Coal-to-Clean Success Stories

Scalable innovations from promising coal-to-clean transitions around the globe

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Executive Summary

The global power sector's transition from “coal-to clean” will be critical to meeting urgent climate targets but must be managed carefully to ensure the transition supports economic development. For a just coal-to-clean transition, existing coal assets must retire earlier than originally planned. This managed coal phaseout requires strategic financing to execute, which can be further complicated by tight balance sheets, a high cost of capital, and coal’s near-complete insulation from competition. Despite such barriers, financial institutions (FIs) are stepping in to make just coal-to-clean transactions happen.

Carefully constructed financial tools called coal transition mechanisms (CTMs) can help generators, electricity customers, and the public overcome these complications and realize the benefits of cheaper clean energy. In the past few years, the first wave of FIs has begun to capitalize on the opportunity to enable early coal plant retirement through the use of CTMs in various markets globally. The continued deployment of CTMs to accelerate the energy transition is especially critical in emerging markets and developing economies (EMDEs), as a significant amount of financing will be needed to enable a managed and just coal transition. Although we have seen billions of dollars committed to coal transition globally, most of that finance has not yet been deployed (and not at scale).

With these case studies, RMI highlights lessons learned from a few of the first successful transactions and the enabling factors they relied on to promote increased awareness and use of such factors for managed phaseout transactions moving forward. Specifically, we have showcased managed phaseout transactions that enabled the early retirement of coal plants:

- Tocopilla power station in Chile, where a results-based concessional loan tranche tied to emissions reductions helped retire coal units early while building new renewable capacity.
- Logan and Chambers generating stations in the United States, where institutional investors refinanced project debt to enable early retirement.
- The Calaca SLTEC power station in the Philippines, where the owner sold its equity stake in the plant to investors who could lower the cost of capital and accelerate the plant’s retirement.

These case studies demonstrate innovative and potentially replicable approaches to utilizing CTMs that could apply in diverse geographies and market structures, most notably in emerging and developing economies.[1]

[1] The material for the case studies was compiled from a combination of qualitative research using information in the public domain and interviews with stakeholders that financed, designed, or assisted in these transactions.

These case studies highlight the key factors that enabled early retirement as examples so that others can carry over these learnings and contextualize them for new markets and future transactions. Across all these case studies, we identified the following enabling factor themes:

1. Clean energy was often cheaper than operating coal or existing coal power purchase agreements (PPAs) in the market at the time of transaction.
2. There was a strong appetite for transition from offtakers and project sponsors.
3. The initial coal asset owners were independent power producers (IPPs) able to navigate potential regulatory barriers to transition.
4. A lower cost of capital was secured in the financing mechanism.
5. There was perceived credibility in the financing mechanism, initial project sponsor, and/or clean energy replacement enabled by early retirement.

Introduction

Reducing emissions from the power sector is key to meeting climate targets — in 2021, the power sector accounted for nearly 44% of global CO_2 emissions. As global access to electricity expands and countries turn to electrification as a means of decarbonization, the need for a rapid power sector transition becomes more imperative.

Core to this challenge is the transition away from coal-fired power, which accounted for 73% of the sector's greenhouse gas emissions in 2021. Utilities and independent power producers (IPPs) worldwide are wrestling with the coal-to-clean transition, especially how to enable the managed phaseout of coal assets. This managed phaseout of coal is complicated by long-term contracts to purchase electricity from coal plants, utility incentives and regulation, the role of coal in supporting national economies and local livelihoods, and other factors. Given these hurdles, well-designed financial structures called coal transition mechanisms (CTMs) can help generators transition away from coal and unlock the benefits of cheaper, cleaner renewable energy sources.

Over the past few years, the first wave of financial institutions (FIs) has begun to capitalize on the opportunity to enable early coal plant retirement using innovative financial mechanisms in markets like Chile, the United States, and the Philippines. As early-stage pilots, each of these mechanisms were designed to meet the needs of specific market and grid conditions.

To scale coal managed phaseout from these first few pilots to the hundreds of gigawatts (GW) needed to meet climate targets, these transactions must become less risky, more replicable, and better able to attract private finance. These case studies highlight the key factors that enabled successful early coal retirement projects. The intention is that key stakeholders in the energy transition (FIs, national and sub-national governments, utilities and IPPs, etc.) can adapt and apply these lessons to create an enabling environment in new markets, mobilize increased private FI participation, and rapidly scale these types of transactions. You can find online versions of these case studies here.

Transition Finance Case Studies: Tocopilla Units 14 and 15 — Results-Based Loan Incentive

Summary

In 2021, IDB Invest (a member of the Inter-American Development Bank group) and Engie Energia Chile (Engie or EECL) closed a deal to finance 151 megawatts (MW) of the Calama wind farm and incentivize the early retirement of units 14 and 15 of Engie's Tocopilla coal plant. The accelerated decommissioning of these Tocopilla units is indicative of EECL's response to stated interest and pressure from both the government to phase out coal power and from its industrial customers (mostly copper mining companies) to provide lower-cost power.

IDB Invest (the lender of record) structured and proposed a blended finance package, which incentivized EECL (the borrower) to retire operating coal assets early via a concessional debt tranche in the financing package. The loan financed the construction of new renewable generation rather than explicitly refinancing or retiring coal assets — however it was structured so that the earlier the operating coal assets were shut down, the lower the amount of interest of the concessional tranche EECL would need to pay at maturity of the loan. The amount of the interest rate reduction depends on a pre-agreed carbon price multiplied by a capped volume of carbon saved via early retirement. Additional details on the Tocopilla coal units can be found in Appendix Exhibit 1.1.

Key Enabling Factors

- Chile's top-down coal phaseout policy fostered buy-in from private players to retire coal-fired power plants.
- The financing mechanism was designed and organized by a proactive and innovative multilateral development bank (MDB) — in this case IDB Invest — that pitched the idea to a willing international asset owner.
- Climate Investment Funds (CIF) provided a concessional tranche that unlocked results-based carbon finance for new renewable generation tied to the early retirement of coal assets.
- A combination of FI appetite for transition in Chile and credit-worthy borrowers (EECL) and offtakers (industrial customers) allowed for power purchase agreement (PPA) renegotiation and low-cost debt to finance the transaction.
- Chile created a market environment that enabled greater renewable energy (RE) penetration and, at the time of the transaction, the economics of RE generation were favorable compared to that of coal power.
    - At the time of the transaction, new RE PPAs were cheaper than high-priced legacy coal PPAs, giving generators and their customers incentive to renegotiate PPA terms. In the 15 years before the transaction, the Chilean government introduced new market mechanisms and policies and invested in central grid expansion and interconnection — all of which drove down the price of renewables.
    - Government-backed "investor roadshows" for renewables helped spread awareness and confidence. This led to sufficient competition in Chile's power auctions and eventually drove down wholesale power prices.

Transaction Details

Deal Size	$125M (total syndicated loan value)[2]

[2] All dollar amounts refer to US dollars.

Loan Structure *[See section below for more details]*	EECL signed a 12-year, blended finance transaction with carbon abatement-based concessional debt with IDB Invest. The financing package includes a $110M commercial loan ($74M from IDB Invest and $36M from the China Fund for Co-financing in Latin America, both at market rate), and a $15M concessional loan from the Climate Investment Fund's (CIF's) Clean Technology Fund (CTF). The carbon monetization mechanism of the concessional loan is detailed below.
Advisors	IDB Invest: Lead arranger for the syndicated loan A&O Shearman (previously Shearman & Sterling): New York counsel to the borrower Hunton Andrews Kurth: New York counsel to the lender Prieto Abogados: Chilean counsel to the borrower Cariola: Chilean counsel to the lender
Use of Proceeds	All proceeds were used for the construction of 151 MW of the Calama wind farm.

Carbon Payment Mechanism Structure

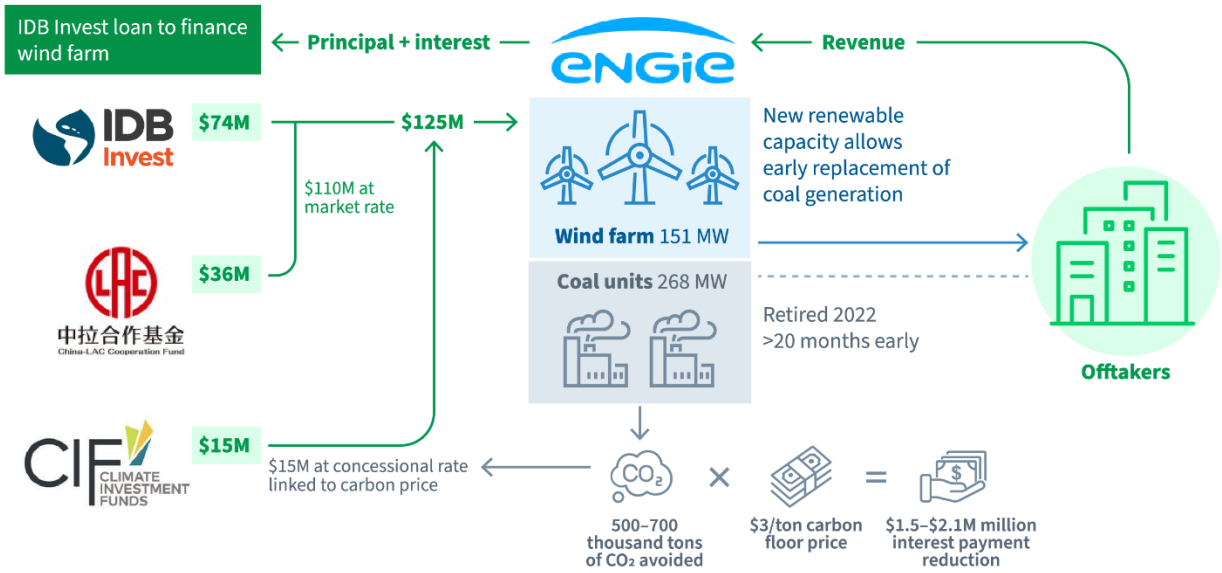
The debt arranged from IDB Invest to EECL is valued at $125 million, with a $74 million senior loan from IDB Invest, a $36 million loan from the China Fund for Co-financing in Latin America (managed by IDB Invest), and a $15 million concessional loan from the CTF (managed by IDB Invest).

The CTF loan is structured as a bullet at maturity loan with a two-tiered interest rate structure – first, a floor fixed interest rate of 1% payable semiannually and, second, the difference between the first rate and the equivalent fixed rate of the commercial tranche provided by IDB Invest, which would be deferred and capitalized to become payable at maturity of the loan.

A carbon payment mechanism is embedded in the CTF loan's interest payment at maturity and is defined by the product of the abated carbon emissions from early retirement and a pre-agreed upon carbon price of $3/ton to be deducted from the deferred and capitalized amount payable at maturity. To ensure additionality, EECL is only credited for abated emissions before the units' May 2024 initial voluntary commitment. Although the emissions numbers are still being verified (see IDB Invest's methodology on emissions accounting), RMI's preliminary calculations estimate between 500,000 and 700,000 tons of abated carbon emissions through the early retirement of unit 14 in June 2022 and unit 15 in September 2022. Using these numbers, EECL would not have to repay $1.5–$2.1 million of the interest payment at maturity.

IDB Invest arrived at this concessional loan mechanism by first attempting to assign value to the emissions reductions (early retirement of coal units), in the absence of a regulated carbon market in Chile. As a result, IDB Invest proposed this mechanism to use the more traditional lever of concessional debt and innovate by embedding the carbon price in the loan. The carbon price of $3/ton was determined via a price-discovery exercise between IDB Invest and EECL, under the principle of minimum concessionality. If Chile establishes a regulated carbon market in line with Article 6 of the Paris Agreement, the loan facility will still secure EECL the agreed-upon floor carbon price.

However, if a potential carbon market prices coal transition carbon credits higher than $3/ton, then the carbon floor price mechanism will no longer hold, and in exchange, EECL will share a fraction of the additional profits with the CTF. See below for an illustration of the transaction structure.



Transition Timeline

Date	Action
1987	Tocopilla unit 14 commenced operation.
1990	Tocopilla unit 15 commenced operation.
2008	Chilean government mandated that 5% of all power sold from generators with over 200 MW installed capacity come from RE sources (with a gradual escalation to 10% by 2024).
2013	Chilean government introduced feed-in tariffs for clean energy. The previous mandate for minimum RE sales from generators was increased to 20% by 2024.
2014	Chilean government introduced a national carbon price of $5/ton, applicable to carbon-intensive generators in the wholesale power market.
2015	Chilean government established energy auctions where generators could commit 5–10-hour blocks (historically they could only commit 24-hour blocks), which was favorable for RE generators. To ensure adequate competition at these auctions and spur RE development, the government hosted “roadshows” with international developers. As a result, developers bid eight times the capacity needed in the auctions, and the competition drove down RE prices. At this point, coal PPAs were priced at $70–$80/MWh, and solar PPAs were priced around $35/MWh. Appendix Exhibit 1.2 shows the effect of introducing these auction blocks on average electricity award prices.

2016	Interconnection costs for new RE projects were passed through to end consumers, improving the capital expenditure figures for RE developers.
2017	The National Electricity System (Sistema Eléctrico Nacional) was created by merging the northern and southern grid systems, allowing the system operator to optimize the deployment of renewable generation. This allowed for lower cost RE from northern Chile to be sold across the country, lowering wholesale power prices. Seeing the lower RE prices, copper mining companies (that were large industrial customers for EECL and other Chilean generators) wanted to get better deals than what their long-term coal PPAs offered and levied pressure on generators to provide cheaper power.
2018	The Chilean government published the Ruta Energética 2018–2022, establishing a binding schedule for the phaseout of coal power as one of ten government commitments. Shortly after, the Chilean government convened the "mesa de trabajo descarbonizacion" (a public-private dialogue between coal power generators, government officials, and mining companies) to phase out all coal by 2040.
June 2019	Chilean Energy Ministry and Engie Chile signed an agreement to retire units 14 and 15 by May 31, 2024, thereby phasing out all coal in Tocopilla.
2019	IDB Invest proposed an incentive-based accelerated coal retirement for units 14 and 15.
April 2020	IDB Invest loan disclosed.
December 2020	IDB Invest loan signed.
February 2021	Engie announced the financial deal for 151 MW Calama wind farm in a transaction linked to the early retirement of Tocopilla units 14 and 15.
October 2021	Calama wind farm commenced operation.
June 2022	Tocopilla unit 14 disconnected.
September 2022	Tocopilla unit 15 disconnected.
May 2024	Original planned retirement date for units 14 and 15.

Transition Finance Case Studies: Logan and Chambers — Renegotiate, Refinance, Redevelop

Summary

In 2022, private equity firm Starwood Energy Group (now Lotus Infrastructure), the majority owner of the Logan (225 MW) and Chambers (285 MW) coal portfolio, accelerated the retirement date of the plants by 30 months, from 2024 to 2022. Starwood did this by renegotiating the power purchase agreements (PPAs), refinancing project-level bonds, and agreeing to redevelop the sites into clean energy resources.

The portfolio's output had originally been sold primarily to Atlantic City Electric (ACE) via 30-year PPAs signed in 1994. ACE had agreed to terminate the PPAs in 2022 instead of 2024 — 30 months early — thereby saving ACE customers around $30 million.[3] ACE would originally have paid Starwood $258.5 million (net) from 2022 to 2024; under the renegotiated PPA, ACE would only pay Starwood $228.5 million (net). Against these $228.5 million revenues, Starwood refinanced using $200 million in debt from MetLife in part to help pay ACE for the early PPA termination. The plants ceased operations in June 2022. It took Starwood 12 months to work with all counterparties to negotiate the agreement. The early decommissioning was expected to result in the reduction of 3.9 million tons of CO_2. Starwood plans to redevelop the sites at both Logan and Chambers into grid-scale batteries, at 876 MWh and 960 MWh in size respectively. Additional details on the Logan and Chambers coal units can be found in Appendix Exhibit 2.1.

Key Enabling Factors

- **Offtaker appetite for early retirement**
  - Investment-grade offtaker wanted to cut short the high-priced PPAs and retire the plants early.
  - Minimal modification to the original PPA was needed because of the agreed payment mechanism between the offtaker and Logan and Chambers.
  - Accelerated coal retirement was in line with local policy and regulatory goals:
- Redevelopment falls within New Jersey state's Energy Master Plan, which promotes the deployment of energy storage facilities.
- Verifiable ratepayer savings from the PPA renegotiation and early retirement helped the transaction pass through the New Jersey Board of Public Utilities (NJBPU) approvals.
- **Transaction structure**
  - The $200 million deal was large enough for the institutional debt market. Appetite from institutional debt for 2-year (i.e., short) loan tenor was strong. The investment structure allowed for simple allocation to institutional investment portfolios such as that of Zurich Insurance. Once regulators had approved the early retirement dates, institutional investors had confidence that the plants would honor their early retirement dates.
- **Starwood was a high-quality, experienced sponsor** that has been a power plant owner for decades.

[3] All dollar amounts refer to US dollars.

Transaction Details

Deal Size	$200M
Financing Structure *[See section below]*	Logan and Chambers had each been previously financed with amortizing, tax-exempt municipal revenue bonds priced at 5% and issued in 2014: Logan had $65M in BBB- bonds maturing in 2024, while Chambers had $114M in BBB bonds due December 2023.[4] Starwood refinanced the bonds with 2-year, $200M institutional debt arranged by MetLife Investment Mgmt. (MIM), which came from MIM's institutional clients and MetLife's general account. The MetLife-led refinancing was announced in April 2022, when 2-year Treasurys were around 2.5%.
Use of Proceeds	1) Site remediation and decommissioning expenses, and 2) Repayment of existing outstanding debt. Starwood paid $30M to ACE to terminate the PPA 30 months early. Because of that payment to ACE, ACE is paying the projects $228.5M (net) from 2022 to 2024, against which $200M in debt was raised from MetLife.

"Renegotiation, Refinancing, Redevelopment" Structure

The debt arranged from IDB Invest The transaction has three key elements, which interact with and reinforce each other: 1) Renegotiated PPAs allowed for early coal retirement, which enabled Starwood to 2) refinance from institutional investors as an attractive investment opportunity, which then enabled Starwood to 3) utilize the site and its favorable interconnection grid position to develop battery storage. [*See flowchart below*.]

[4] Aside from the project-level debt, there was also some portfolio-level debt: According to *Power Finance & Risk*, when Starwood bought majority stakes in Logan and Chambers as part of a larger four-plant US coal portfolio holding company called "Excalibur Power" in 2018, Starwood secured $200 million in acquisition financing from SunTrust Robinson Humphrey. The SunTrust loan was reportedly priced at LIBOR + 400bps. LIBOR in 2018 was around 3%, implying 7% overall interest rate in 2018. It is unclear if the $200 million MetLife project-level debt refinancing also paid down any of the $200 million SunTrust Holdco financing. See *Power Finance & Risk* article for more details.

Original PPA	Renegotiated PPA
In 2022, the original 30-year PPAs (signed in 1994 when PPAs were higher) had two more years until the original 2024 end-date. • ACE payment to plants 2022–2024: $417.8M • *less grid capacity payments to ACE: $159.3M* • **Net ACE ratepayer expenditure: $258.5M**	Renegotiated PPAs would cease in 2022 — 30 months earlier than the original 2024 end date. Offtaker was freed from high-priced PPA. • ACE payments to plants 2022–2024: $258.5M • *less Starwood payments to ACE: $30M* • **Net ACE ratepayer expenditure: $228.5M**

Original debt	Refinanced debt[5]
Logan (Ba1/BBB-) and Chambers (BBB) had approximately $186M in combined 10-year, 5%, amortizing, tax-exempt municipal revenue bonds due in 2024.	2-year $200M institutional debt arranged by MetLife and sold to institutional investors in 2022, when 2-year US Treasurys were around 2.5%. Pricing on MetLife debt is unknown.

Original project characteristics	Redevelopment plans
Two coal projects totaling 510 MW	Two battery projects totaling 1,827 MWh

Transition Timeline

Date	Action
August 1988	ACE signed long-term PPAs with Logan and Chambers.
1994	Logan and Chambers commenced operations.
1994–2017	The projects had various changes in debt and equity financing over 20 years, including 10-year, project-level, fixed-rated tax-exempt municipal bonds issued in 2014, which retired earlier variable-rate tax-exempt debt.
November 2017	Starwood agreed to buy a majority equity position in Logan (100%) and Chambers (60%) projects by acquiring a 4-project portfolio from Ares-EIF. The project-level debt remained in place and Starwood added $200M in portfolio-level acquisition financing via a loan from SunTrust Robinson. Atlantic Power held the remaining 40% equity in Chambers.
December 2021	Starwood agreed to acquire remaining 40% stake in Chambers.
December 2021	ACE filed a petition with NJBPU to modify PPAs and accelerate retirement.
March 2022	State regulator NJPBU approved ACE's petition to modify PPAs, bringing forward retirement date by 30 months from 2024 to May 2022.

[5] For a full deal profile, see article in Proximo Infra.

April 2022	MetLife Investment Management announced $200M in financing, following the defeasance of the previous municipal revenue bonds.
June 2022	Logan and Chambers ceased operations.
December 2022	Logan demolished; Starwood announced plans for a $1 billion utility-scale battery storage facility on the former project sites. Demolition plans for Chambers have yet to be announced.
2024	Original portfolio retirement date.

Transition Finance Case Studies: SLTEC — Project Sale to Special Purpose Vehicle

Summary

In 2022, ACEN Renewables (energy subsidiary of the Philippines-based conglomerate Ayala Group), offtaker of the 246 MW (net) South Luzon Thermal Energy Corporation (SLTEC) coal plant, closed a deal to fully sell its equity in the plant to a special purpose vehicle (SPV) and thereby reduce the plant operating life by 25 years, to 2040.

ACEN had originally planned to sell off the asset to a buyer that was willing to own and operate the plant for its expected remaining lifetime, as the company wanted to pivot toward 100% renewable energy by 2025. A combination of investor pressure to avoid continued plant operation after divestment and ambition from ACEN leadership to be a leader in the clean energy transition led to the decision to explore managed phaseout opportunities as a potential path to get the plant off ACEN's balance sheet. ACEN therefore pursued investing in renewable energy and selling its equity stake in SLTEC to investors with lower return hurdles, enabling the plant to retire earlier than scheduled. Additional details on the SLTEC coal units can be found in Appendix Exhibit 3.1.

Key Enabling Factors

- The quality and experience of the initial project sponsor (ACEN) and its parent company (Ayala Group) mitigates risk: As a major Philippines conglomerate, Ayala Group has a history of strong financial standing.
- ACEN already had a corporate target for 100 percent renewable energy by 2025, a commitment to a just transition, and an ambitious CEO that wanted to be a leader in the energy transition. ACEN's equity divestment of SLTEC also freed up capital — proceeds from the transaction have been earmarked by ACEN for reinvestment in renewable energy projects.
- Having multiple contracts helps mitigate risk: ACEN is contractually obliged (through a power purchase agreement, or PPA) to offtake power from SLTEC until 2040, which lowers risk for financiers (and likely system operators/regulators). Similarly, ACEN's operation and maintenance (O&M) contract with SLTEC mitigates operational and reliability risk for lenders.
- The SPV structure mitigates risk:
    - The SPV re-levered the capital structure of SLTEC by replacing higher-cost equity with lower-cost debt and equity (specifically longer-term debt) from institutional investors. Before the SPV, SLTEC had a debt/capital ratio of 0.58, which increased to 0.79 post-transaction.
    - ACEN followed the Asian Development Bank's (ADB's) energy transition mechanism structure, giving it a credible template to sell to investors. ADB itself was not involved in the transaction.
- The presence of strong and supportive domestic FIs, both debt and equity, enabled the transaction to close efficiently, as this avoided the lengthier due diligence and risk assessment processes sometimes associated with international capital. Notably, these domestic FIs were willing to provide debt and equity financing on a coal asset for approximately 18 years until early retirement, which would not be possible for any international FIs with coal exclusion policies.
- ACEN and project partners were explicit about emphasizing the role of investors in allowing the coal plant to retire early. This gave the SPV lenders an unofficial "carve-out" for having a coal asset on the books, protecting them from potential pushback on coal investment.

Transaction Details

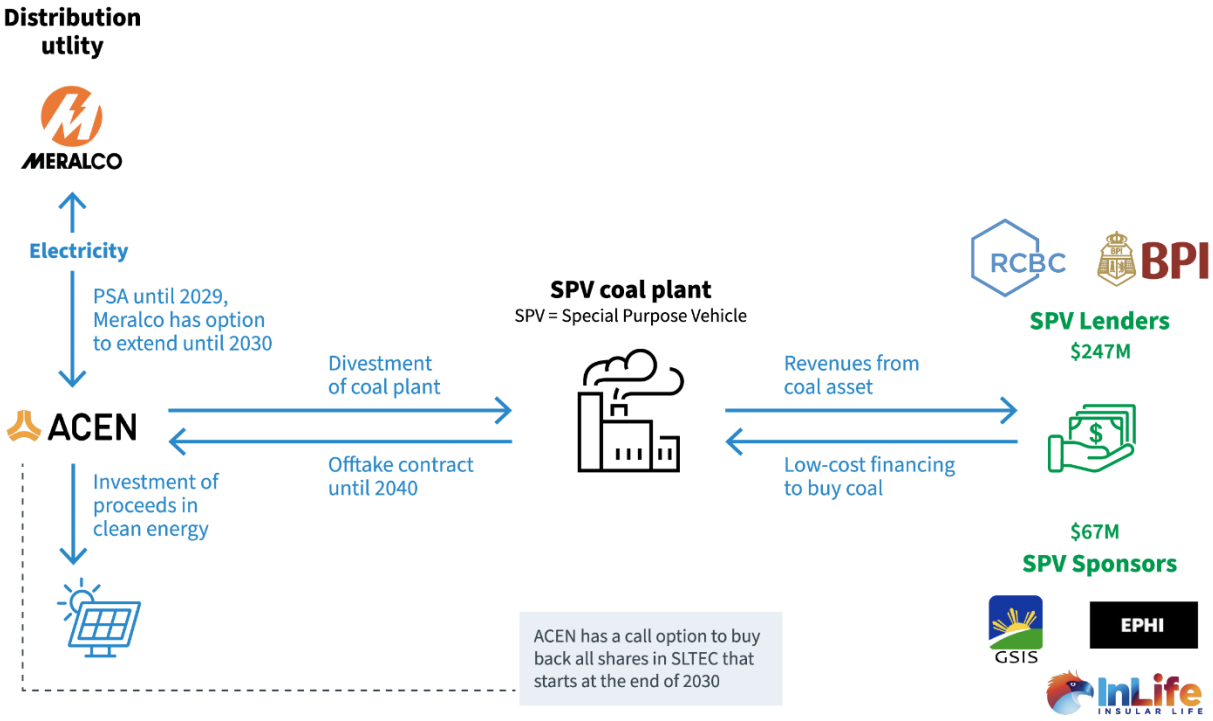
Deal Size	~$314M, based on book value and PHP/USD exchange rates at the time of the transaction (November 2022).[6]
Financing Structure *[See section below for more details]*	The $314M SPV was capitalized with $247M in debt from Rizal Commercial Banking Corporation (RCBC) and Bank of the Philippine Islands (BPI, another Ayala subsidiary) and $67M in equity from institutional investors Insular Life Insurance, the Philippines Government Service Insurance System (GSIS, a pension fund), and ETM Philippines Holding Inc. (EPHI). Post-transaction, ACEN still has a continued role with SLTEC due to three contracts detailed below: a PPA; an O&M contract; and a call option contract. ACEN has plans to reinvest proceeds from the SPV in new renewable energy projects.
Contracts	O&M: SLTEC has an O&M contract with ACEN to manage plant reliability, security, and employees.
	Call Option: ACEN has a call option contract to buy back the plant from the new SPV owners as early as 2030. ACEN could exercise this option to accelerate plant retirement even earlier than 2040 (potentially with proceeds from carbon financing).
Advisors	Alphaprimus advisors: Financial advisors to the transaction. BPI Capital: Financial advisor to the transaction and joint arranger for SLTEC's debt financing. RCBC Capital: Joint arranger for SLTEC's debt financing. CLSA: Lead arranger for the equity placements.
Use of Proceeds	$184M was used to refinance debt and cover transaction fees. The refinanced debt was liable to Banco de Oro, RCBC, and Security Bank Philippines, all of which were original lenders to SLTEC. The remaining $130M is earmarked by ACEN for reinvestment in the company's renewable energy projects (likely some combination of off-site solar PV, wind, and battery storage, details of which are to be determined).

SPV Structure

ACEN sold 100% of its equity in the plant to an SPV capitalized by multiple lenders and equity sponsors. The SPV was capitalized by a 0.79 debt/capital ratio, with $247 million debt combined from RCBC ($123.5 million) and BPI ($123.5 million). The remaining $67 million in equity was bought by institutional investors with a competitive cost of

[6] All dollar amounts refer to US dollars.

capital: Insular Life Insurance ($9 million), the Philippines GSIS ($40 million), and EPHI ($18 million) — GSIS' shares are preferred equity, sitting in the mezzanine tranche between senior debt and the other (common) equity. EPHI is a holding company under ACEN, allowing the original owners to retain a stake in the asset and generate revenue through continued plant operation. A visual depiction of the SPV capital structure can be found in Appendix Exhibit 3.2.



Transition Timeline

Date	Action
October 2011	SLTEC project commenced as a joint venture between PHINMA Energy and Axia Power Holdings Corporation of the Marubeni group. Debt financing for Unit 1 from initial project sponsors closed.
July 2013	Debt financing for Unit 2 from initial project sponsors closed.
April 2015	Unit 1 commenced operation.
February 2016	Unit 2 commenced operation. At this point, more than 90% of ACEN's portfolio was coal.
2016–2017	ACEN expanded across APAC to Indonesia, Vietnam, India, and Australia. ACEN also decided to shift from thermal power to renewables and build internal capacity in development and operations (via acquiring partner firms) rather than continuing to be an investment management firm reliant on development and industrial partners.
June 2019	ACEN acquired PHINMA Energy, original owners of 80 percent stake in SLTEC.
October 2019	Offtake contract (PPA until 2040) signed between SLTEC and ACEN.
June 2020	Offtake contract (power supply agreement until 2029) signed between ACEN and Meralco.

September 2021	ACEN completed the buyout of Axia Power's shares in SLTEC and became sole owner of the plant.
Early 2022	Closed debt financing for SPV.
November 2022	Closed equity financing for SPV.
2040/2041	Unit 1 and 2 planned shutdowns (on 25th anniversary for each unit).
2030–2040	Potential to move forward retirement timelines through the utilization of carbon credits.

Conclusion

The above pilots required to meet ambitious climate targets requires more easily replicable models for early coal asset retirement. These case studies highlight lessons learned from past transactions and the enabling factors they relied on to promote increased awareness and use of such factors for managed phaseout transactions moving forward. Across all highlighted case studies, we identified the following enabling factor themes:

1. **There were underlying coal asset and electricity market characteristics that made coal asset transition attractive.**
    a. **Clean energy was often cheaper than operating coal or existing coal PPAs in the market at the time of transaction.** In Chile, the national government made efforts to drive down the price of clean energy by introducing new market mechanisms, enacting favorable policies, and investing in central grid expansion and interconnection. With Logan and Chambers, both plants were under high-priced long-term PPAs with the offtake utility.
    b. **There was a strong appetite for transition from offtakers and project sponsors.** With both Tocopilla and Logan and Chambers, the fact that the cost of clean energy was cheaper than what respective offtakers were paying for electricity through their long-term coal PPAs sparked these offtakers' appetite. Engie built new renewable assets with proceeds from the transaction and Lotus Infrastructure now has plans to build large, utility-scale battery storage on the site of the former coal plants. With SLTEC, the initial project sponsor (ACEN) is contractually obliged through a PPA to offtake power from SLTEC until 2040, which lowered risk for financiers (and likely system operators/regulators). Although ACEN has not yet announced specific plans for replacing SLTEC's generation, they intend to invest proceeds from the CTM into renewable generation, and CEO Eric Francia has been vocal about his belief in the growth of and the investment opportunity in renewables.
    c. **The initial coal asset owners were independent power producers (IPPs) able to navigate potential regulatory barriers to transition.** In each of these cases the coal assets were originally owned by IPPs that sold power to offtakers via PPAs, which allowed for bilateral renegotiation of contract terms. Additionally with Logan and Chambers, Starwood Energy was able to gain state-level regulatory approval for PPA renegotiation and early retirement upon the verification of ratepayer savings as a result of the transaction.
2. **A lower cost of capital was secured in the financing mechanism.** Engie secured concessional debt tied to the early retirement of Tocopilla units 14 and 15 via a blended finance package from the IDB Invest, and Starwood Energy refinanced the original Logan and Chambers project debt with (presumably) cheaper debt from institutional investors. ACEN sold all its equity stake in SLTEC to a special purpose vehicle capitalized by low-cost debt lenders and equity sponsors.

3. **There was perceived credibility in the financing mechanism, initial project sponsor, and/or clean energy replacement enabled by early retirement.** The CTM that financed the Tocopilla transaction was designed and organized by IDB Invest, a well-known multilateral development bank. Additionally, Engie's large presence in the Chilean market and strong credit rating ensured credibility. With Logan and Chambers, plant owner Starwood Energy was a high-quality sponsor with a large power generation portfolio and decades of experience as a power plant owner. Similarly in the Philippines, plant owner ACEN is the energy subsidiary of the Philippines-based conglomerate Ayala Group, which has a history of strong financial standing. In each of these cases, the original asset owner has either already stood up replacement clean generation (Engie) or plans to invest in new clean energy projects (Lotus and ACEN), enabled by the early retirement of the coal assets.

By analyzing the carefully constructed financing mechanisms that enabled these pilots, we have identified replicable formats that can serve future transactions in diverse geographies with coal capacity that can be retired. Given the speed with which such transactions must scale, it is crucial to continue iterating on and sharing best practices of innovative managed phaseout.

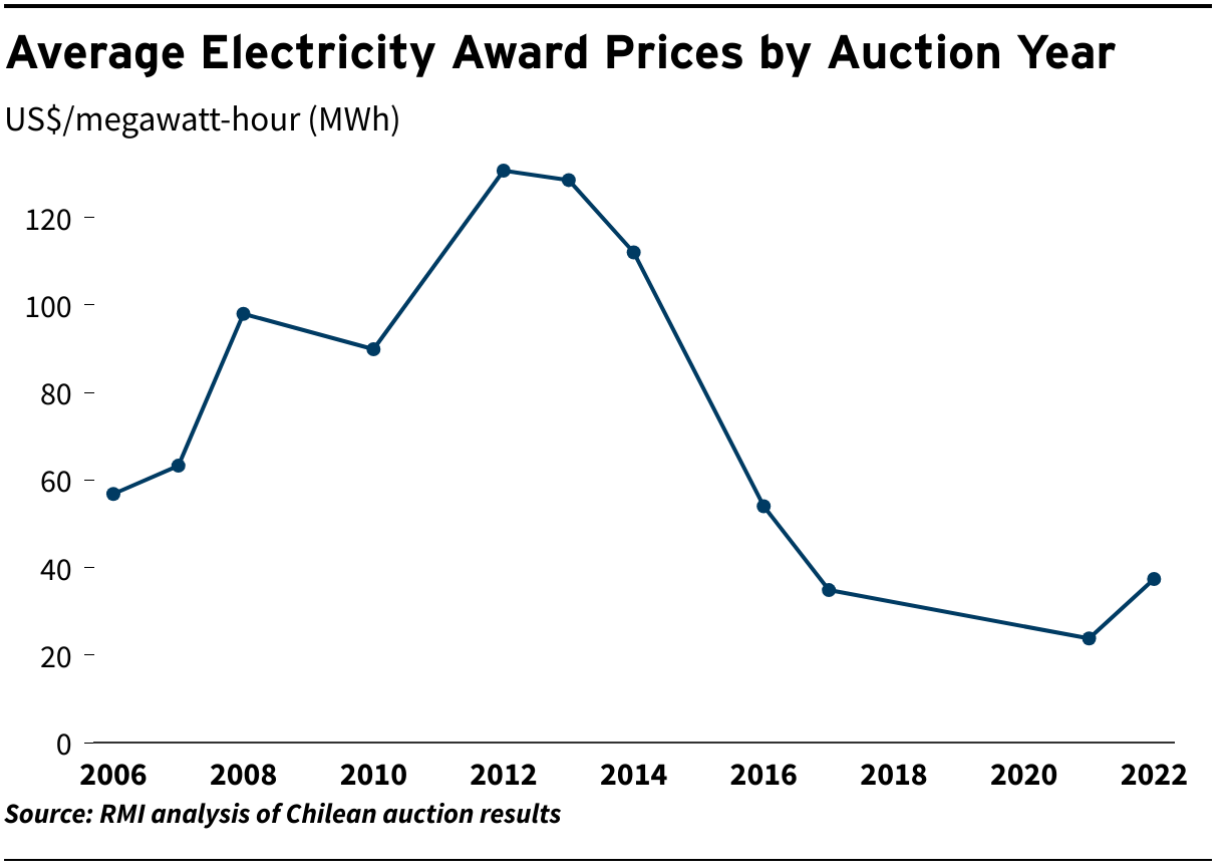
Appendices: Transition Finance Case Studies: Tocopilla Units 14 and 15 — Results-Based Loan Incentive

Exhibit 1.1: Tocopilla Coal Asset Details

Owner	Engie Energia Chile SA (100%)
Location	Tocopilla, Antofagasta, Chile
Capacity	Unit 14 – 136 MW Unit 15 – 132 MW
Boiler Technology	Subcritical
Coal Type	Sub-bituminous
Revenue Model	Part of a portfolio-level, long-term PPA between EECL and multiple offtakers in the mining industry (Antofagasta Minerals, Glencore, etc.)

Exhibit 1.2: Average Electricity Award Prices by Year

Please see RMI's Fossil Fuel Transition Strategies report for more details and a deep dive on the EECL transition. Included is the chart below, which shows the effect of 2015's hourly-time block supply auction reforms on average electricity award prices in Chile.



Appendices: Transition Finance Case Studies: Logan and Chambers — Renegotiate, Refinance, Redevelop

Exhibit 2.1: Logan and Chambers Coal Asset Details

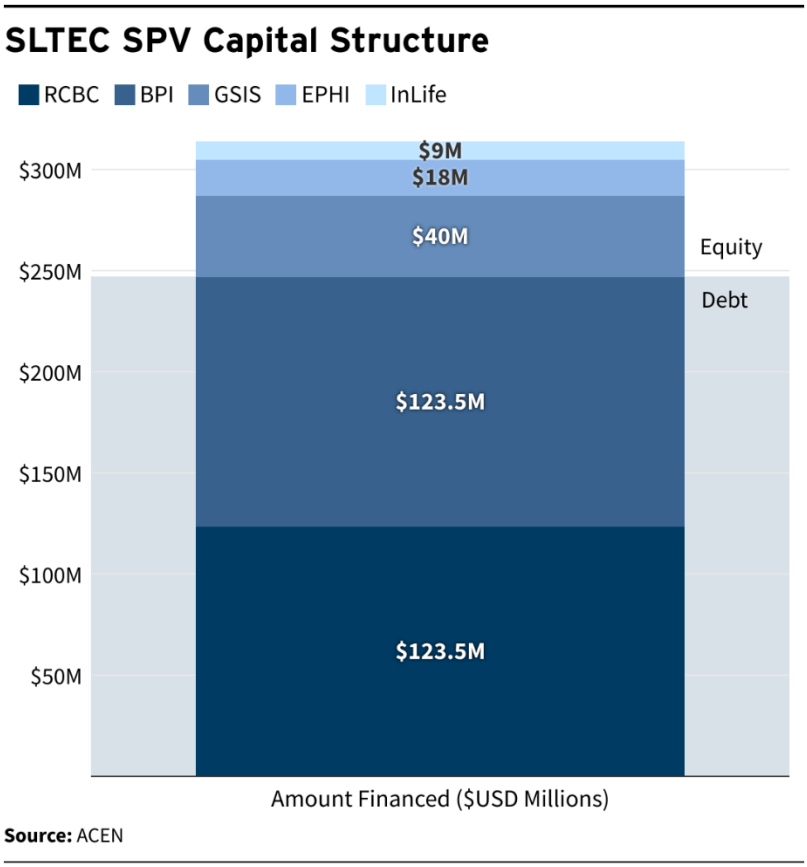
Owner	Starwood Energy Group (now Lotus Infrastructure)
Location	New Jersey, USA
Logan (225 MW)	Simple cycle, co-generation (power and steam), dual fuel (pulverized coal and fuel oil); Foster Wheeler boiler; Westinghouse turbine. Heat rate: 12,400 Btu/kWh
Chambers (285 MW)	Co-generation (power and steam); Foster Wheeler boiler; GEC Alstom turbine. Heat rate: 13,100 Btu/kWh
Coal type	Bituminous, pulverized.
Coal use (Jan–July 2021)	Logan: 137,37 metric tons Chambers: 119,268 metric tons
Revenue Model	90% contracted power, steam, and capacity sales to Atlantic City Electric (Exelon-owned utility rated BBB+ by Fitch) with remainder sold to nearby sub-investment grade industrial customers (Chemours Chemicals & Valtris Specialty Chemicals) and via PJM capacity payments.

Appendices: Transition Finance Case Studies: SLTEC — Project Sale to Special Purpose Vehicle

Exhibit 3.1: SLTEC Coal Asset Details

Owner	ACEN Renewables
Location	Batangas, Philippines
Boiler Technology	Two subcritical units; circulating fluidized bed; unknown OEM
Coal type	Sub-bituminous
Revenue Model	There is a long-term PPA between SLTEC and ACEN until 2040 — ACEN is liable for either generating or procuring the contracted amount of power for the contract term. ACEN has a power supply agreement with distribution utility Meralco ending in 2029, and Meralco has the option to extend this contract to 2030.

Exhibit 3.2: SLTEC SPV Capital Structure



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