www.energyinnovation.org
98 Battery Street; San Francisco, CA 94111
power@energyinnovation.org

# DEPRECIATION AND EARLY PLANT RETIREMENTS

BY RON LEHR AND MIKE O'BOYLE ● DECEMBER 2018

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*The rapid cost decline of renewable energy means the cost of running coal generation now exceeds the all-in cost of replacing it with wind and solar in many parts of the United States. This cost crossover is causing rapid reconsideration of the prudency of allowing existing coal generation to continue operating, particularly for regulated investor-owned utilities that recover plant costs through regulation. Untangling potentially stranded assets and transitioning this unproductive capital into new clean energy resources requires balancing consumer, environmental, investor, and local interests through complicated regulatory proceedings.*

*This series of briefs can help regulators and utility stakeholders navigate these complex proceedings and achieve a fair balance of interests to accelerate the clean energy transition. This four-part series addresses the implications of financial transition, the "steel for fuel" investment strategy, debt for equity swaps to refinance uneconomic assets, and depreciation options and policies.*

## HOW UTILITY ACCOUNTING AFFECTS THE CLEAN ENERGY TRANSITION

The electric utility sector is divided between markets where electricity generation from power plants is competitive, and markets where generation owners receive monopoly protection and some guarantee of cost recovery for their generation investments. In competitive markets, generation owners take on risks that their power plants will become uneconomic when compared to new competitors. Recently, coal generation in these markets has taken a major hit, as the fracking revolution has driven down the price of its main competitor – natural gas. Meanwhile a rapid drop in renewable energy prices (particularly for solar and wind power), paired with robust state and federal policy support for environmentally friendly generation, has allowed these technologies to gain market share as well.

But where generation continues receiving regulatory protection, the transition from old fossil generation plants to newer, cheaper, and cleaner technologies encounters regulatory barriers. In lieu of market-based returns, utilities earn administratively set rates of return on their capital investments in generation, which accrue under a predetermined depreciation schedule. Each subsequent capital investment in a power plant, such as a retrofit to scrub air pollution, will also have its own depreciation schedule. Typically, the useful life of original coal-fired power plant equipment has been 30-40 years when built, which retrofits or other new capital expenditures may extend.

When plants retire before the end of their useful lives, regulators must account for the value remaining on utilities' books. Typically, these "plants in service" and related accounts still hold significant value because of on-going investment to keep them running, particularly where fossil plants are retired earlier than their planned retirement dates. The remaining book value of retired plants, already included in consumers' electricity rates, will stay in rates until regulators decide to change these values. How long these assets continue earning returns for shareholders and costing customers depends on how quickly their remaining asset value depreciates to zero. As a result, depreciation schedules determine starting points for refinancing discussions as part of financial transition from fossil to clean energy.

Like homeowners who refinance home mortgages when interest rates drop, refinancing remaining early-plant investments can save utilities money. The level of savings depends on cost of money for refinancing and how much principal amounts are subject to refinancing. In homeowner terms, that would be how much of a mortgage balance is refinanced. Depreciation schedules determine that starting point when considering refinancing remaining investment balances on early retired fossil plants.

## UNDERSTANDING DEPRECIATION

### DEFINITIONS

Depreciation is a general accounting concept representing costs of tangible assets[1] over their useful lives. Depreciation accounting recognizes asset value reduction over time; for example due to wear and tear a power plant that has operated for ten years has less value than a new one of the same type. However, depreciation is technically an allocation method, allocating a firm's costs to relevant accounting categories, not a valuation method determining asset values.

[1] According to Investopedia, "A tangible asset is an asset that has a physical form. Tangible assets include both fixed assets, such as machinery, buildings and land, and current assets, such as inventory." https://www.investopedia.com/terms/t/tangibleasset.asp

Depreciation determines how assets' balance sheet (or "book") values change over time. In turn, balance sheets provide a starting place for determining assets' market or sale values. Four criteria are applied: asset cost, salvage or residual value, estimated useful life, and a method to apportion cost over asset life.[2] Assets become "impaired" or "stranded" if their expected cash flow is less than their remaining book value—in other words, if the asset is expected to make less money before the end of its useful life than it will cost over that same period.[3]

Depreciation cost accounting, measuring asset value decline over time, allocates original cost over service life. In the regulated utility context, it also records cumulative depreciation costs already recovered through rates in a "depreciation reserve" account representing investment return and deduction from rate base valuation. The book value of tangible assets determines the value of utility "rate base," a value on which the utility is entitled to a fair and reasonable return for its shareholders. All utility depreciation details are within a federal or state regulatory agency's discretion.[4]

Assets' book values are critical inputs for determining a regulated utility's revenue requirement, investor rates of return, and ultimately utility customer prices. This is true both of new plants and capital investments in existing plants, which may extend plant life beyond initial estimates.

Depreciation is one of a larger set of financial and policy questions that arise when utility generation is under consideration for early retirement. That larger set of questions is addressed in "Utility Transition Financial Impacts: From Fossil to Clean,"[5] which introduces issue briefs on particular emerging issues as the electric system transitions toward more clean energy. Several issues accompanying depreciation in the context of financial transition toward clean energy are also described below.

## DEPRECIATION DETERMINES VALUE REMAINING WHEN PLANTS RETIRE EARLY

To achieve least costs and maximum benefits from early plant retirements and replacements, regulators must determine how much value remains in rate base. When plants retire early, stakeholders will immediately reference a state commission's latest plant value determination in the last depreciation case or docket, called "book value." The most recent depreciation case

[2] Most common is "straight line" depreciation that takes into account equal yearly amounts over asset life. Declining balances is another common method. See: https://www.fool.com/knowledge-center/difference-between-straight-line-depreciation-and.aspx There are many other such methods.

[3] When such assets result in a business loss, the loss may be recognized for corporate tax purposes. https://en.wikipedia.org/wiki/Depreciation

[4] FERC's Uniform System of Accounts provides for depreciation accounting for regulated utilities. See: https://www.ferc.gov/enforcement/acct-matts/usofa.asp Utilities might provide depreciation expert testimony from members of the Society of Deprecation Professionals: https://depr.site-ym.com/general/register_member_type.asp The USOA is also used and recommended by state regulators. See: https://pubs.naruc.org/pub.cfm?id=5381A5A2-2354-D714-5192-728574E7A8E8 and see: https://pubs.naruc.org/pub.cfm?id=5379AFF3-2354-D714-51CD-44B8485883BE

[5] "Utility Financial Transition Impacts: From Fossil to Clean" https://energyinnovation.org/wp-content/uploads/2018/11/From-Fossil-to-Clean-Brief_December-2018.pdf

establishes how much investment remains in undepreciated plant balances, defining remaining plant value that needs to be addressed as part of early plant retirement and financial transition away from impaired or stranded assets.

Rather than presenting known and fixed amounts with little discretion or opportunity for adjustment, depreciation can be adjusted several ways. Regulators can lengthen or shorten depreciation schedules. They can also adjust amounts subject to depreciation to include, or exclude, a variety of plant and plant-related expenses. The details matter because they define how much investment remains when plants retire early and impact the time period over which customers pay for these assets.

For equities, the relationship between risk and cost is similar. However, the "cost" of capital for equity cannot be directly observed in the same way. Equity investors have their own risk tolerance and perceived rate of return when making investments, but there is no formal agreement or contract between equity shareholders and corporations like utilities.

Financial transition away from fossil fuel assets poses risks over and above a wide range of factors that may impact cost of capital for utility shareholders, such as regulatory risk, environmental risks, political interventions, fuel price and commodity risks, aging workforces, technological risks, and economic risks.

## UNDEPRECIATED REMAINING PLANT BALANCES

Typically, early retired fossil generating plants have remaining unaddressed undepreciated balances. Utilities set end of life dates based on engineering estimates of how long equipment might last under normal circumstances as productive for original purposes. Remaining undepreciated plant balances are also likely because utility owners respond to regulatory profit incentives to earn equity returns on investments, investing more in plants whenever they can justify such investment.[6]

While depreciation accounts are formally at issue in utility rate cases, commissions will often remove depreciation issues from rate cases to handle them separately. Depreciation accounting, engineering estimates on which it is based, and intergenerational and other equity and rate impacts issues that arise in depreciation regulatory reviews are complex and can be arcane. Handling them separately can more efficiently use regulatory time and assets.

## CHANGING DEPRECIATION BALANCES

If available, a recent commission determination of remaining plant depreciation will determine how much value is at stake in an early plant retirement situation. If a commission has not recently reviewed depreciation for a plant under consideration for early retirement, stakeholders can raise questions about the remaining investment amounts at stake. This is particularly true if

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[6] *Averch, Harvey; Johnson, Leland L. (1962). "Behavior of the Firm Under Regulatory Constraint". American Economic Review. 52 (5): 1052–1069. JSTOR 1812181.*

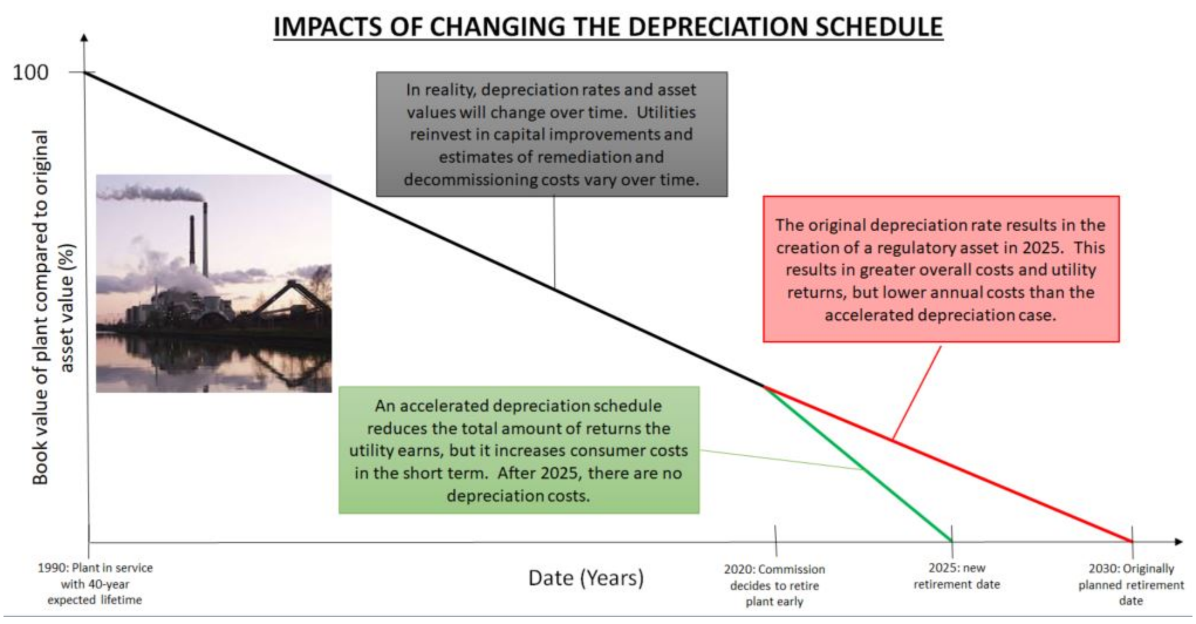
utilities have since invested additional capital in a plant, such as a coal plant retrofit to comply with Clean Air Act regulations.

Both the amount subject to depreciation and length of time over which an asset's costs are depreciated can change when depreciation is reviewed, typically on a periodic schedule—every five years is common. Resolving differences among depreciation approaches, particularly in the context of accelerating plant retirement, requires balancing often contrary stakeholder interests.

## FROM DEPRECIATION TO REGULATORY ASSET

After plants subject to early retirement complete depreciation reviews, commission orders define amounts remaining in new "regulatory asset" accounts, providing the starting point for refinancing discussions.

The first choice before regulators is whether to allow plants to become regulatory assets, or to disallow recovery. Since assets will retire early, they are no longer "used and useful" for providing service for customers and can be taken out of "plant in service" accounts and either removed from the utility rate base or placed in "regulatory asset" accounts. Depending on circumstances under which utilities invested in plants, disallowance is most often an unpalatable choice for utilities and regulators. Regulators more typically consider disallowance in cases of errant utility management decision making.




*An illustrative timeline of the impacts of accelerated depreciation on the value remaining in utility rates.*

Assuming no disallowance, the next decision is how to treat the regulatory asset. Regulatory asset accounts track remaining asset values to be included in rates to pay off remaining utility investments after retirement. Like plants in service, regulatory asset accounts are subject to depreciation. The equity portion of these accounts receives the same regulated rate of return as equity in plant in service assets.  Consumers' rates include both regulatory and plant in service asset accounts.  Regulatory assets represent regulators' decisions to allow recovery of remaining assets in rates including equity returns.

When plants are in service, equity risk premiums are justified by risks that investors in company shares are taking as utilities own and operate plant and equipment.  Once plants retire, these risks are no longer present, so at least an arguable question remains about how much equity return is justified.  Higher equity risks attendant on plant ownership and operation justify higher equity returns.  When the only risk is that regulators might change their minds about full equity returns on "regulatory assets," then less risk might justify lower returns.

Other depreciation policy tradeoffs must be considered within negotiations for early plant retirements.  Much of the content of depreciation policy reviews rests on engineering judgments regarding estimates of remaining useful life, costs to retire and demolish plants, their salvage value, and expense to remediate plant sites.  These can be difficult to ascertain, since they represent aspects of construction costs.  Construction costs vary over time, in concert with interest rates, materials costs, and cyclic factors that result in increasing and decreasing costs depending on when estimates occur.  Values proposed in depreciation cost estimations can depend on when, in terms of construction cycles, estimates occur.  Differing expert opinions in depreciation proceedings are almost inevitable, depending on a mix of real-world factors as well as outcomes sought by parties who present such expert testimony.

Regulators confronting these competing claims and equities will have many opportunities for balancing these disputes.  Reasonable compromises that can satisfy utilities, consumers, and clean energy advocates exist within the options for asset valuation and depreciation timelines.

## UTILITIES INTERESTED IN FULL RECOVERY

Utilities want complete return "of and on" all capital investments represented in regulatory asset accounts.  They will argue that they invested in generation plants in good faith, regulators approved these investments, and shareholders rationally expect rewards for taking significant investment risk.  In exchange for agreeing to early retirement of their plant assets, utilities can also claim they should be fully compensated for their plants' previous life spans.

Depreciation matters in this context because remaining plant balances earning returns depend on time and value assigned to the new depreciation schedule.  Accelerating depreciation to match early retirement dates will appeal to utilities because it improves their cash flow by charging depreciation expense to consumers at higher rates, reducing perceptions of stranding assets.  It limits risks of holding regulatory assets to shorter periods of time.  Accelerating depreciation to match new retirement dates matches cost responsibility with current users.

However, accelerating depreciation reduces future returns.  Utilities that feel their stranded asset risk is negligible may seek to maintain the value of their regulated asset account on the original schedule.  Given the certainty accelerating depreciation grants, there is often room to compromise on the depreciation schedule to accommodate utility expectations.

## CONSUMER ARGUMENTS FOR DISALLOWING FULL RECOVERY

By contrast, consumers could argue that such remaining investments should be disallowed by regulators, in whole or in part, for inclusion in rates. They may contend that utility management decision making about generation plant lives was faulty, and since decisions were faulty, shareholders should bear financial responsibility for some or all remaining plant balances.

Likewise, consumers could assert that shareholders have already been compensated for risks attendant to early retirement via equity risk premiums they earned prior to early retirement. Equity risk premiums represent return on equity encompassing all risks of equity investment, including investment decision making and operations risks—including early retirement. If shareholders have already been compensated for early retirement risks, allowing continued equity return gains on regulatory assets would pay them additional returns for a risk that has already been rewarded, thereby treating consumers unfairly.

Finally, consumers might argue that equity risks attendant on keeping regulatory assets in rates are different, and less than those of operating plants in service. Regulatory assets are only at risk when regulators change their minds about allowing them in rates. Plants in service have more risks of different kinds, justifying higher equity returns.

Accelerating depreciation to match early retirement dates confronts consumers with rate increases, which they generally prefer avoiding. Matching users with cost responsibility is an appealing notion, but must be tempered with rate certainty, gradualism in rate changes, and consumer rate shock concerns.

The relative cost responsibility between current and future consumers is another point of consumer tension. The matching principle in depreciation suggests that matching cost recovery responsibility with consumers benefitting from plant operations provides justification for cost assignment through depreciation schedules. Under this theory, future consumers who are not served by plant investments should not pay for them.

But future consumers do benefit if they can be served sooner by lower-cost clean energy, rather than depending on service from higher cost fossil units. From this perspective, depreciation schedules that run beyond plant retirement dates could be in consumers' interests. Other lower-cost financing options become even more important in this context of balancing consumer interests – using low-cost debt to pay off undepreciated assets provides additional savings that can ameliorate consumer equity and cost concerns.[7]

## CLEAN ENERGY ADVOCATES

Clean energy advocates may argue regulators should consider depreciation changes in terms of whether they make early fossil plant retirements easier or more difficult. Accelerated

[7] See overview paper https://energyinnovation.org/wp-content/uploads/2018/11/Depreciation-and-Early-Plant-Retirements-Brief_December-2018.pdf

depreciation matching cost recovery with cost responsibility makes the transition to clean energy more expensive in the near term. These advocates may argue that transition benefits like fuel savings sooner, rather than later, justify spreading depreciation costs across more time. This way, future ratepayers would have some cost responsibility since they will enjoy benefits from more clean energy.

## POLICY OPTIONS TO ENABLE FINANCIAL TRANSITION FROM COAL-FIRED PLANTS

### CHANGING DEPRECIATION SCHEDULES

- Accelerated depreciation recovers capital invested in early retired plants faster. Recovery can be timed to coincide with new retirement dates, ensuring today's customers don't burden future ones. Accelerating depreciation raises consumer rates and provides additional cash flow for utilities.
- Extended depreciation can reflect overall impacts of early plant retirements and their replacement with new clean energy, which benefit both existing and future consumers. Extending depreciation schedules reduces consumer rate impacts and enhances shareholder capital recovery.

### CHANGING DEPRECIATION AMOUNTS

- More or less investment can be recognized during depreciation proceedings. A variety of plant in service and related accounts can be considered for inclusion or exclusion from depreciation schedules. Regulators have discretion around where to draw the line around plant assets.
- Net salvage value and site remediation exemplify how elastic depreciation coverage can be. Net salvage value depends on commodity prices, construction cycles, and other factors, while the level of site remediation deemed prudent can determine its cost.

### DEPRECIATION IN CONTEXT – OTHER CONSIDERATIONS FOR EARLY RETIREMENT

- Early plant retirement creates transition costs in addition to the plant cost itself, and many merit consideration. Stakeholders might consider mitigation for impacted workers and communities and cleaning up pollution and waste management problems, such as ash disposal facilities.
- As detailed in a companion brief,[8] refinancing remaining undepreciated balances of an early retired power plant with debt can reduce consumer costs without disallowing

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[8] "Debt for Equity Refinance" posted at: https://energyinnovation.org/wp-content/uploads/2018/11/Debt-for-Equity-Issue-Brief_December-2018.pdf

expenses.  Taking out higher cost equity with lower-cost corporate debt, ratepayer-backed bonds, or green bonds held by impact investors can reach balanced overall results.

Transition investment opportunities in clean energy may also present themselves, if savings after early retirements are reinvested.  Since transition can lead to substantial fuel, operations, and maintenance savings, and refinancing and reinvesting capital can provide significant interest rate savings, reinvestment in other elements of transition that increase the velocity of capital recycling to meet customer goals is possible.  A variety of outcomes deserve further consideration:  energy efficiency, demand management, distributed resources, and additional grid-scale clean energy investments.

## QUESTIONS FOR CONSIDERATION BY PUBLIC UTILITY COMMISSIONS AND OTHER INTERESTED STAKEHOLDERS

- Is depreciation an important regulatory tool, helpful in balancing contested equity claims when early fossil plant retirements are at issue?
- Should depreciation be addressed in context with transition issues:
    - early retirements,
    - refinancing to achieve least cost transition,
    - negative transition impacts, and
    - positive transition opportunities?
- Will these depreciation changes make early retirements easier or more difficult?
- In what part of construction, materials, and commodities cycles are salvage and remediation cost estimates made?
- How will depreciation changes impact utility shareholders and bond investors?  Could opportunities to reinvest in replacement clean energy offset negative investor impacts?
- How can depreciation changes speed up utility capital recycling, so new lower-cost clean energy replaces old fossil plants more quickly?