WORKING PAPER:

Financing Mechanisms to Accelerate Managed Coal Power Phaseout

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Acknowledgments and Disclaimer

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About RMI

RMI is an independent nonprofit founded in 1982 that transforms global energy systems through market-driven solutions to align with a 1.5°C future and secure a clean, prosperous, zero-carbon future for all. We work in the world's most critical geographies and engage businesses, policymakers, communities, and NGOs to identify and scale energy system interventions that will cut greenhouse gas emissions at least 50 percent by 2030. RMI has offices in Basalt and Boulder, Colorado; New York City; Oakland, California; Washington, D.C.; and Beijing.

EXECUTIVE SUMMARY

Any credible Paris-aligned decarbonization pathway assumes the early phaseout of coal power. Despite pressure to withdraw all coal power financing, a blanket financial exodus by climate-conscious financial institutions (FIs) risks undermining the financial feasibility of the global transition away from coal. FIs committed to net zero can design and implement "managed phaseout" plans for new or existing coal power holdings.

A handful of completed transactions show that managed phaseout is already financially feasible in both developed and developing countries and for both older and newer coal plants. These transactions rely on some combination of three financing mechanisms designed to adjust risks and returns for affected stakeholders in a way that enables coal plants to run for fewer years:

- Lowering cost of debt via financing mechanisms such as securitizations and key performance indicator (KPI)-linked debt instruments
- Lowering cost of equity via managed transition vehicles, blended finance tools, etc.
- Improving cash flows via government incentives, revenue contracts for replacement renewables, etc.

Though managed phaseout is a relatively new investment activity for private capital providers, the core goals of adjusting risks and returns through the cost of capital are squarely in their wheelhouse. Private FIs routinely deploy these kinds of mechanisms in other power-sector transactions.

Private FIs can and should pursue managed phaseout deals (1) to align their portfolios with net-zero commitments in a way that drives real-economy impact, and (2) to deepen, broaden, and/or maintain client engagement. Private FIs can take an "all-of-firm" approach to managed phaseout by offering clients multiple products and services from across their institutions.

Managed coal phaseout presents a unique climate-aligned investment opportunity. Using this paper together with RMI's *Managed Coal Phaseout: Metrics and Targets for Financial Institutions* (2023) and *Guidelines for Financing a Credible Coal Transition* (2022) papers, private FIs now have the tools to take the critical first steps on managed coal phaseout.

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Introduction

No credible decarbonization pathway that achieves the Paris Agreement goals exists without the early phaseout of coal power. This reality leaves little room for financial institutions (FIs) with climate commitments to continue holding or financing coal power assets *without* a "managed phaseout" plan in place. In other words, to align with credible decarbonization pathways, FIs must limit their financial support for coal power assets to instances where there are clear commitments to retire or transition the asset prior to the end of its expected operational life span.[1]

Whereas coal power plants have only recently begun to develop managed phaseout plans, recent funding announcements such as Indonesia's $20 billion Just Energy Transition Partnership (JETP) deal reinforce momentum and indicate a clear direction of travel. This working paper focuses on the role of private finance within transactions to support managed phaseout, and it is complemented by other guidelines to ensure those transactions deliver on their social and climate goals, namely RMI's recently released *Guidelines for Financing a Credible Coal Transition*.[2] This working paper also focuses exclusively on coal-fired power phaseouts, rather than coal mining or other coal applications such as steelmaking.

Pressure to withdraw coal power financing is high, but a blanket financial exodus by climate-conscious FIs risks undermining the financial feasibility of transitioning away from coal globally. Instead, financing provided for the managed phaseout of coal power assets (hereafter referred to as *managed phaseout* unless otherwise specified) with a robust managed phaseout plan in place must be differentiated from other coal asset financing. Withdrawing financing risks financially marginalizing companies that have credible phaseout intentions, which may delay coal power asset retirement and ultimately undermine efforts to transition the global power sector in line with 1.5°C pathways in a stable and equitable way. New approaches to measure and communicate on managed phaseout progress are elaborated on in our *Managed Phaseout: Metrics and Targets for Financial Institutions* working paper.[3]

Managed phaseout transactions can be financially feasible today, but only with strategic interventions to untangle currently misaligned incentives that lock in prolonged reliance on coal generation. Although renewable energy alternatives are quickly outcompeting both new and existing coal power assets, market forces alone will not replace coal with renewables quickly enough, because over 93% of global coal power capacity is shielded from competitive pressures. As a result, many coal power asset owners are incentivized to operate plants until the end of their expected operating lives, even when lower-cost and more climate-aligned alternatives exist. A proactive approach is especially necessary in emerging markets and developing countries that are home to younger coal plants (the average age of coal plants in Southeast Asia is 11 years, compared with 41 years in the United States[4]).

Public and Private Finance in Coal Power Phaseout Transactions

Depending on the context, circumstances, and investor requirements, financing mechanisms can leverage private finance, public finance, or a mixture of the two. Public finance is not a necessary component for a successful managed phaseout transaction (see Case Study 2), but public finance can help (1) shape risks and returns in line with the investment appetite and criteria of various private capital providers to accelerate phaseout; and (2) accomplish specific goals of public stakeholders (e.g., socioeconomic goals) that private finance is not well equipped to address in phaseout transactions.

Various factors isolate coal plants from competitive pressure, including long-term contractual arrangements that guarantee future revenues (e.g., power purchase agreements [PPAs]), market structures in which operating costs are passed through to ratepayers (e.g., through regulated cost recovery), or other government subsidies that support coal power. The result is a stalled transition away from coal, and burdens that often fall on communities and customers.[i]

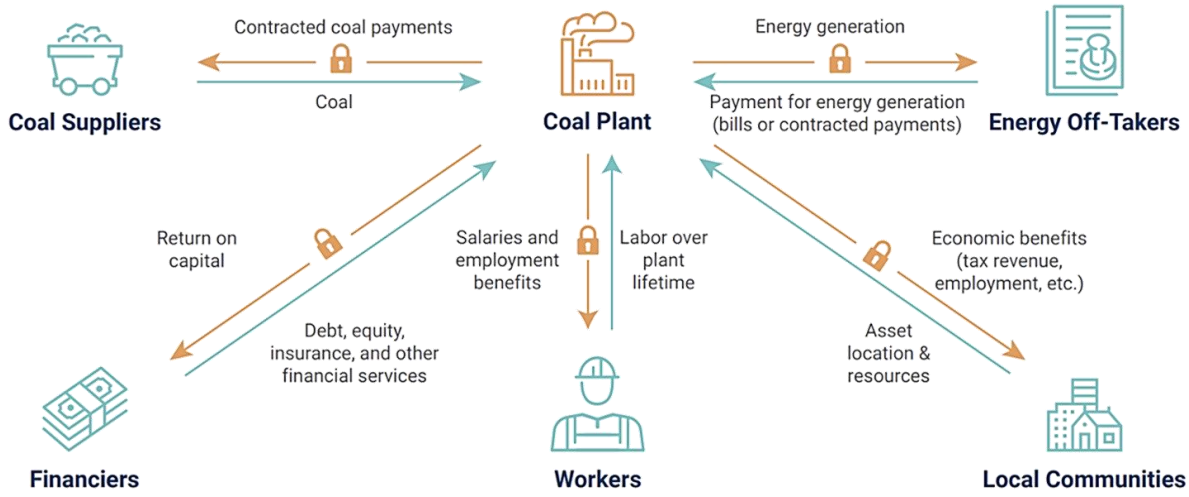
Financing mechanisms are one tool that could help align incentives and accelerate managed phaseout outcomes. Financing mechanisms refer to financial products and services that enable FIs to provide finance where a managed phaseout plan is in place, thereby improving financing conditions for increasingly challenged assets. Both public and private capital can play a role in deploying financing mechanisms for managed phaseout transactions, though this working paper focuses on guidance for private capital providers.

This paper also focuses on the direct financial levers that private FIs can wield through product and service offerings, rather than their indirect role through shareholder engagement and policy advocacy. Financing mechanisms are one category of many tools (including policy and regulations) that could support managed phaseout outcomes. By securing a sufficiently low cost of capital and/or additional or alternative revenue streams, financing mechanisms aim to reduce the returns required over the coal plant's remaining life, while proactively managing the risks and costs that might otherwise stem from disorderly or unmanaged early retirement. The specific mechanisms cited in this paper may be applicable only in specific geographies due to local regulations; however, the underlying levers they pull to adjust cost of capital and/or cash flows can be implemented universally.

Exhibits 1 and 2 illustrate how financing mechanisms can minimize value destruction by unlocking long-term obligations and realigning incentives across stakeholders, including plant owners, financiers, off-takers, fuel suppliers, plant employees, and communities.

Exhibit 1

Barriers Across Stakeholders Lock Coal Plants into Continued Operation



Source: RMI, 2023

[i] More discussion on this topic can be found in RMI's November 2021 report, *Financing the Coal Transition: Pragmatic Solutions to Accelerate an Equitable, Clean Energy Future*: https://rmi.org/insight/financing-the-coal-transition/

Exhibit 2

Financing Mechanisms Shift Costs, Benefits, and Risks Across Stakeholders

Business-as-Usual Constraints	Solutions through Financing Mechanisms for Managed Phaseout
Asset owners are locked into operating uneconomic coal assets via financial, market-related contractual, and social obligations.	Financing mechanisms can help by giving asset owners options to repay outstanding financial obligations in less time; free up capital to buy out or mitigate counterparty losses associated with long-term contractual obligations; and provide support to offset possible social or economic costs to affected workers and local communities.
Lenders are stuck receiving returns from assets misaligned with climate commitments.	Financing mechanisms can refinance financial obligations, enabling repayment of corporate- or asset-level debt over an accelerated time line.
Energy off-takers are locked into long-term contracts to purchase coal power.	Financing mechanisms can give power purchase agreement (PPA) counterparties fair solutions to contractual obligations, facilitating work-arounds for renegotiating or at least covering penalties for early termination of PPAs.
Customers are stuck paying for uneconomic coal power.	Financing mechanisms can give customers cheaper and cleaner electricity, reducing customer obligation to pay for uneconomic coal, including possible price spikes for un-managed phaseout.
Coal suppliers may have to be compensated for the remainder of contracts to supply coal to plant owners.	Financing mechanisms can accelerate repayment or buy out long-term fuel supply contracts.
Employees face the risk of receiving little to no support if the plant closes under an unmanaged transition.	Financing mechanisms can free up capital and/or tap concessional or alternative revenue streams to ensure a just transition for affected workers, including for retraining, reskilling, and replacing them.
Local communities are stuck with the negative health and economic impacts of relying on coal power.	Financing mechanisms can give communities cleaner electricity and a just transition, freeing up capital and/or tapping into concessional financing to invest in local economic development, energy security, or grid updates to offset any economic losses from early plant closure.

Source: RMI, 2023

Though managed phaseout is a relatively new investment activity for private capital providers, the core goals of adjusting risks and returns through the cost of capital are squarely in their wheelhouse. With appropriate guardrails and accountability, this role for private FIs represents, in many ways, a more proactive contribution to real-economy decarbonization outcomes in line with their climate commitments. Indeed, near-term and widespread participation of private capital in deploying financing mechanisms to accelerate the phaseout of global coal power assets may be the only way to realize power-sector decarbonization in line with global climate goals.

Ensuring a Just Transition in Coal Power Phaseout

Aligning incentives across all stakeholders that stand to be affected by early coal phaseout includes ensuring a just transition for affected communities (e.g., associated with potential tax base erosion) and workers (e.g., supporting reskilling and relocation). It is clear that the global energy transition introduces numerous benefits, including job creation, but these benefits may not necessarily accrue to the same communities and labor forces of existing coal plants without a targeted and managed approach. Managed phaseout transactions can help free up capital and unlock new sources of financing to ensure a just transition. Ignoring just transition and equity concerns may not only impede coal plant retirements but could also introduce legal and/or political risks.

Sponsors of previous power-sector deals provide precedent for allocating funds to local community initiatives and job training. Blackstone's recent $6 billion Champlain Hudson transmission line project set aside almost $200 million for just transition activities via trust funds. Other examples of power-sector deals that have successfully engaged and proactively addressed risks and costs to affected communities are the Cascade Power Project (Exhibit 12); the Henvey Inlet wind farm; and the Kayenta solar plant.

Public funds can also be used to reinforce just transition outcomes, such as through grants or other incentives designed to cover expenses for worker reskilling, local community redevelopment, and other public goals. For example, the European Just Transition Mechanism is set to deliver over €55 billion in grant and loan funding for coal transition regions.

Three Financing Levers for Managed Phaseout Transactions

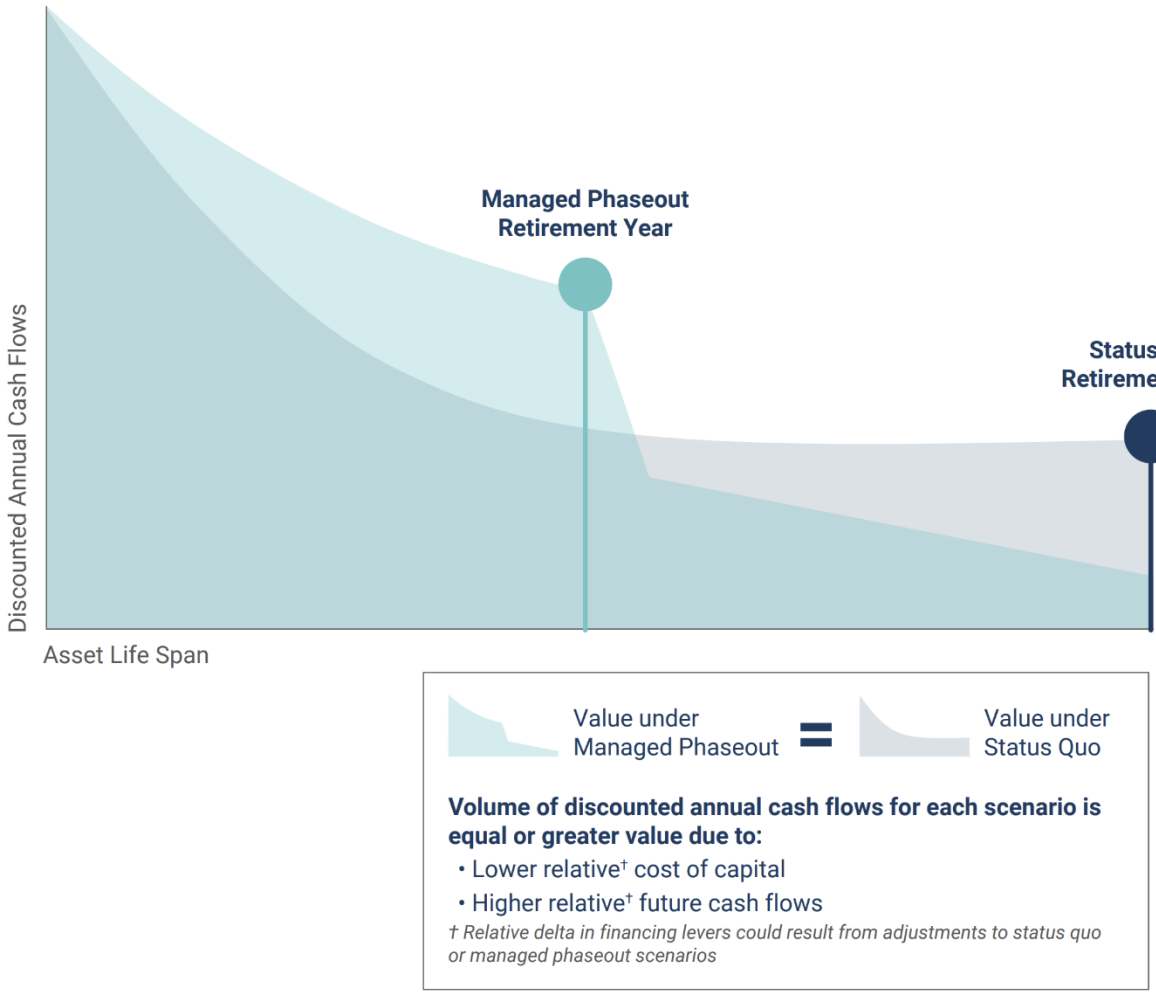
Although financing mechanisms for coal phaseout are being piloted around the world, few examples of completed coal phaseout financing mechanisms exist, and only a subset have successfully leveraged private capital. In a catch-22, a sparse track record of successful transactions impedes private FI involvement in managed phaseout transactions. Yet, although the activity of financing managed phaseout may be new for private FIs, the underlying goal of adjusting risks and returns is immensely common.

Financing mechanisms achieve managed phaseout outcomes by targeting three financing levers: (1) weighted average cost of debt; (2) weighted average cost of equity; and (3) future cash flows. Through a lower cost of capital and/or new, additional, or replacement cash flows or revenue streams, financing mechanisms can reduce the total returns needed from operations over the plant's remaining life, deliver risk-adjusted returns for investors, lower costs for customers and taxpayers on an accelerated time line, and free up capital for investment in the plant's early retirement, replacement, or retrofit.

Exhibit 3 shows two scenarios: status quo and managed phaseout. The gentler slope for the discounted cash flow curve under the managed phaseout scenario illustrates the effect of a lower weighted average cost of capital. The cash flows depicted after the retirement date represent future cash flows from potential alternative revenue streams, such as carbon credits awarded for emissions savings from early retirement.[ii] Together, a lower cost of capital plus additional cash flows preserves the same value under the asset's discounted cash flow curve in less time, despite fewer years of operation. This refinancing can enable repayment of financial and contractual obligations and cover potential losses to affected communities and workers — status quo conditions that otherwise locked the asset into continued operations (see Exhibits 1 and 2).

Exhibit 3

Accelerating the Managed Phaseout Economic Tipping Point



Source: RMI, 2023

[ii] The graphs in Exhibit 3 are intended to illustrate the role that lowering the cost of capital or securing additional revenue streams could play in preserving value under managed phaseout. This could look different in practice. For instance, revenues associated with avoided carbon emissions may be required up front in some instances for the transaction to work out.

Financial savings from a lower cost of capital can be substantial. According to recent estimates, the weighted average cost of capital (WACC) of the world's coal plant owners and operators stands around 6%–7%, though this varies significantly by market.[5] On average, a 3% reduction in cost of capital is needed to incentivize the early retirement of approximately one-third of the global coal plant fleet for advanced economies and China, and around a 6% reduction is needed in emerging markets and developing countries. Utilizing financing mechanisms to bring the cost of capital down to these levels would accelerate the point at which coal asset owners can recoup their initial investment and enable early coal retirements within 10 years. Of course, this estimate may significantly change on the basis of context-specific considerations, such as asset-level cost of capital.

Managed phaseout transactions may inherently have access to lower-cost capital for a variety of reasons. For one, an asset owner with a managed phaseout plan should have access to a broader universe of financiers and insurers who will be increasingly interested in financing phaseout and unwilling or unable to otherwise extend financing to coal power. Improved certainties from reduced asset life (and faster realization of required returns) can also lower capital costs in comparison with business-as-usual scenarios. However, it may not always be possible to use lower-cost debt and/or equity as an incentive to accelerate managed phaseout, namely when projects have been financed with extremely low-cost capital already (e.g., some assets financed by state-owned entities).

Managed phaseout transactions may also be more likely to benefit from public support, including concessional finance or government-backed guarantees. Governments may support and complement private finance for managed phaseout transactions for many reasons, including where managed phaseout advances national climate goals, helps ensure a just transition for affected communities, or mitigates the risk that governments and taxpayers will be stuck covering decommissioning costs in the event of an abrupt closure of a stranded asset. For instance, the proposed $8.5 billion JETP deal for South Africa and a similar $20 billion program for Indonesia offer blended finance packages to be disbursed through various mechanisms to support the countries' transitions away from coal power.[6,iii] Negotiations are also under way for an $11 billion JETP facility for Vietnam.[7] Debt guarantees can also be especially powerful in mitigating the perceived risks of first-of-a-kind transactions. European banks recently used this approach to de-risk H2 Green Steel's €3.5 billion hydrogen-powered green steel plant.[8]

The "All-of-Firm" Approach

Across cost-of-equity and cost-of-debt financing mechanisms, as well as through strategies to maximize future cash flows, private FIs have numerous opportunities to support and accelerate the viability of managed phaseout transactions by mobilizing different business lines.

Managed phaseout transactions may require different types of financial support depending on the deal context. Aside from project-level loans, a project may need additional equity, revenues, grant funding, and/or other forms of debt. Different types of private FIs, depending on their size and scope, may be able to offer multiple products and services to clients to make a phaseout deal economically viable. Banks regularly provide both financing and revenue for power projects (see Midway wind example in Exhibit 12) and can similarly engage different business units within their organizations to support coal asset owners. For instance, a bank's private equity affiliate could provide equity; its foundation could provide grants; its commodities desk could structure hedges. Though the FI must manage its project-level risk exposure, mobilizing more business units on a single transaction will enrich client engagement and build more internal expertise. For a coal asset owner, this increased engagement with a single counterparty may drive down overall financing costs.

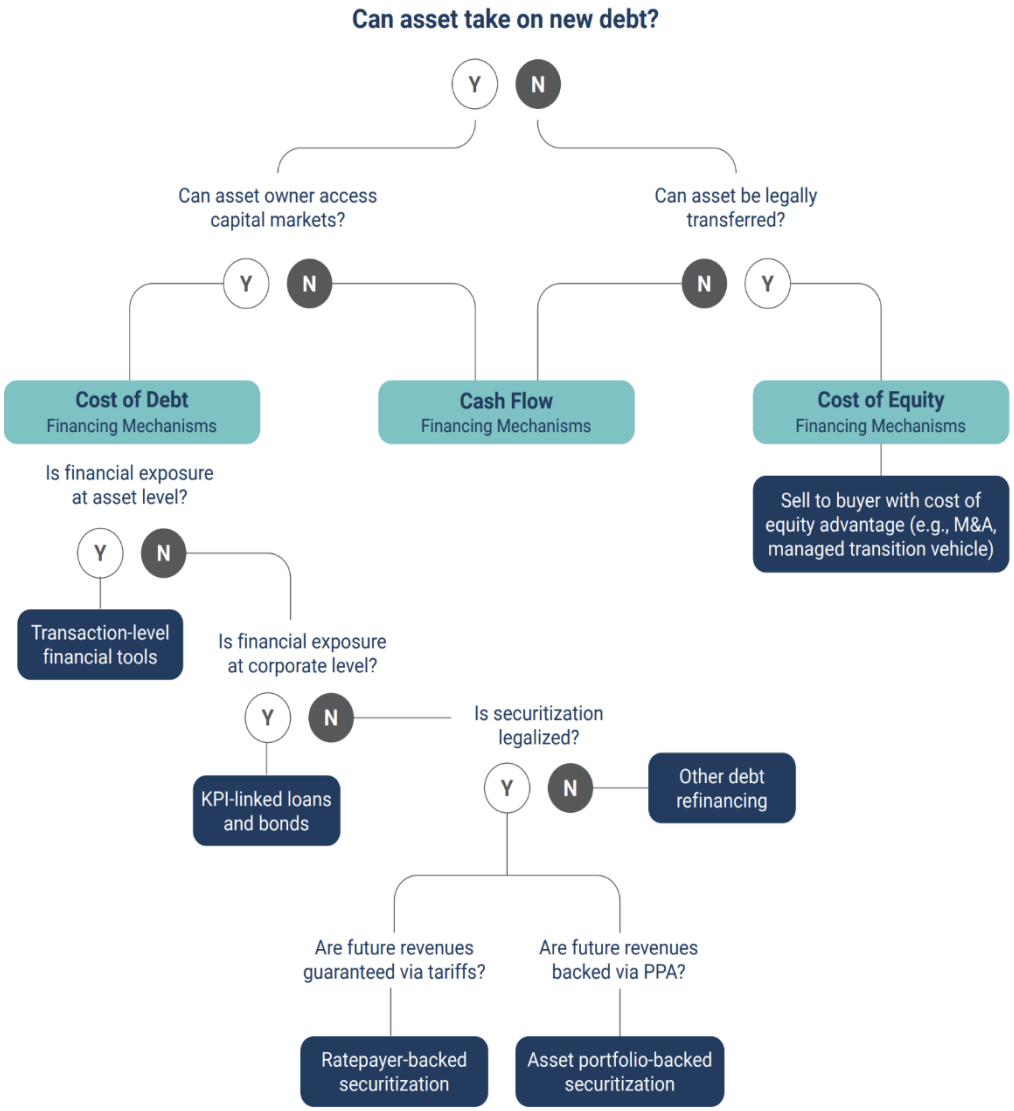
[iii] Early details on the proposed loan disbursal of South Africa's program indicate 54% of the funding is earmarked as concessional loans, with the remaining 43% comprising commercial loans and investment guarantees.

Identifying Appropriate Financing Mechanisms for Different Phaseout Contexts

As various researchers have pointed out, different financing mechanisms are better suited to different managed phaseout contexts, including in relation to the varying political and regulatory environments, specific asset-level characteristics, and FIs' risk/return considerations, including fiduciary duties.[9] There is no one-size-fits-all financing mechanism to use in all different contexts. Financing mechanisms are not mutually exclusive, and a hybrid approach may often make sense, even for one utility looking to transition or retire a fleet of coal assets. For a utility client with a diverse coal portfolio, for example, a hybrid approach could take advantage of government grants for accelerated closure, renegotiating PPAs to facilitate replacement renewables generation, and selling plants to phaseout-focused owners.

Exhibit 4

Factors Influencing Suitability of Financing Mechanisms for Managed Phaseout



Source: RMI, 2023

As an illustrative example, Exhibit 4 showcases some of the key decision points that a financial institution may face in developing a managed phaseout transaction for a coal plant asset owner. These decisions assume that the coal plant in question is eligible for transition finance through a managed phaseout plan.[10] In practice, these decisions would also be shaped by costs and revenues associated with the end use of a coal asset (e.g., the retrofit versus retirement of a coal plant). Cost-of-debt, cash flow, and cost-of-equity financing mechanisms are not always mutually exclusive. Additional options also exist. For example, an asset owner who could not take on new debt or who lacks access to capital markets may be able to take advantage of sovereign debt guarantees or on-lending as work-arounds.

The planned end use of the coal plant is another important factor influencing managed phaseout transaction economics and therefore appropriate financing mechanisms. The end use of a coal plant under managed phaseout transactions will affect decommissioning costs (e.g., reclamation and remediation costs) [iv], time lines, and future revenue prospects, and therefore the level of net cash flows that come into the plant and which financing solutions will be available to accelerate early retirement. Generally, the greater the projected future net cash flows of a managed phaseout plan, the more the forgone revenues from planned plant operations can be tolerated, and therefore the earlier the asset can be retired. Every asset will have different considerations for optimal end use, based on its location, power market, grid condition, etc., but FIs can work with asset owners to explore alternative business models that maximize yield, especially when retiring newer, more economic coal plants.

Managed phaseout falls roughly into three approaches offering different financial value propositions:

- **Asset retirement:** Financing accelerated closure of operational coal power assets.
- **Asset transition (retirement + replacement):** Financing accelerated closure of operational coal power assets and reinvesting (on-site or elsewhere) in new, lower-emitting resources.
    - Replacing coal power with fossil gas poses several risks to the credibility of a managed phaseout plan, as covered in detail in RMI's *Guidelines for Financing a Credible Coal Transition*.[11] For instance, though FIs have deployed transition bonds in high-emitting sectors such as power, steel, and gas, some critics have questioned the climate credibility of these types of bonds because they replace coal with fossil gas.[12]
- **Asset retrofit or repurpose:** Financing modifications to operational coal power assets toward a lower-emissions mode of operation (e.g., shifting generation to a balancing capacity or a mothballed-but-recallable state). Mothballing — rather than retirement or transition — may be necessitated by local government regulations, especially in cases lacking adequate firm replacement power generation.

See the Appendix for more discussion on asset end use and decommissioning cost implications.

[iv] Coal decommissioning costs can vary widely, depending on factors such as plant location, age, local environmental regulations, and level of government support (see Appendix for more details on definitions, costs, and implications of each end-use case). Without a managed phaseout plan, decommissioning costs for stranded assets risk falling on taxpayers.

Pulling the Three Levers: Cost of Debt, Cost of Equity, and Future Cash Flows

Lever 1: Cost-of-Debt Financing Mechanisms

Cost-of-debt financing mechanisms comprise financial products, services, and strategies that provide the asset owner with access to lower-cost debt. These mechanisms could include:

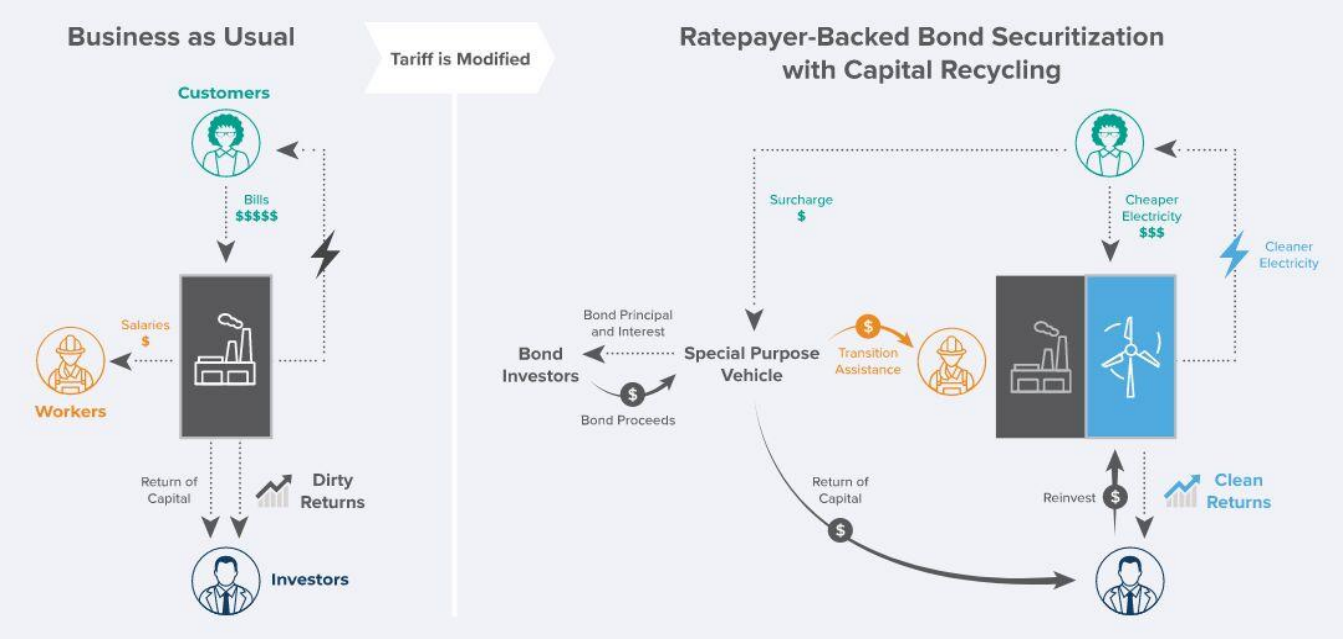
- Transaction-level financial optimization (e.g., refinancing with adjusted loan tenors, repayment holidays, and/or lower interest rates)
- Credit enhancements (e.g., ratepayer-backed securitization or government-backed guarantees)[v]
- KPI-linked loans and bonds (e.g., covenants or margins linked to phaseout outcomes or emissions reductions)

An example of using lower interest rates is the Asian Development Bank's (ADB's) Energy Transition Mechanism (ETM),[13] which is exploring blending low-cost/concessional debt with private debt to retire coal fleets in Indonesia, the Philippines, and Vietnam. At least two ETM-based coal retirement deals are being piloted in Indonesia: a roughly $250 million refinancing to retire the Cirebon-1 plant 15 years early[14] and a deal to retire the Pelabuhan Ratu plant nine years early.[15]

Private FIs could have several opportunities to participate in coal phaseout deals through cost-of-debt financing mechanisms (see Exhibit 6).

Exhibit 5

Ratepayer-backed Bond Securitization



Source: RMI, 2023

[v] The US Inflation Reduction Act's Energy Infrastructure Reinvestment (EIR) loan program introduces new government-backed credit enhancements; US utilities can apply for a low-interest EIR loan (guaranteed by the US Department of Energy's Loan Program Office) to retire coal plants and pay off their plant balance in a process like securitization.

Exhibit 6

Roles for Private FIs in Cost-of-Debt Financing Mechanisms

FI role	Financial products and services	Example	Relevant business units
Direct lending	Lending/refinancing asset- or corporate-level loans (including sustainability-linked loans and transition loans)	Bank of the Philippine Islands and Rizal Commercial Banking Corporation provided $249 million in loans for ACEN's managed transition vehicle for the South Luzon coal plant in the Philippines.[16]	Corporate and investment banking
Arranging financing	Arranging financing through underwriting, structuring, and placing loans and bonds (including securitizations and transition bonds); and arranging concessional or blended finance	Barclays and Drexel Hamilton underwrote $118 million for Wisconsin Electric Power's Environmental Trust Bond securitization to recover $100 million from the retirement of the Pleasant Prairie coal plant in Wisconsin.[17]	Corporate and investment banking
Investing in bonds	Investing directly in fixed-income products, such as bonds	MetLife Investment Management bought bonds related to retiring the Chambers and Logan coal plants in New Jersey.[18]	Asset management
Risk management	Providing insurance and hedging products (including currency and interest rate swaps)	The World Bank, IFC, and African Development Bank may provide South Africa's Eskom some of the $330 million Accelerating Coal Transition coal retirement funding package via loan guarantees. Eskom is also exploring private-sector loan guarantees.[19]	Insurance; commodities and trading
Advisory	Offering financial advisory services on debt structuring	Boutique investment bank Ducera Partners served as financial advisor to Missouri Public Service Commission on the Asbury coal plant securitization.[20]	Corporate and investment banking
Trust banking	Providing trust banking services on coal securitizations	US Bank acted as indenture trustee, paying agent, and registrar for Wisconsin Electric Power's $118 million securitization.[21]	Trust banking

Source: RMI, 2023

Cost-of-Debt Financing Mechanism Example: US Ratepayer-Backed Securitization

Mechanics: As shown in Exhibit 5, in markets where an asset owner's return on investment is guaranteed through future tariffs, lower-cost securitized debt can be raised against the guarantee of future surcharges on ratepayer bills. In many ratepayer-backed securitization structures, securities are accompanied by a "true-up" mechanism, guaranteeing rate adjustments to provide timely repayment. This guarantee of repayment enables securitized bonds to receive exceptionally strong credit ratings (typically AAA) and therefore substantially lower the relative cost debt to fund the retirement and transition costs of coal assets. For more details on securitization, see RMI's *Financing the Coal Transition* report.[22]

Considerations: New senior debt may have an impact on the seniority or repayment ranking of existing securities.

Context Suitability: Ratepayer-backed securitization is feasible only in markets where it has been legalized as a tool to refinance debt obligations. Securitization can benefit from access to liquid capital markets to ensure debt can be issued at a sufficiently low cost. Securitization can also be asset- or portfolio-backed:

- **Portfolio asset-backed securitization.** In 2022, private equity firm Starwood Energy Group, the majority owner of the Logan and Chambers coal plants in New Jersey, secured $200 million[23] in debt refinancing to accelerate retirement and leave in place the original tax-exempt construction bonds.[24] The plants had high-priced PPAs with Atlantic City Electric (ACE) and steam supply contracts through 2024. The plants also had portfolio-level financing via a $200 million 22-year loan from SunTrust[25] priced at the London Interbank Offered Rate plus 400 basis points (L+ 400 bps) in 2018. Starwood refinanced the L+ 400 bps portfolio loan with two-year institutional debt from MetLife structured to meet lenders' environmental, social, and governance concerns. Starwood and ACE agreed to modify the PPAs and close the plants in May 2022, 30 months early; ACE will pay the plants $227.5 million[26] from Jan. 2022 to Dec. 2024, saving ratepayers $30 million.[27]
- **Single asset-backed securitization.** In 2021, Wisconsin Electric Power (WEPCo) issued $118 million in AAA-rated 13-year Environmental Trust Bonds[28] to recover $100 million of the undepreciated environmental control costs associated with the Pleasant Prairie coal plant retirement in Wisconsin in 2018. The average operating coal-fired generating unit in the United States is 45 years old. The two Pleasant Prairie units were commissioned in 1980 and 1985, meaning they were retired at ages 38 and 33, respectively, and had undepreciated costs. Barclays (sole book-running manager) and Drexel Hamilton (co-manager) sold the WEPCo Environmental Trust Finance I[29] notes at 1.578%, far less than their estimated WACC. This would save WEPCo's customers around $40 million[30], despite not even recovering the full value of the plant.

State of Play: Securitization is an established practice in utility financing, but its application in supporting managed phaseout is nascent. Nonetheless, the application is taking off in markets such as the United States, where 11 states have passed legislation enabling its use to retire coal.[vi] Although securitization has been the main mechanism that private FIs have used to accelerate coal phaseout in the United States, there have been only a handful of successful bond issuances to date.[31]

[vi] https://rmi.org/securitization-in-action/; https://saberpartners.com/list-of-investor-owned-utility-securitization-rocrrb-bond-transactions-1997-present/; the 11 states are CO, ID, IN, KS, LA, MI, MO, MT, NC, NM, and WI (although Wisconsin can be used only for pollution control equipment).

Ratepayer-backed securitization has thus far been deployed only in the United States. However, private FIs can engage with regulators, credit rating agencies, and institutional clients in developing economies to emulate securitization structures suited to the country context. Further, the mechanisms underlying securitized debt payments are replicable outside the context of US regulator-approved, ratepayer-backed securitization. For instance, securitization as a financing mechanism has been widely used in the power sector (e.g., in rooftop solar) and across a wide variety of other assets.[32]

Case Study 1: Ratepayer-backed Securitization for Empire Electric

Background: Missouri-based Empire District Electric Company (operating as Liberty Utilities), a subsidiary of Algonquin Power, invested over $145 million over 20 years in regulation-driven capital investments into its Asbury coal power plant that had yet to be fully amortized and recovered through rates. As of 2020, these investments represented approximately 73% of the plant's net book value, and the plant had a negative valuation of nearly $134 million, meaning Empire would have to pay a new owner a substantial amount to purchase, operate, and assume all of Asbury's associated liabilities. Empire also estimated that continuing to operate Asbury would cost an additional $20 million for complying with environmental regulations. Thanks to falling costs of competing generation sources, Empire found that replacing Asbury with new solar generation and battery storage could save ratepayers tens of millions of dollars over 20 years, driven primarily by a substantial decrease in operating, maintenance, and fixed costs from early closure. Empire retained Goldman Sachs as structuring advisor for the securitization.

Mechanism Structure: In August 2022, the Missouri Public Service Commission (PSC) approved Algonquin Power's request to securitize over $290 million. Of this amount, $81.2 million (plus $7.9 million in financing costs) is dedicated to recovering costs from retiring the Asbury Coal Power Plant 15 years ahead of schedule. Although bonds have yet to be issued, Missouri PSC expects the issuance of AAA-rated bonds to incur a meaningfully lower interest rate than Asbury's WACC of 6.77%. Previous coal retirement securitizations have seen bond issuances at 2.5%.

Outcome: Per the Missouri PSC decision, securitization is expected to save customers an estimated $65.6 million compared with traditional cost recovery.

Lever 2: Cost-of-Equity Financing Mechanisms

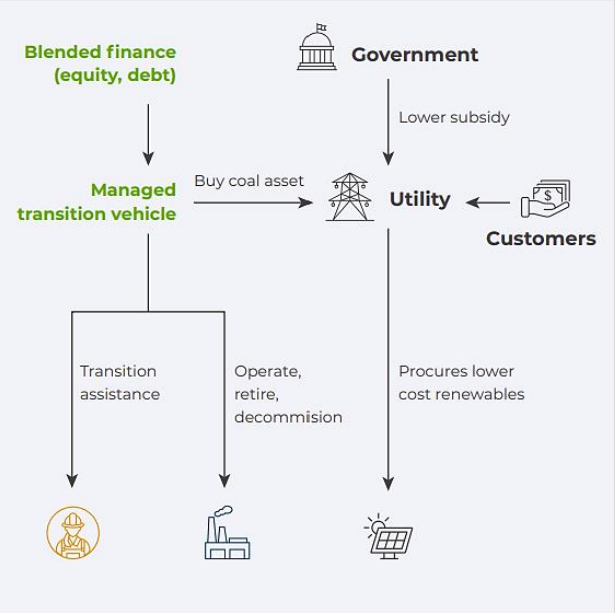
Cost-of-equity financing mechanisms comprise financial products, services, and strategies that can lower the cost of capital, including:

- Managed transition vehicles (MTVs)
- Sale to investors with lower operating costs as a result of competitive advantages — e.g., technical knowledge about responsible decommissioning of coal

FIs could have several opportunities to participate in coal phaseout deals through cost-of-equity financing mechanisms (see Exhibit 8).

Exhibit 7

Managed Transition Vehicle



Source: RMI, *How to Retire Early*, 2021

In addition to providing project or portfolio-level equity directly to managed transition vehicles, FIs can use their role as corporate shareholders to indirectly support managed phaseout outcomes, such as asset management divisions engaging with public and private portfolio companies to demand accelerated coal transitions. For example, Australia's largest utility company, AGL, announced that it would retire its highest-emitting coal plant, Loy Yang, a decade earlier than planned after facing shareholder pressure to change strategies.[33] AGL shifted its corporate strategy to fast-track its phaseout of coal assets after identifying that action as necessary to access wider pools of capital and combat the company's declining share price.[34]

Aside from the opportunity to engage publicly listed coal asset operators, large FIs also have an enormous opportunity to accelerate retirement of coal assets operated by privately held portfolio companies via their private equity divisions.[35] Private equity funds are especially well positioned to accelerate managed phaseout outcomes as they can set a portfolio company's strategic direction and accept higher risk relative to the short-term return pressures of public markets.[36,vii] Yet, although there have been numerous announcements regarding new private equity transition fundraising efforts, there have been few public announcements of managed phaseout plans.

[vii] Private equity firms could explore setting up plant owner-operator subsidiaries as certified public benefit corporations ("B corps"). B corp status may provide them more flexibility in incorporating environmental and social considerations into decision-making around managed phaseout. An example of a B corp in the US power sector is Vision Ridge-backed IPP Earthrise Energy.

Exhibit 8

Roles for Private FIs in Cost-of-Equity Financing Mechanisms

Role	Financial products and services	Example	Relevant business units
Arranging and managing MTVs	Arranging and managing funds, or managed transition vehicles (MTVs)	BPI Capital and AlphaPrimus Advisors acted as joint financial advisors for ACEN's MTV for the South Luzon coal plant in the Philippines.[37]	Corporate and investment banking
Investing in MTVs or asset/portfolio acquisitions	Providing or underwriting private equity, tax equity, and/or public equities (including initial public offerings), as well as mezzanine financing such as preferred equity.	Philippines-based life insurance company Insular Life and the Philippine Government Service Insurance System (GSIS) provided $67 million in equity for ACEN's managed transition vehicle.[38] GSIS bought redeemable preferred shares.	Private equity/venture capital; corporate and investment banking
Advisory	Offering sell-side and buy-side financial advisory, e.g., for M&A	CLSA was lead arranger for the equity placements for ACEN's MTV.	Corporate and investment banking
Philanthropic grants	Providing grants for feasibility studies and technical assistance packages that de-risk projects for potential equity investors. Grants can also enhance broader financing packages.	Private FIs can emulate multilateral development banks; in 2021, the Asian Development Bank granted $220,000 in technical assistance for pre-feasibility studies for coal transition in Southeast Asia.[39]	Philanthropic foundation

Source: RMI, 2023

Coal Phaseout Valuations

Data on valuations of coal phaseout deals (i.e., price discovery) has been limited due to nascency of managed phaseout (and therefore the paucity of deal flow) as well as certain deals being executed by private equity firms that have not disclosed information publicly. It has also been difficult to compare valuations of coal deals executed in the Global South with those in the Global North because of the large variation in labor and compliance costs across geographies — especially those related to decommissioning.

However, some data points have emerged. Aside from the price discovery resulting from loss-making plants closed via Germany's reverse auctions, it has been notable to see valuations for relatively new plants in the Global South. The landmark ACEN managed transition vehicle in the Philippines was $316 million (including debt and equity) for a six-year-old 246 MW plant (i.e., $1.28/W). Meanwhile in Brazil, private equity firms bought a three-year-old 345 MW plant for $424 million ($1.23/W). Although the exact plant economics vary and are not public, we can estimate that the Philippines MTV seems to have cost only a fraction more than the Brazil plant while enabling a managed phaseout by 2040 — some 15 years earlier than the plant's technical life. **FIs can bridge this kind of fractional phaseout-related funding gap by lowering the cost of equity.**

Cost-of-Equity Financing Mechanism Example: MTV

Mechanics: As shown in Exhibit 7, MTVs are funds that acquire coal power plants at a lower cost of equity, earn returns over less time, and retire the assets ahead of schedule. MTVs can be blended with concessional finance to further lower the cost of equity.

Considerations:

- Requires continued operation of coal asset until investors are repaid, thereby introducing a countervailing incentive to accelerate phaseout
- May introduce more complex legal challenges (e.g., enhanced liability or higher transaction costs)

Context Suitability: MTVs are feasible only if the asset can be transferred (e.g., considering state ownership or other legal barriers) and/or if there is a well-suited alternative operator of the underlying asset(s). MTVs are particularly suitable if coal asset owners are unable to take on additional debt (i.e., challenging the use of cost-of-debt financing mechanisms), or when the new buyer possesses technical expertise that enables operating the coal plant more efficiently and/or at a lower cost of capital.

State of Play: MTVs are beginning to be piloted by both public- and private-sector stakeholders around the world, including ACEN's ADB-inspired managed transition vehicle (see Case Study 2).[40]

Case Study 2: ACEN MTV

Background: In July 2022, Philippines-based utility ACEN Corporation created a $316 million (USD$1 = PHP 55) MTV to accelerate retirement of the six-year-old, 246 MW South Luzon coal plant. This first-of-its-kind deal had to overcome several barriers: (1) the plant was relatively new, (2) the plant is in the Philippines (low investment grade sovereign rating Baa2/BBB), and (3) MTV was a relatively novel financing structure.

Mechanism Structure: The MTV comprised debt (approx. $249 million) and equity (approx. $67 million) from Philippines-based FIs, proving that coal phaseouts can be financed in the Global South without international financing or concessional and/or blended finance. Insular Life Assurance provided long-term equity to match the project's 18-year tenor. The Philippines Government Service Insurance System also provided equity via redeemable preferred shares. The debt from Bank of the Philippine Islands and Rizal Commercial Banking Corporation refinanced $174 million in outstanding loans. The mechanism is based on the principles of the Energy Transition Mechanism piloted by the Asian Development Bank. AlphaPrimus Advisors and BPI Capital served as financial advisors on the transaction; CLSA Philippines was the lead arranger for the equity placements and BPI Capital and RCBC Capital were lead arrangers for the debt placements.

Outcome: The plant will close in 2040, 15 years earlier than planned, and, according to ACEN, the closure will halve the 50-year life of the plant and avoid emitting up to 50 million tons of CO_2. Through this mechanism, ACEN raised approximately $141 million to build replacement renewables generation.

Lever 3: Future Cash Flows

Future cash flows for managed phaseout transactions comprise financial products and services, as well as alternative business strategies, that deliver alternative or additional revenues. Cash flow sources could include:

- Monetization of carbon credits from emissions reductions
- Monetization of other environmental or health benefits[viii]
- Proceeds from sale or lease of asset or asset site and/or grid connections
- Revenue from sale or recycling of a coal plant's commercial and infrastructure assets
- Grants and government support, for example, for compensating and/or retraining workers, project-level subsidies or tax breaks, or government payouts (e.g., via reverse auction)[ix]
- Future revenues from reinvestment in replacement clean energy generation

FIs could have several opportunities to participate in managed phaseout deals through cash flow financing mechanisms (see Exhibit 9).

Exhibit 9

Roles for Private FIs in Cash Flow Financing Mechanisms

Role	Financial products and services	Example	Relevant business units
Revenue enhancements	Providing commodity hedges (including power hedges for replacement generation) to secure revenues to build out managed phaseout alternatives. Also includes selling carbon credits.	The Clean Technology Fund's $15 million coal retirement credit-linked loan for Engie Energia Chile's Calama wind farm (see Case Study 3). In this example, carbon offset revenues result in more favorable debt terms.	Commodities trading and hedging
Cash flow optimization	Providing additional financial services such as sustainability-linked equipment, supplier, and receivables financing.	In the World Bank's planned $497 million loan package to retire South African utility Eskom's 1,000 MW Komati plant, estimated revenues from recycling equipment are $10 million.[41]	Trade finance
Advisory	Advising asset owners or governments on running or bidding into reverse auctions, which create revenue opportunities for assets.	The World Bank's Komati loan (see above) will provide $3 million in grants for Eskom to hire a financial advisor to structure private or blended financings for managed phaseouts.[42]	Corporate and investment banking

Source: RMI, 2023

[viii] Although further study is needed, innovative tools, such as pay-for-outcomes, could be worth exploring for managed phaseout pilots. One study found that retiring two coal plants 19 years early would result in approximately 40 fewer deaths and avoid over $274 million in health impacts.

[ix] In 2020, German utility RWE bid two coal units totaling 1,600 MW into Germany's first coal reverse auction and was awarded €216 million (€140,000/MW) in government funds; they were decommissioned in 2021. According to reports, "The financial and investor pressure is likely to have brought forward the participation of some relatively modern power plants with bids significantly below the maximum permissible bid. Most notably among them are the auction participation decisions of RWE and Uniper."

Cash Flow Example: Carbon Credits

Mechanics: Carbon credits could be awarded to asset owners for the reduction in emissions attributable to managed phaseout. Asset owners could sell credits to offset revenue losses and accelerate phaseout dates.

Considerations: In many cases, carbon credits may not be readily implementable yet due to:

- Nascent methodologies for assessing additionality and calculating emissions savings in a way that ensures accuracy and is tailored to different contexts
- Questions concerning the impacts on global carbon markets from creating a managed phaseout carbon credit asset
- Challenges in quantifying and monetizing phaseout benefits

Context Suitability: Robust guidance is needed. RMI is among several organizations developing guidance on where and when managed phaseout transactions could be eligible for carbon credits.

State of Play: Although the possibility of generating carbon credits to support managed phaseout transactions is garnering increased attention, work is just beginning to answer key questions involving whether, when, and where carbon credits can provide a credible financing option to help accelerate managed phaseout. Various estimates have been made for the total avoided emissions in a handful of phaseout deals; however, more advanced emissions avoidance guidance is needed to give investors a realistic idea of the size of avoided emissions associated with managed phaseout. This is one essential step needed to develop a robust carbon credit market.

Case Study 3: Engie Energia Chile's Carbon Floor Price

Background: In December 2020, France's Engie, through its Chilean subsidiary, signed a 12-year, $125 million loan package with IDB Invest, comprising a $74 million senior tranche from IDB, $15 million in blended finance from the Clean Technology Fund (CTF), and $36 million from the China Fund for Co-financing in Latin America and the Caribbean. Engie is using the loan to build and operate its $152.9 million, 151 MW Calama wind farm and retire two units (each 125 MW) of its 32-year-old Tocopilla coal plant. Engie drew down on the full loan amount in August 2021.

Mechanism Structure: Lenders pay Engie a floor price for carbon abated through early retirement, by decreasing the financing cost in the $15 million CTF loan tranche. The baseline to calculate the incentive is the total CO_2 emissions avoided by accelerating coal asset decommissioning and replacing that power with Calama's wind generation. The methodology is aligned with the CDM2 and Article 6 of the Paris Agreement to ensure no carbon emissions leakage occurs. A total of 5.16 million tons of CO_2 are expected to be effectively displaced during the 12-year loan life. Up to 2.18 million tons of CO_2 would be eligible at maturity for credit under the CTF loan, for a value of $6.54 million, implying a carbon floor price of $3/ton. For comparison, Chile's current green tax on generators is approximately $5/ton CO_2.

Outcome: Efficacy has yet to be determined because the CTF credit amount and volume of carbon abated remains undisclosed. Engie expected to close the coal units in 2021, but Chile's National Energy Commission asked Engie to delay retirement until after June 2022, citing prolonged drought and therefore lower hydropower generation. One unit was disconnected in June 2022 and the second in September 2022. The Calama wind farm began operations in June 2021. The financing structure is expected to serve as a replicable model for other phaseout deals in Latin America and the Caribbean. If a regulated carbon market is created during the life of the loan, CTF and Engie would share any increase in the minimum carbon price.

Scaling Learnings from Analogous Power-sector Transactions

Private capital has a variety of roles to play in facilitating, accelerating, and scaling managed coal phaseout transactions. Although few structured finance deals specific to managed phaseout have yet been undertaken, numerous successful cases of power-sector deals from around the world address challenges similar to those faced by FIs looking to get involved in managed phaseout.

Many of the examples in the exhibits below comprise both blended and purely private financings. Note that the examples cited below are illustrative of the levers that FIs could pull to optimize managed phaseout deals and do not constitute endorsements of the efficacy of those transactions. Exhibit 10 shows examples of cost-of-debt financing mechanisms, Exhibit 11 shows examples of cost-of-equity financing mechanisms, and Exhibit 12 shows examples related to additional or alternative cash flows.

Exhibit 10

Cost-of-Debt Financing Mechanism Examples from Power-sector Transactions

Dynamics relevant to managed phaseout	Transaction details	Deal-specific risks/barriers	Financing solution(s)/mechanism
Distressed debt can discourage traditional lenders, decreasing the pool of capital and increasing WACC. This is a possibility in proposed deals involving PPAs/ownership by distressed or insolvent utilities that lack robust managed phaseout plans.	In 2021, the government of Belize purchased $553 million (25%) of the country's public debt from bondholders at a 45% discount through a "Blue Loan" arranged by the Nature Conservancy.	Belize's $553 million Eurobond was trading at a deep discount owing to concerns over macroeconomic issues. Belize could not refinance at market rates and generate savings.	The US Development Finance Corporation insured the Blue Loan, increasing its credit rating to Aa2 and allowing Belize to refinance at much lower rates. Credit Suisse arranged the bond refinancing, which reduced the principal outstanding by $189 million and allowed Belize to create $180 million in conservation funding. Read full case study.
Borrowers may not have enough cash to cover capital expenditures, especially in the Global South. This decreases the project's ability to service debt, thus increasing risk and WACC.	The Home Repair Program, run by the Opportunity Council in the United States, offers deferred payment loans to low- and moderate-income households for energy efficiency projects.	Typical monthly loan repayments often place an unmanageable financial burden on low- and moderate-income households.	The Home Repair Program offers 0% interest loans with no payments due until sale of the property, the proceeds from which give the borrower funds to repay the loan. Most loans are eventually repaid with only a small share of loans written off (see case study). Deferred loan repayments have been floated as a solution for China-funded coal in Pakistan.
Certain replacement renewable energy	In 2021, JPMorgan arranged a $812 million	The project had sizable local content	The deal used public finance to overcome up-front technology

technologies can be costlier in developing economies as they are often produced in OECD countries. Sourcing these post-phaseout components can lower cash flows and/or increase WACC.	syndicated loan for Kalyon's 1.35 GW Karapinar solar project in Turkey, which included innovative new solar technology produced in the United Kingdom.	requirements. Government-backed PPAs often mandate that asset owners procure locally produced equipment.	costs. Kalyon needed GE's FLEXINVERTER solar technology, which is produced in the United Kingdom. GE EFS provided Kalyon a $291 million Buyer Credit Facility, guaranteed by UK Export Finance. GE's Turkey factory provided locally made components.
Low sovereign credit ratings can exclude lenders and/or limit some lenders' exposure, driving up WACC. This may especially inhibit managed phaseout deals in the Global South.	In July 2022, Genser Energy closed a $425 million refinancing to support midstream gas expansion in Ghana. Northcott Capital advised, helping to bring in non-African lenders.	Fitch recently downgraded Ghana to CCC, citing the deterioration of the country's public finances and an imminent IMF deal.	Genser previously raised $366 million in 2019 from African funders. It upsized the refinancing despite the sovereign credit risk, bringing in Europe's Société Générale and US-based Trilinc using more creditworthy off-takers such as Gold Fields (BBB-) and Trafigura (BBB+). Trafigura provided mezzanine debt.
Volatile capital markets (whose volatility may be due to unstable geopolitics and rising interest rates) potentially increase WACC. This may inhibit managed phaseout deals in volatile markets.	In July 2022, Morgan Stanley Infrastructure Partners–owned Continuum Green Energy raised over $350 million in 3.5-year private debt from three investors to expand its Indian solar business.	Geopolitical tensions from Russia's invasion of Ukraine and rate hikes by the US Federal Reserve led to "adverse market conditions," said placement agent Deutsche Bank.	Continuum issued senior secured floating rate notes, backed by projects with commercial and industrial off-takers. It included an option for another $50 million. The floating rate spread the risk of market volatility across the issuer and bondholders, protecting investors if rates rise.
Currency depreciation is a risk for lenders to managed phaseout projects with non-dollar revenues**,** increasing WACC.	In July 2022, India's ReNew Energy Global refinanced US dollar-denominated, hedged bonds with a new local rupee loan from an Indian lender, cutting the rate by 200 bps.	Indian renewables developers have generally had to hedge their bonds, leading to an increase of 6%, on average, in overall spread.	In 2019, ReNew issued $525 million 6.67% notes that mature in 2024. The total spread, including the currency hedge, was even higher. By sourcing rupee financing from a local lender and pushing out maturity to 2027, ReNew saved on financing costs.
The technical complexity of asset decommissioning (e.g., cleaning up after dismantling an old coal	In January 2022, wind developer Leeward completed repowering its Crescent Ridge	The repowering was complex, involving decommissioning nine wind turbines,	Wells Fargo provided a construction-plus-five-year, $94 million financing package for the repowering project, whose

plant) can increase risk, leading to higher WACC, especially if governments are not involved with decommissioning.	project in Illinois, which was originally commissioned in 2005.	repowering 24 legacy turbines, and constructing four new turbines.	technical complexity mirrors the challenges of retiring and transitioning a coal plant and shows how banks can structure flexible deals.
Public credit ratings may be unavailable or unwanted due to the novelty of coal phaseout transactions. An unrated managed phaseout project may have difficulty accessing parts of the bond market, potentially increasing WACC.	In December 2019, Korea Electric Power Company (KEPCO) issued $401 million in unrated 18-year project bonds to refinance its Norte II gas-fired plant in Mexico.	By 2019, step-ups to the Norte II project's original construction loan package from 2011 had increased the overall cost of debt. In the bond market in 2019, Mexican 20-year notes were trading above 7%.	South Korea's export credit agency (ECA) KEXIM became the first ECA to guarantee a project bond tranche when Credit Agricole led on refinancing Norte II into the bond market. The KEXIM guarantee allowed KEPCO to borrow a $250 million unrated 18-year tranche at just 3.3% from a single investor.
Uncertain or unavailable long-term off-take for replacement generation could leave asset owners with only short-term off-take, thereby increasing risk for lenders and increasing WACC.	In 2018, the Carlyle Group closed a $363 million, seven-year debt package from Investec to refinance its 583 MW RISEC gas-fired plant in Rhode Island, priced at L+ 275 bps. It was more than twice oversubscribed.	Gas-fired plants were riskier than renewables due to gas price volatility and the relatively few counterparties for hedges and tolling agreements. RISEC had only a three-year hedge for a seven-year loan.	Carlyle and Investec agreed to an innovative "hedge toggle" feature, wherein the interest rate would increase 100 bps if Carlyle did not secure a power hedge to cover years four through seven of the loan, compensating the lender for the higher risk. Carlyle ultimately extended its hedge.
Complex projects with higher execution risks and/or uncontracted revenues feature higher project risk, and therefore higher WACC.	In November 2022, Goldman Sachs announced grants to support two Asian Development Bank–led bus electrification loan packages, via the Climate Innovation and Development Fund (CIDF) it jointly funds.	The projects, located in Vietnam and India, face several risks, including geographic risks and risks related to the nascency of electric vehicle markets in those countries.	CIDF provided parts of the concessional financing tranches that helped de-risk the $135 million Vietnam and $40 million India loan packages. Private FIs' foundations could similarly provide grant funding to support coal phaseout projects led by multilateral development banks in the Global South.

Source: RMI, 2023

Exhibit 11

Cost-of-Equity Financing Mechanism Examples from Power-sector Transactions

Dynamics relevant to managed phaseout	Transaction details	Deal-specific risks/barriers	Financing solution(s)/mechanism
Sourcing institutional capital is slow in the Global South. Project-level equity from investors in the Global North is traditionally harder to raise for projects in the Global South than debt, potentially increasing WACC for managed phaseout deals in the Global South.	In 2020, Italy's Enel Green Power set up a joint investment partnership with Norwegian development finance institution (DFI) Norfund to fund renewables in India. In their first investment, Enel sold 49% of an under-construction solar farm to Norfund and Norway's largest pension fund, KLP for ~$35 million.	Doing due diligence on an individual cross-border deal in an emerging market for a DFI like Norfund is time-intensive. For KLP, India is a totally new market. For Enel, India is a relatively new market.	By structuring a country-focused equity partnership with Norfund, Enel can quickly draw down on project equity. With a respected DFI like Norfund as a co-investor, the project could access private equity from KLP. Aside from the long-term institutional capital, the IFC is providing $50 million in local currency, fixed-rate 20-year debt.
"Just transition" principles in coal deals are nascent, and definitions of what just transition entails for managed phaseout transactions are nascent and unclear, specifically in terms of compensating local communities and/or plant staff.	Cascade is a C$1.5 billion gas-fired power plant in Canada. C$93 million (of the C$680 million in equity) comes from six Alberta First Nations. The lead sponsors were Kineticor Resource Corp, OPTrust, Axiom Infrastructure, and DIF Capital Partners.	Financing fossil fuel–based infrastructure without the consent/buy-in of Indigenous nations/local communities increases permitting and construction risk, leading to higher WACC.	The sponsors brought local communities into the deal as equity co-investors. Six first nations formed the Indigenous Communities Syndicate (ICS). Alberta Indigenous Opportunities Corp (a government entity) backstopped ICS's equity investment with a C$93 million loan guarantee. More details in case study.
Current plant owner(s) may not have the technical expertise or liability insurance to efficiently decommission the plant and remediate the site. This may increase execution risk and thereby raise WACC.	US energy retailer Energy Harbor (formerly FirstEnergy Solutions) is selling two US coal plants, totaling nearly 3 GW, to a joint venture between private equity firm Hull Street Energy and decommissioning specialist Energy Transition and Environmental Management.	The 1.5 GW Sammis facility in Ohio and the 1.3 GW Pleasants facility in West Virginia were commissioned 40 to 50 years ago. Older coal plants can have high and/or uncertain environmental remediation costs, which may discourage potential investors.	Structured as a sale leaseback, Energy Harbor operates the units while making lease payments to the new owners. ETEM specializes in decommissioning high-emitting assets thanks to technical expertise, specific liability insurance protections, and transition-compatible equity capital.

Source: RMI, 2023

Exhibit 12

Alternative or Additional Cash Flow Examples from Power-sector Transactions

Dynamics relevant to managed phaseout	Transaction details	Deal-specific risks/barriers	Financing solution(s)/mechanism
Currency risk is a threat to projects with non-dollar revenue streams. The risk of currency depreciation increases WACC.	In Q1 2021, Deutsche Bank structured a six-year $185 million Indian rupee/US dollar currency hedge for Morgan Stanley–owned Continuum Green Energy, linked to Continuum's US dollar green bonds.	The rupee has been steadily depreciating against the dollar since 1991. Continuum's revenues are in rupees, whereas its bond payments are in dollars.	Deutsche Bank and Continuum developed a green hedge framework to support Continuum's green bond framework. An external reviewer, Cicero Green, issued the second-party opinion. The currency hedge alleviated depreciation concerns for international bond investors.
Lack of guaranteed revenues for future replacement generation can lead to increased WACC.	In 2019, Danish private equity firm Copenhagen Infrastructure Partners (CIP) closed tax equity financing from US Bank for its Misae solar plant in Texas.	Securing a bankable power purchase agreement for solar in Texas in 2019 was challenging, since power prices were (and remain) relatively volatile.	Goldman Sachs, via its subsidiary J Aron & Co., offered CIP an innovative seven-year power hedge that came with a three-year collar feature thereafter, allowing the project to take advantage of changes in power prices after the seven-year period.
Structuring transactions involving multiple investors and off-takers can be complex, especially for smaller/regional asset owners.	In 2018, Sammons Renewable Energy closed construction financing for its Midway wind farm in Texas, securing debt and tax equity based on an 11-year power hedge.	The pool of wind tax equity investors and hedge providers in Texas in 2018 was very limited, making it even more difficult for asset owners to match financing with off-take.	Citi played four separate but coordinated roles to get the transaction across the line, providing (1) a portion of the tax equity, (2) a portion of the construction debt, (3) a portion of the off-take (power hedge and renewable energy certificates), and (4) agency and trust services.

Source: RMI, 2023

Conclusion

In 2022, coal power supplied over a third of the world's electricity, despite scientific consensus that its accelerated phaseout is essential to achieving global climate goals and the reality that renewables (combined with battery storage) are generally more economic.[43] Without question, the transition away from global coal power toward readily available low-carbon alternatives is imperative, and the scale and urgency of the challenge necessitates swift and sweeping interventions from governments and the private sector alike. At the same time, calls for the private financial sector to ditch their coal holdings have been growing for years. Yet a blanket capital exodus from all coal power assets will not directly support a timely and just transition. If anything, coal divestment can make it harder for coal asset owners to access affordable capital to unlock long-term obligations and realign incentives in favor of early retirement.

Innovative financing mechanisms present one way to accelerate a timely transition away from coal assets. A managed phaseout generally entails internalizing the costs related to early retirement and allocating these costs efficiently across various funding sources. Some of the variables involved in a successful managed phaseout deal may be contingent upon conditions and realities that are out of a financial institution's control, such as the availability of renewable energy projects and grid capacity to replace coal across geographies. But, where possible, this working paper should serve as a starting point for FIs pursuing innovative, climate-aligned investment opportunities that offer a significant opportunity for FIs and their clients alike.

Private FIs can and should pursue managed phaseout deals for two main reasons: (1) to align their portfolios with net-zero commitments in a way that drives real-economy impact, and (2) to deepen, broaden, and/or maintain client engagement. Accelerating the transition away from coal power toward a greener power generation also supports FIs' climate goals in other real-economy sectors where electrification relies on clean power to reach net zero (e.g., electric vehicles and building electrification retrofits).

Though the managed phaseout ecosystem is young, with only a handful of "first-of-their-kind" deals completed, the types of financing that private FIs can offer in support of managed phaseout outcomes have been well established through global power-sector financings. Private FIs have a key role to play in enabling and scaling these transactions. FIs have the tools and knowledge to accelerate coal retirement in close partnership with their clients and governments, and they can look to take an "all-of-firm" approach to managed phaseout by providing a range of climate-aligned products and services from different business units across their organizations.

There is no one-size-fits-all approach to managed phaseout because coal power plants operate under different geographic and regulatory contexts. Ultimately, each managed phaseout transaction will introduce unique constraints and opportunities, and global learning will accumulate with leadership, experimentation, and experience from private and public FIs, which will further lower transaction costs and risks. By pulling the three levers of cost of debt, cost of equity, and future cash flows, managed coal phaseout plans can be an effective strategy for FIs as they advance a just and expedited transition away from coal power while securing risk-adjusted returns. Managed coal phaseout presents a unique climate-aligned investment opportunity, and private finance has the tools to take the critical first steps. There's no time to spare — bold leadership and urgent action are the only way forward.

Appendix: Asset End Use and Decommissioning Cash Flow Implications

Private FIs can work with asset owners to identify the optimal end-use case for coal power assets. There are several options for asset end use; feasibility and cash flow implications vary according to differences in coal plant profiles and global contexts. Coal plant retirement generally falls into one of three buckets, each of which present different costs, risks, and implications for transactions:

- **Retirement** or shutdown implies costs associated with decommissioning and remediation, which may already be funded and accounted for. The premature end of power production implies an end to cash inflows from power and capacity sales while existing fuel supply and employment contracts must be paid out sooner than initially agreed, all of which may negatively affect cash flows. However, potential revenues from recycling components and materials may improve cash flows.

- **Transition (retirement and replacement)** costs include decommissioning and remediation expenses as well as the costs of buying out existing fuel supply and certain employment contracts. They also include up-front investments in construction of new infrastructure, either for repowering with cleaner replacement electric generation or for redevelopment to other uses, such as data centers, warehousing, or real estate. For repowering, power supply contracts can be renegotiated with existing off-takers. New renewable energy PPAs could be priced lower (and/or longer in duration) than the old coal PPA and, coupled with battery storage, could allow for long-term cash inflows, lower cost of capital, and a smooth, speedy transition. Redevelopment to non-power generation can also introduce positive cash flow potential associated with revenues from new activities. Exhibit A1 illustrates how coal sites can be redeveloped even for non-power-generation activities.

- **Retrofit and repurpose** implies curtailing generation but preserving the asset as callable generation or balancing capacity. This frees asset owners from costs related to decommissioning and remediation (including from potential litigation related to contamination), though the plant would have ongoing operating costs (e.g., fuel supply and labor), reduced revenues from curtailed generation, and no immediate revenue opportunities from repurposing and selling the site. This "mothballing" option may be necessary in some cases if local regulation requires generation capacity be kept ready in case of emergencies (e.g., for energy security reasons). Mothballing introduces a risk that future asset owners will operate the plant at higher levels; however, this could be addressed through covenants and penalties in financing agreements. This strategy may also increase overall risk under the assumption that it will become increasingly difficult to find coal asset buyers as markets move toward net zero and FIs implement stricter coal policies.

Both retirement and transition end uses will likely involve decommissioning and remediation costs. In some instances, these will already be accounted for in project financing but will need to be addressed on an accelerated time line. Decommissioning costs involve expenses to demolish infrastructure and remove equipment and materials, in compliance with environmental regulations. Remediation costs involve the clean-up of contamination post-decommissioning and support for new site uses, with closure of coal ash facilities typically representing the most substantial cost associated of coal decommissioning[44]. All options require concerted adherence to just transition principles, where harmful impacts to local communities are minimized and worker retraining is prioritized.

In both retirement and transition, cash inflows could result from salvaging and/or reselling equipment and materials. Net cash flow implications of decommissioning and remediation will vary based on the plant location and profile, including federal regulations.

- In South Africa, financing proposed by the World Bank for Eskom's 60-year-old 1,000 MW Komati coal plant estimated $33.5 million in decommissioning costs, with $10 million estimated to be recouped from recycling and/or sale of materials including iron and steel.[45]
- In India, total decommissioning cost estimates (including remediation, recycling scrap materials, and employee compensation) for four plants in Tamil Nadu ranged from $29 million for the 26-year-old 630 MW North Chennai plant to $64 million for the 33-year-old 1,470 MW Neyveli plant.[46] A 2021 World Bank study estimates decommissioning costs at $58 million for a separate 1,000 MW plant in India.[47]
- In the United States, decommissioning costs vary widely, ranging from $21 million to $466 million, with a mean of $117 million across 28 estimates, according to a 2017 study.[48] A series of studies by the Tennessee Valley Authority illustrated the cost variation of remediation; estimated "closure-in-place" costs ranged from $3.5 million for a 22-acre pond to $200 million for a 350-acre site.[49]

Exhibit A1

Coal Power Site Redevelopment Case Studies

Redevelopment	Coal site redevelopment case study	Role of private finance in similar cases
Data center	In 2015, TVA removed the last operating unit of the Widows Creek coal plant in Alabama from service. In 2018, Google broke ground on a $600 million data center on the 360 acres former Widows Creek site. Google powers the data center with renewable energy sourced from TVA.	FIs have funded billions of dollars in sustainability-linked loans (SLL) for data center owners. For example, TD Securities, Wells Fargo, and Citizens Bank were joint bookrunners on a $1.75 billion SLL for Aligned Data Centers in May 2022. Loan proceeds could enhance future cash flows for coal plants with managed phaseout plans.
Industrial park	In 2018, WEC Energy Group retired its 1,200 MW Pleasant Prairie coal plant in Wisconsin. Real estate developer Dermody Properties agreed to buy the property in June 2022 and convert it into a $226 million industrial park. Pending final approvals, the project could break ground in 2023 and be completed in 2024.	FIs can engage clients to redevelop coal plant sites to enhance future cash flows and thus accelerate retirement. FIs' private equity arms can fund redevelopment that would cover coal decommissioning costs. Dermody itself raised $2.05 billion from AXA's alternative investment management arm in 2021.
Mixed-use real estate	Philadelphia's coal and fuel oil–fired Delaware Station ceased operations in 2004. Its owner, Exelon, sold the waterfront plant property in 2015 for $3 million. In 2020, Lubert-Adler Real Estate Funds bought the property for $14 million to convert it to a residential and commercial campus. The first phase of the $153.6 million redevelopment is set for completion in 2023, including $21 million in federal historic tax credits.	FIs can engage with their real estate clients and incentivize lower-carbon buildings via instruments such as green bonds. For example, Goldman Sachs underwrote a $457.5 million green bond refinancing for Silverstein Properties' LEED Gold-certified 7 World Trade Center office tower in New York city in April 2022. Bond proceeds could enhance future cash flows for coal plants with managed phaseout plans.

Source: RMI, 2023

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