	-1.062	-0.178
	(-2.31)	(-5.24)	(-1.85)	(-1.80)	(-1.60)	(-2.51)	(-1.33)	(-0.27)
Ln(Total_Capacity)	-0.140***	-0.327***	-0.138***	0.033*	-0.102	-0.180***	-0.014	0.193***
	(-3.20)	(-6.60)	(-8.34)	(1.90)	(-1.22)	(-2.70)	(-0.26)	(3.71)
N	1,377	1,400	1,377	1,400	1,377	1,400	1,377	1,400
Adj. R-squared	0.600	0.579	0.669	0.382	0.493	0.457	0.703	0.567
Unit of Analysis	Generator Level							
Utility × Cohort FE	Yes	No	Yes	No	Yes	No	Yes	No
State × Cohort FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Start Year × Cohort FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Clustering	Uti × Co	St × Co	Uti × Co	St × Co	Uti × Co	St × Co	Uti × Co	St × Co

Table 4: Is It Over- or Under-investment?

This table reports estimates from the following cross-state design comparing treated regulated utilities to never-treated regulated utilities in event-time cohorts:

$$Y_{i,c,t} = \delta\,(\mathit{Treat}_{i,c} \times \mathit{Post}_{c,t}) + X'_{i,c,t}\gamma + \alpha_{i\times c} + \alpha_{t\times c} + \varepsilon_{i,c,t},$$

where $\mathit{Treat}_{i,c}$ equals one for utilities in the treated regulated arm of cohort c, $\mathit{Post}_{c,t}$ equals one in event years on or after the cohort's adoption year, $\alpha_{i\times c}$ is a unit-by-cohort fixed effect, and $\alpha_{t\times c}$ is an event-year-by-cohort fixed effect included where indicated by each panel's fixed-effect rows. The timing indicator *Post* takes an outcome-appropriate form that is defined panel by panel below.

Panel A (Capital Intensity) reports the capital-intensity rank, an integer ordering of generator technologies from cheapest to most expensive per kilowatt (lower values indicate cheaper technology), estimated at the generator level. Because a generator's technology is fixed once it is built, *Post* here is *Const_ Post*, equal to one for generators whose construction-start year falls on or after the cohort's CWIP adoption year.

Panel B (Cancellation) reports cancellation outcomes measured before and after groundbreaking. The dependent variable in columns (1) and (2) is *Cancel_ after_ construction*, equal to one for spells that broke ground and were then canceled before reaching commercial operation. The dependent variable in columns (3) and (4) is *Cancel_ before_ construction*, equal to one for spells that were proposed but abandoned before groundbreaking. Because columns (1) and (2) condition on a spell having broken ground, *Post* there is the same *Const_ Post* used in Panel A. In columns (3) and (4) a spell may be abandoned before it ever breaks ground and so has no construction-start year, so *Post* there is *Prop_ Post*, equal to one for spells whose proposal year falls on or after the cohort's CWIP adoption year. Each pair of columns includes a fixed effect for the project milestone that dates treatment. Columns (1) and (2) include a start-year-by-cohort fixed effect and columns (3) and (4) a proposal-year-by-cohort fixed effect.

Panel C (Capacity Utilization) reports capacity-utilization outcomes. Columns 1 through 4 are at the generator-year level and cover fossil generating units larger than 25 megawatts. The dependent variables are the CEMS capacity factor (columns 1 and 2) and the share of days operating (columns 3 and 4). These outcomes measure how hard a unit runs in a given year, so *Post* is the calendar-time indicator that turns on in event years on or after adoption. Columns 5 and 6 are at the plant-year level and report the share of installed capacity held in standby or out-of-service status. Here *Post* is instead a build-vintage indicator that separates capacity brought online after adoption from capacity built before it, because whether a unit sits idle depends on when it was built rather than on the current year.

Panel D (Retirement) is the sample of generators retired in 2001 or later, with dependent variables the share of the plant retired, the log plant capacity at retirement, and the age at retirement. Each outcome is entered in two columns, the second dropping the unit fixed effect.

t-statistics in parentheses. *, **, and *** denote significance at the 10%, 5%, and 1% levels. All variable definitions are provided in Appendix D.

Table 4 (Continued): Is It Over- or Under-investment?

Panel A: Capital intensity of New Projects

	Capital-intensity rank (1)
Treat × *Const_Post*	-1.903***
	(-2.67)
N	2,710
Adj. R-squared	0.731
Unit of Analysis	Generator Level
Utility × Cohort FE	Yes
State × Cohort FE	Yes
Start Year × Cohort FE	Yes
Controls	Yes
Clustering	Utility × Cohort

Table 4 (Continued): Is It Over- or Under-investment?

Panel B: Cancellation Before and After Groundbreaking

	Cancel_after_construction		*Cancel_before_construction*	
	(1)	(2)	(3)	(4)
Treat × *Const_Post*	0.149***	0.081		
	(2.849)	(1.122)		
Treat × *Prop_Post*			−0.690***	-0.332**
			(−19.293)	(-2.353)
N	2,168	2,206	1,108	1,132
Adj. R-squared	0.138	0.164	0.280	0.317
Unit of Analysis		Generator-Spell		
Utility × Cohort FE	Yes	No	Yes	No
State × Cohort FE	Yes	Yes	Yes	Yes
Start year × Cohort FE	Yes	Yes	No	No
Proposal year × Cohort FE	No	No	Yes	Yes
Controls	Yes	Yes	Yes	Yes
Clustering	Utility × Cohort	State × Cohort	Utility × Cohort	State × Cohort

Table 4 (Continued): Is It Over- or Under-investment?

Panel C: Capacity Utilization

	Calendar-year panel				Build-vintage panel	
	Capacity factor		Share days operating		Share idle built	
	(1)	(2)	(3)	(4)	(5)	(6)
Treat × *Post*	-0.097***	-0.086***	-0.042**	-0.025	-0.020	-0.051
	(-3.51)	(-3.26)	(-2.12)	(-1.25)	(-0.85)	(-1.30)
N	32,915	32,916	35,472	35,472	7,205	7,210
Adj. R-squared	0.391	0.341	0.509	0.456	0.363	0.236
Unit of Analysis	Generator-Year				Plant-Year	
Utility × Cohort FE	Yes	No	Yes	No	Yes	No
State × Cohort FE	Yes	Yes	Yes	Yes	Yes	Yes
Year × Cohort FE	Yes	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Clustering	Util × Coh	State × Coh	Util × Coh	State × Coh	Util × Coh	State × Coh

Table 4 (Continued): Is It Over- or Under-investment?

Panel D: Retirement Decision

	Share of plant retired		*Plant capacity at retirement*		*Age at retirement*	
	(1)	(2)	(3)	(4)	(5)	(6)
Treat × *Post*	0.111	0.445***	-9.454***	-5.698***	14.312***	6.775
	(0.39)	(3.26)	(-4.75)	(-4.55)	(2.96)	(1.38)
N	348	364	473	487	473	487
Adj. R-squared	0.232	0.345	0.787	0.667	0.675	0.461
Unit of Analysis			Generator Level			
Utility × Cohort FE	Yes	No	Yes	No	Yes	No
State × Cohort FE	Yes	Yes	Yes	Yes	Yes	Yes
Retire Yr × Cohort FE	Yes	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Clustering	Util × Coh	State × Coh	Util × Coh	State × Coh	Util × Coh	State × Coh

Table 5: Financing Channel: Income-Statement and Cash-Flow Growth

This table reports estimates of the effect of CWIP adoption on the firm's income-statement and cash-flow growth. It uses the *cross-state* design, which compares treated regulated utilities to never-treated regulated utilities in event-time cohorts:

$$Y_{i,c,t} = \delta \left(Treat_{i,c} \times Post_{c,t} \right) + X'_{i,c,t}\gamma + \alpha_{i \times c} + \alpha_{t \times c} + \varepsilon_{i,c,t},$$

where $Treat_{i,c}$ equals one for utilities in the treated regulated arm of cohort c, $Post_{c,t}$ equals one in event years on or after the cohort's adoption year, $\alpha_{i \times c}$ is a unit-by-cohort fixed effect, and $\alpha_{t \times c}$ is an event-year-by-cohort fixed effect. The table reports year-over-year growth rates for following varaibles: revenue, operating expense, operating income, net income, cash revenue (operating revenues plus the change in receivables), and cash flow from operations. Each growth rate is estimated under the full-controls specification across three symmetric event-time windows around adoption (±5, ±10, and ±15 years). t-statistics in parentheses. *, **, and *** denote significance at the 10%, 5%, and 1% levels. All variable definitions are provided in Appendix D.

	$Treat \times Post$		
	±5	±10	±15
Revenue growth	0.032	0.037**	0.038***
	(1.61)	(2.44)	(2.73)
Operating expense growth	0.020	0.032*	0.032**
	(0.86)	(1.78)	(1.99)
Operating income growth	-0.013	-0.017	-0.018
	(-0.28)	(-0.50)	(-0.53)
Net income growth	0.051	0.022	-0.014
	(0.60)	(0.27)	(-0.17)
Cash revenue growth	0.026	0.030**	0.029**
	(1.39)	(2.22)	(2.35)
Cash flow from operations growth	-0.017	-0.086	-0.108
	(-0.13)	(-0.82)	(-1.06)

Table 6: Financing Channel: Credit Quality and Price

This table reports estimates of the effect of CWIP adoption on the firm's credit-market outcomes. It uses the *cross-state* design, which compares treated regulated utilities to never-treated regulated utilities in event-time cohorts:

$$Y_{i,c,t} = \delta\left(Treat_{i,c} \times Post_{c,t}\right) + X'_{i,c,t}\gamma + \alpha_{i\times c} + \alpha_{t\times c} + \varepsilon_{i,c,t},$$

where $Treat_{i,c}$ equals one for utilities in the treated regulated arm of cohort c, $Post_{c,t}$ equals one in event years on or after the cohort's adoption year, $\alpha_{i\times c}$ is a unit-by-cohort fixed effect, and $\alpha_{t\times c}$ is an event-year-by-cohort fixed effect. The table reports three credit-market outcomes: the S&P long-term issuer rating on a 1-22 numeric scale (columns 1-2), the firm-year average coupon on outstanding fixed-rate debt in percentage points (columns 3-4), and the firm-year average maturity at issuance in years (columns 5-6); for each outcome the first column adds fixed effects only and the second adds the full control vector. t-statistics in parentheses. *, **, and *** denote significance at the 10%, 5%, and 1% levels. All variable definitions are provided in Appendix D.

	S&P LT Rating		*Average coupon*		*Average maturity*	
	(1)	(2)	(3)	(4)	(5)	(6)
Treat × *Post*	0.560	0.072	0.056	-0.054	-2.719	-5.850***
	(1.23)	(0.22)	(0.29)	(-0.24)	(-1.42)	(-3.48)
N	1,852	1,852	953	953	1,004	1,004
Adj. R-squared	0.546	0.700	0.508	0.589	0.126	0.244
Unit of Analysis			Utility-Year			
Utility × Cohort FE	Yes	Yes	Yes	Yes	Yes	Yes
State × Cohort FE	Yes	Yes	Yes	Yes	Yes	Yes
Year × Cohort FE	Yes	Yes	Yes	Yes	Yes	Yes
State controls	No	Yes	No	Yes	No	Yes
Firm-finance controls	No	Yes	No	Yes	No	Yes
Clustering			Utility × Cohort			

Table 7: Financing Channel: Public-Parent Equity and Capital-Market Outcomes

This table reports two-way-fixed-effects regressions of three capital-market outcomes on a continuous parent-firm CWIP-exposure measure, using a panel of listed-parent utility holding companies with publicly traded equity from 2001 through 2023. The estimating equation is

$$Y_{i,t} \;=\; \beta\, CWIP_exposure_{i,t} \;+\; X'_{i,t-1}\gamma \;+\; \alpha_i + \delta_t + \varepsilon_{i,t},$$

where i indexes parent-firm CIKs, t indexes calendar years, α_i is a parent-CIK fixed effect, and δ_t is a year fixed effect. The dependent variables are *ann_ret*, the annual stock return (columns 1-2); *ann_ex_ret*, the annual stock return in excess of the S&P 500 (columns 3-4); and *ret_vol_ann*, the annualized standard deviation of monthly returns (columns 5-6). The main independent variable is *CWIP_exposure*, the share of the parent's MWh sales in CWIP-adopting states in year t, constructed by rolling up EIA Form 861 subsidiary sales to SEC-filer CIKs via the PUDL Exhibit 21 parent-subsidiary mapping. For each outcome, the first column includes fixed effects only and the second adds the full control vector; the two columns are estimated on the same sample of parent-firm-years with non-missing controls. All controls are measured at $t-1$. Standard errors are clustered by parent firm and year. In the annual-return column without controls the two-way cluster-robust variance matrix is not positive semi-definite, so that column reports standard errors clustered by parent firm only. t-statistics in parentheses. *, **, and *** denote significance at the 10%, 5%, and 1% levels. All variable definitions are provided in Appendix D.

	ann_ret		*ann_ex_ret*		*ret_vol_ann*	
	(1)	(2)	(3)	(4)	(5)	(6)
CWIP_exposure	0.064**	0.061*	0.061**	0.061**	-0.016	-0.017
	(2.59)	(2.05)	(2.39)	(2.09)	(-1.07)	(-1.41)
log_at		-0.034		-0.042		0.044**
		(-1.09)		(-1.20)		(2.54)
sale_g		-0.065		-0.056		0.032*
		(-1.54)		(-1.46)		(1.84)
tang_at		-0.082		-0.061		0.011
		(-0.62)		(-0.40)		(0.18)
rated_d		0.002		0.006		0.001
		(0.17)		(0.41)		(0.17)
n_analysts		-0.003		-0.003		0.001
		(-1.00)		(-1.09)		(1.11)
idio_vol_ann		-0.059		0.084		0.382***
		(-0.41)		(0.45)		(3.46)
N	824	824	824	824	824	824
Adj. R-squared	0.411	0.411	0.491	0.492	0.435	0.496
Unit of Analysis			Parent Company			
Parent Company FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Controls	No	Yes	No	Yes	No	Yes
Clustering			Parent Company + Year			

Table 8: Regulatory-Regime Moderation of the CWIP Response

This table augments the *cross-state* design (treated regulated utilities versus never-treated regulated utilities in event-time cohorts) with a triple interaction between treatment and a continuous measure of regulatory regime:

$$Y_{i,c,t} = \delta\,(Treat_{i,c} \times Post_{c,t} \times RRA_i) + X'_{i,c,t}\gamma + \alpha_{i\times c} + \alpha_{t\times c} + \varepsilon_{i,c,t},$$

where $Treat_{i,c}$ and $Post_{c,t}$ are the cross-state treatment and post indicators and RRA_i is the utility's regulatory-return regime score, built from S&P Global's Regulatory Research Associates state ranking (a nine-level ordinal grade oriented so that higher values denote a more utility-favorable environment), fixed at its 2011–2013 baseline average, sales-weighted across states for multi-state utilities, and z-scored; the control vector $X_{i,c,t}$ additionally includes every constituent lower-order interaction of the triple. Standard errors are clustered by utility-by-cohort. Each dependent variable is a two-row block across three event windows (±5, ±10, and ±15 years). Outcomes are grouped as capital margins (capital expenditure and the electric construction-work-in-progress balance, each scaled by lagged total assets), production operating-and-maintenance expense per megawatt-hour sold, and income-statement growth rates (revenue, operating expense, and net income). t-statistics in parentheses. *, **, and *** denote significance at the 10%, 5%, and 1% levels. All variable definitions are provided in Appendix D.

	Event window		
	±5	±10	±15
Capex			
Treat × *Post*	0.000	0.008	0.010
	(0.05)	(0.95)	(1.11)
Treat × *Post* × *RRA*	0.035***	0.033***	0.033***
	(3.16)	(3.58)	(3.67)
CWIP			
Treat × *Post*	0.003	0.006	0.007
	(0.27)	(0.57)	(0.66)
Treat × *Post* × *RRA*	0.045***	0.042***	0.043***
	(2.67)	(3.09)	(3.29)
Production O&M			
Treat × *Post*	2.80	4.99***	4.64***
	(1.48)	(3.00)	(2.71)
Treat × *Post* × *RRA*	-5.30***	-8.07***	-7.82***
	(-2.85)	(-3.76)	(-3.58)
Revenue growth			
Treat × *Post*	0.059**	0.045**	0.038**
	(2.38)	(2.30)	(2.10)
Treat × *Post* × *RRA*	-0.047	-0.016	-0.002
	(-1.52)	(-0.68)	(-0.07)
Operating expense growth			
Treat × *Post*	0.034	0.027	0.019
	(1.24)	(1.16)	(0.87)
Treat × *Post* × *RRA*	-0.043	-0.018	-0.003
	(-1.17)	(-0.63)	(-0.11)
Net income growth			
Treat × *Post*	0.145	0.115	0.082
	(1.35)	(1.05)	(0.80)
Treat × *Post* × *RRA*	0.026	0.094	0.100
	(0.19)	(0.73)	(0.88)
Unit of Analysis		Utility-Year	
Utility × Cohort FE	Yes	Yes	Yes
Year × Cohort FE	Yes	Yes	Yes
State controls	Yes	Yes	Yes
Firm-finance controls	Yes	Yes	Yes
Clustering		Utility × Cohort	

Table 9: Historical-Test-Year Moderation of the CWIP Response

This table augments the primary design with a triple interaction between treatment and the state's use of a historical rather than a forecast test year in rate-setting, $Historical_\ Test_\ Year_\ d_i \in \{0, 1\}$:

$$Y_{i,c,t} = \delta\,(Treat_{i,c} \times Post_{c,t} \times Historical_\ Test_\ Year_\ d_i) + X'_{i,c,t}\gamma + \alpha_{i\times c} + \alpha_{s\times c} + \alpha_{t\times c} + \varepsilon_{i,c,t},$$

where $Treat_{i,c}$ equals one for utilities in the treated regulated arm of cohort c and $Post_{c,t}$ equals one in event years on or after the cohort's adoption year, and the control vector $X_{i,c,t}$ additionally includes every constituent lower-order interaction of the triple. $Historical_\ Test_\ Year_\ d$ equals one for states that set rates from actual past-year costs rather than projected costs, and so is the natural moderator for states with the longest pre-CWIP wait between construction spending and rate inclusion.

The dependent variables are two construction-timing outcomes, the pre-construction gap between approval and ground-breaking (column 1) and the overall completion delay from proposal (column 2), each estimated on the generator-spell panel (±5 start-year window, strict-observability sample).

Both columns carry the full fixed-effect stack (utility-by-cohort, state-by-cohort, and start-year-by-cohort) and cluster at utility-by-cohort. Cluster-robust t-statistics are in parentheses. *, **, and *** denote significance at the 10%, 5%, and 1% levels. All variable definitions are provided in Appendix D.

	Post-approval gap (yrs) (1)	Completion delay (yrs) (2)
$Treat \times Post \times Historical_\ Test_\ Year_\ d$	-1.406^{**}	-2.311^{**}
	(-2.09)	(-2.04)
N	1,377	1,377
Adj. R-squared	0.672	0.600
Unit of Analysis	Generator-Spell	
Utility × Cohort FE	Yes	Yes
State × Cohort FE	Yes	Yes
Start-yr × Cohort FE	Yes	Yes
Firm and state controls	Yes	Yes
Clustering	Utility × Cohort	

Table 10: CWIP and Operational Side Effects

This table reports estimates of the effect of CWIP adoption on three operating-side outcomes that customers experience directly, power outages (Panel A), residential customer satisfaction (Panel B), and demand-response and energy-efficiency program activity (Panel C), using the *cross-state* stacked difference-in-differences design, which compares treated regulated utilities to never-treated regulated utilities in event-time cohorts:

$$Y_{i,c,t} = \delta\,(\mathit{Treat}_{i,c} \times \mathit{Post}_{c,t}) + X'_{i,c,t}\gamma + \alpha_{i\times c} + \alpha_{t\times c} + \varepsilon_{i,c,t},$$

where $\mathit{Treat}_{i,c}$ equals one for utilities in the states treated in cohort c's adoption year, $\mathit{Post}_{c,t}$ equals one in event years on or after the cohort's adoption year, $\alpha_{i\times c}$ is a unit-by-cohort fixed effect, and $\alpha_{t\times c}$ is a year-by-cohort fixed effect. All panels are restricted to investor-owned distribution utilities, and standard errors are clustered at the utility-by-cohort level.

Panel A (Power Outages) reports the two industry-standard outage metrics at the utility-state-year level, with an additional state-by-cohort fixed effect $\alpha_{s\times c}$. *SAIDI* (System Average Interruption Duration Index, columns 1–2) measures the total minutes without power per customer per year. *SAIFI* (System Average Interruption Frequency Index, columns 3–4) measures the number of separate interruptions per customer per year. Each metric is shown twice, once including major event days ("w/ MEDs," the industry term for storms, ice events, and other extraordinary disruptions) and once excluding them ("w/o MEDs," the normal-conditions measure). All four outcomes are in log form and winsorized at the 1st and 99th percentiles within ownership-by-distribution buckets. The sample combines the Lawrence Berkeley National Laboratory 2000–2012 utility reliability compilation (name-matched to the EIA utility identifier) with EIA Form 861 for 2013–2024, restricted to the never-treated and 2001–2023 CWIP cohorts. Only the coefficient of interest is displayed. The full control-coefficient panel is in Online Appendix Table O.7.8.

Panel B (Residential Customer Satisfaction) reports the J.D. Power residential overall satisfaction score, *Customer_Sat_Score*, measured on a 1,000-point scale and restricted to the post-2006 sample, estimated on a symmetric ±5 event-time window around CWIP adoption, with an additional state-by-cohort fixed effect $\alpha_{s\times c}$. Column (1) omits controls. Column (2) adds the demand-side, policy, and political control vector. Column (3) additionally conditions on the log of implied residential price as a post-treatment mediator, so the coefficient on *Treat* × *Post* in column (3) measures the effect of CWIP on satisfaction net of the residential-bill channel rather than a more fully controlled total effect. Column (3) drops *Lag_State_Sales*, which is mechanically collinear with implied residential price, from the control vector. For brevity the panel displays only *Ln(Price_Res)* and *Lag_State_Sales*.

Panel C (Demand-Response Programs) reports demand-response and energy-efficiency program activity from EIA Form 861 at the utility-year level, estimated on the same ±5 event-time window. Columns (1) and (2) report *DRP_d* (an indicator equal to one if the utility operates any demand-response program). Columns (3) and (4) report *DRP_customers* (customers enrolled in time-response programs scaled by lagged total customers). Columns (5) and (6) report *Energy_Savings* (megawatt-hours saved through energy-efficiency programs scaled by lagged total sales, in percent). Within each pair, the odd-numbered column omits controls and the even-numbered column includes the demand-side, policy, and political control vector. For brevity the panel reports only the coefficient of interest.

t-statistics in parentheses. *, **, and *** denote significance at the 10%, 5%, and 1% levels. All variable definitions are provided in Appendix D.

Table 10 (Continued): CWIP and Operational Side Effects

Panel A: Power Outages

	Ln(SAIDI)		*Ln(SAIFI)*	
	with Major Events (1)	w/o Major Events (2)	with Major Events (3)	w/o Major Events (4)
Treat × *Post*	−0.219	+0.110	+0.249***	−0.037
	(−1.46)	(+1.46)	(+4.07)	(−0.37)
N	2,162	2,505	1,734	2,502
Adj. R-squared	0.035	0.051	0.065	0.035
Unit of Analysis	Utility-State-Year			
Utility × Cohort FE	Yes	Yes	Yes	Yes
State × Cohort FE	Yes	Yes	Yes	Yes
Year × Cohort FE	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes
Clustering	Utility × Cohort			

Table 10 (Continued): CWIP and Operational Side Effects

Panel B: Residential Customer Satisfaction

	Cross-State		
	Customer_Sat_Score		
	(1)	(2)	(3)
Treat × *Post*	-12.538***	-11.944***	-10.664***
	(-5.68)	(-3.97)	(-3.59)
Ln(Price_Res)			-21.349**
			(-2.60)
Lag_State_Sales		52.380***	
		(4.41)	
N	573	414	414
Adj. R-squared	0.904	0.913	0.907
Unit of Analysis		Utility-State-Year	
Utility × Cohort FE	Yes	Yes	Yes
State × Cohort FE	Yes	Yes	Yes
Year × Cohort FE	Yes	Yes	Yes
Controls	No	Yes	Yes
Bill-Pass-Through Mediator	No	No	Yes
Clustering		Utility × Cohort	

Table 10 (Continued): CWIP and Operational Side Effects

Panel C: Demand-Response Programs

	Cross-State					
	DRP_d		*DRP_customers*		*Energy_Savings*	
	(1)	(2)	(3)	(4)	(5)	(6)
Treat × *Post*	0.020	-0.098	-0.029***	-0.051***	-0.008	-0.020**
	(0.38)	(-1.57)	(-4.56)	(-4.04)	(-1.33)	(-2.57)
N	3,476	3,154	3,469	3,154	3,469	3,154
Adj. R-squared	0.719	0.759	0.397	0.444	0.539	0.635
Unit of Analysis			Utility-Year			
Utility × Cohort FE	Yes	Yes	Yes	Yes	Yes	Yes
Year × Cohort FE	Yes	Yes	Yes	Yes	Yes	Yes
Controls	No	Yes	No	Yes	No	Yes
Clustering			Utility × Cohort			

Table 11: The Announced Generation Pipeline by CWIP Status: The Data-Center-Driven Wave

This table describes the announced generation pipeline as of the EIA Form 860 2024 vintage, grouping states by their CWIP status. Six groups are shown. Virginia, the current data-center epicenter, on its own. The three first-time adopters (Arkansas, Missouri, Oklahoma) that enacted CWIP for the first time in the current wave. The three re-uppers (Indiana, Kansas, North Carolina) that expanded CWIP authority in the current wave. The 33 long-standing CWIP states that allowed CWIP before the current wave. Finally, the never-treated states, split at the group median 2024 summer peak into 5 large and 5 small systems. Panel A covers regulated utilities (the Electric Utility sector), for which CWIP recovery applies; Panel B covers independent power producers (IPPs), which are not rate-regulated and finance construction on their own balance sheets. For each group, proposed capacity is the summer rating of all announced units (planned plus under construction), reported in megawatts and as a percent of the group's 2024 summer peak demand; gas share is the megawatt share of that capacity whose primary energy source is natural gas; and the final column reports capacity that came online during 2020–24, also as a percent of peak, as a recent-build benchmark.

	States (N)	Proposed cap. (MW)	Proposed cap. (% of peak)	Gas share (%)	Online 2020–24 (% of peak)
Panel A: Regulated utilities (Electric Utility sector)					
Virginia (data-center epicenter)	1	4,287	16.0	0.0	5.0
First-time adopters (AR, MO, OK)	3	3,033	3.7	98.1	4.2
Re-uppers (IN, KS, NC)	3	3,296	4.1	55.9	3.0
Long-standing CWIP (other)	33	30,609	4.5	61.4	5.1
Large never-treated	5	1,480	0.8	16.3	1.2
Small never-treated	5	632	7.4	0.0	14.8
Panel B: Independent power producers					
Virginia (data-center epicenter)	1	3,472	12.9	0.1	10.4
First-time adopters (AR, MO, OK)	3	6,129	7.6	0.1	6.1
Re-uppers (IN, KS, NC)	3	8,780	11.0	0.2	9.4
Long-standing CWIP (other)	33	160,711	23.4	4.3	13.4
Large never-treated	5	44,714	23.1	2.1	19.0
Small never-treated	5	8,600	100.8	0.0	25.9