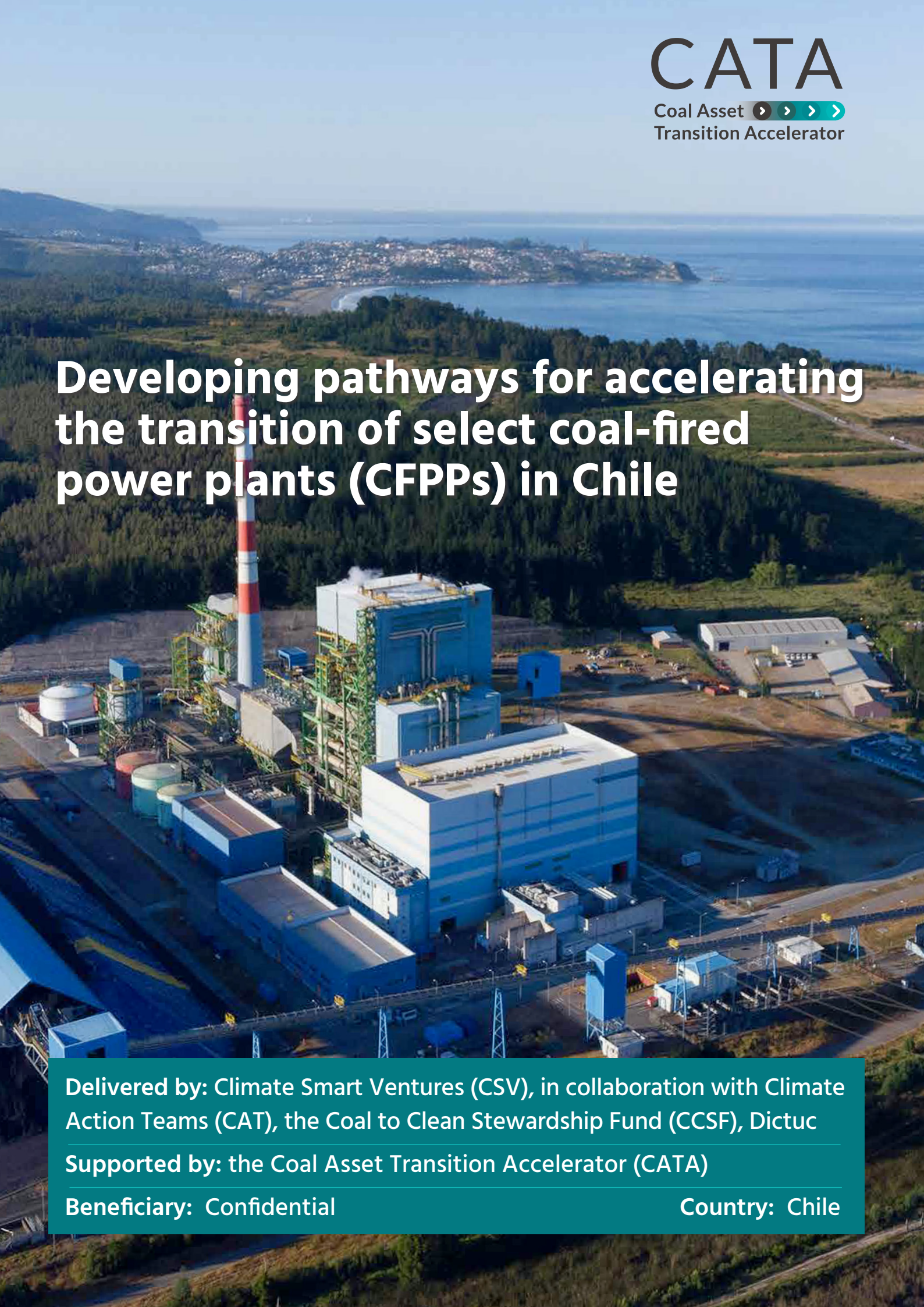
CATA
Coal Asset Transition Accelerator

Developing pathways for accelerating the transition of select coal-fired power plants (CFPPs) in Chile



Delivered by: Climate Smart Ventures (CSV), in collaboration with Climate Action Teams (CAT), the Coal to Clean Stewardship Fund (CCSF), Dictuc

Supported by: the Coal Asset Transition Accelerator (CATA)

Beneficiary: Confidential **Country:** Chile

Summary

Chile has emerged as a global leader in renewable energy among emerging economies, driven by a robust policy framework, ambitious targets, and abundant solar and wind resources. Since 2008, the country has implemented progressive legislation mandating renewable energy quotas for electricity providers, which has catalysed significant investment and growth in clean energy.

Despite notable progress, reducing coal's share in the electricity mix from 44% in 2016 to 23% in 2022, Chile still has 1,660 MW of coal-fired power capacity without defined retirement timelines. These remaining plants pose a challenge to Chile's goal of phasing out coal by 2030, a commitment reinforced by its membership in the Powering Past Coal Alliance and recent government efforts to accelerate decommissioning.

To support this transition, Climate Smart Ventures (CSV), in collaboration with Climate Action Teams (CAT), the Coal to Clean Stewardship Fund (CCSF), Dictuc, and the Coal Asset Transition Accelerator (CATA), undertook a comprehensive study. The project aimed to assess technical and financial pathways for retiring the remaining coal-fired power plants (CFPPs), using a modelled "archetype" plant to evaluate options such as refinancing, repurposing, co-firing, and transition credits.

Context and Challenge

Chile has taken decisive steps to harness its vast solar and wind resources through robust policy measures. In 2008, the government introduced a renewable energy quota requiring electricity providers with over 200 MW of installed capacity to source a minimum percentage of their supply from renewables. Contracts signed after 2007 mandated at least 5% of renewable energy, increasing to 10% by 2024.[1]

As of February 2024, Chile's total installed power generation capacity sits at 35 GW, of which, solar accounts for 27.5%, hydro - 21.4%, wind - 14.0%, while natural gas stands at 12.9%, and coal - 10.8%.

Chile's coal phaseout strategy, announced in 2019, marked a turning point. Following extensive stakeholder engagement, major energy companies - Enel, Engie, AES Gener, and Colbún—committed to closing coal plants by 2040. This was reinforced by decarbonisation efforts in the copper mining sector, including renegotiated Power Purchase Agreements (PPAs) such as Colbún's agreement with Codelco to replace coal with zero-emissions power, delivering both environmental and economic benefits.

[1] Law No. 20.257 on Non-Conventional Renewable (2008). Energies. https://climate-laws.org/document/law-no-20-257-on-non-conventional-renewable-energies_0bc5

Between 2019 and 2024, 11 coal units were retired, and 9 more have announced closure or conversion timelines. Chile reduced coal's share in its electricity mix from 44% in 2016 to 23% in 2022, with renewables overtaking coal that same year making it one of the fastest countries to phase down coal globally. Only three coal plants, comprising eight units, remain without a retirement date:

Original Sponsors	Current Sponsors	Company	Power Plant	Capacity	COD
50% AES Andes (Previously AES Gener) 50% Global Infrastructure Partners (GIP)	100% Capital Advisors (acquired in 2021)	El Aguila Energy II SpA	Guacolda (5 units totalling 750 MW)	152 MW	1995
				152 MW	1996
				152 MW	2009
				152 MW	2010
				152 MW	2015
30% AES Andes 30% Toesca Infraestructura II 40% Mitsubishi Corporation	30% AES Andes 30% Toesca Infraestructura II[2] 40% Daelim Energy (acquired in 2020)	Empresa Eléctrica Cochrane SpA	Cochrane (2 units totalling 550 MW)	275 MW	2016
				275 MW	2016
100% Colbún	100% Colbún	Colbún	Santa María	350 MW	2012
Total				1,660 MW	

Source: Global Energy Monitor[3]

Legal obligations and grid stability concerns keep these plants operationally relevant, but experts say retirement must happen by 2030 and not 2040 to stay in line with global climate goals. To back this, Chile joined the Powering Past Coal Alliance in 2021 and committed to work towards achieving phase out by 2030.

In August 2023, the Ministry of Energy announced efforts to develop a new decarbonisation plan that will further bring forward the decommissioning of the remaining eight plants by 10 years.[5]

[2] S&P Global. Bulletin: AES Gener Strengthens Renewable Strategy With Its Coal-Fired Plant's Incorporation Of Minority Stakeholder As Partner (2020). https://www.alacrastore.com/s-and-p-credit-research/Bulletin-AES-Gener-Strengthens-Renewable-Strategy-With-Its-Coal-Fired-Plant-s-Incorporation-Of-Minority-Stakeholder-As-Partner-2510168

[3] Global Energy Monitor. Cochrane Power Station. https://www.gem.wiki/Cochrane_power_station#cite_note-:5-20; Guacolda Power Station. https://www.gem.wiki/Guacolda_power_station; Santa María power station. https://www.gem.wiki/Santa_Mar%C3%ADa_power_station

[4] WRI. These 10 Countries Are Phasing Out Coal the Fastest (2023). https://www.wri.org/insights/countries-phasing-out-coal-power-fastest

[5] Renewables Now. Chile prepares roadmap to ditching coal by 2030 (2023). https://renewablesnow.com/news/chile-prepares-roadmap-to-ditching-coal-by-2030-830363/

Approach

CAT has advanced early decarbonisation planning in Chile by modelling scenarios that go beyond the country's current Nationally Determined Contributions (NDCs). These scenarios assess the timing, investment needs, and electricity system requirements for a more ambitious energy transition. This work has engaged technical, academic, governmental, and civil society stakeholders—most notably through the Climate Dialogue series co-hosted with CBI in June and September 2023.

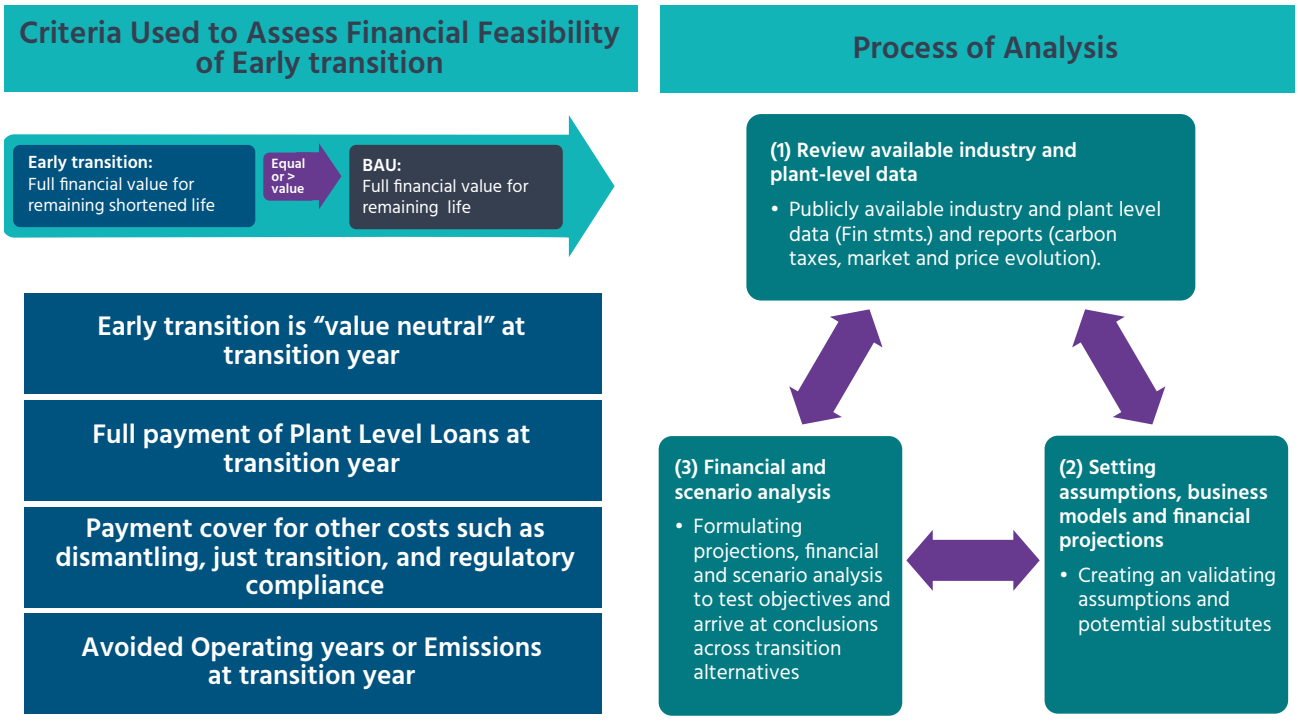
Building on this foundation and complementing support from CAT and MCETs, CATA plays a key role in bridging technical planning with real-world decision-making. By conducting targeted due diligence and engaging directly with CFPP owners, CATA is helping to align asset-level decisions with national decarbonisation goals.

In support of Chile's accelerated coal phase-out, CSV - alongside CAT, CCSF, Dictuc, and with CATA's backing - led a scoping and design study to analyse the technical, financial, and commercial pathways for decommissioning the country's last three coal plants by or before 2040. This initiative aimed to unlock short- to mid-term transaction opportunities and engage asset owners in operationalising Chile's voluntary coal exit in a technically sound, commercially viable, and socially just manner.

Solutions and Mechanisms

Financial Analysis

Figure 1. Methodology for Structuring and Analysing an Early transition



To assess the financial feasibility of early coal plant retirement in Chile, the project developed a methodology comparing the value of early transition against continued operation under a business-as-usual (BAU) scenario. Early retirement is considered financially viable if it is "value neutral" at the year of transition - meaning the present value of future cash flows from an

early closure equals or exceeds that of continued operation. Key criteria in this evaluation include full repayment of plant-level loans, coverage of costs such as dismantling, just transition efforts, and regulatory compliance, and the valuation of avoided operating years or emissions at transition year.

The financial analysis followed a structured three-step process:

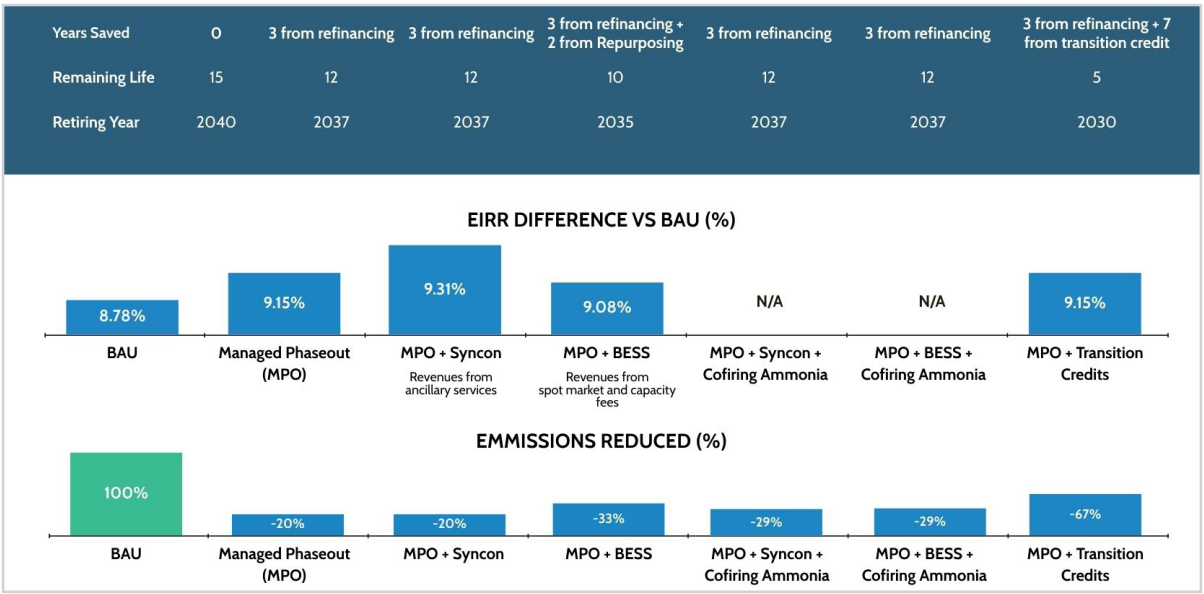
1. Review of available plant-level and industry data, including emissions profiles, capital structures, and market projections.
2. Development of assumptions, business models, and financial projections for a 15-year-old 100 MW archetype CFPP, reflecting potential transition options.
3. Conduct of scenario analyses to assess whether early retirement could be achieved without financial loss to asset owners.

Due to limitations in publicly available and confidential plant-level data, the project team developed an archetype CFPP to serve as a representative model for analysis. This archetype synthesises shared characteristics from the three remaining subcritical CFPPs in Chile that have not yet announced retirement timelines. It enabled the team to apply consistent assumptions and test transition pathways across multiple scenarios, while preserving confidentiality and maintaining relevance to real-world conditions.

Using the archetype plant, the team evaluated four transition options:

1. Refinancing, to optimise debt structure and reduce financing costs;
2. Ammonia Co-Firing, involving capital investment to reduce emissions during remaining operations;
3. Repurposing, converting CFPP sites to battery energy storage or synchronous condensers to enhance post-retirement value; and
4. Transition Credits, designed to compensate asset owners for the financial impact of accelerated retirement.

Figure 2. Archetype Coal Plant | Transition Options Financial Analysis



These options were selected to reflect and complement the transition pathways that asset owners are themselves currently exploring, thereby strengthening the practical relevance and uptake potential of the findings.

Stakeholder Engagement

Stakeholder engagement has been a cornerstone of this project, with regular consultations and dialogues conducted to capture insights from key actors across Chile's public and private power sectors. These interactions aimed to understand the on-the-ground realities and regulatory, financial, social, and environmental constraints on decarbonising the energy sector. The engagement strategy was designed to incorporate critical input from government institutions, target independent power producers (IPPs), and civil society organisations (CSOs), ensuring the analysis and recommendations remain grounded in Chile's current energy landscape.

Two country visits to Chile were conducted as part of this process. The first, held in October 2024, involved consultations with the Ministry of Energy (MEN), as well as key IPP owners including AES Andes, Guacolda, and Colbún. During this visit, the project team presented the initial concept and gathered valuable feedback on transition technologies and operational realities. Stakeholder input from this round directly informed the development of the archetype plant model and the selection of transition levers, ensuring alignment with options already being explored or considered by the asset owners themselves.

A second visit took place in May 2025, once preliminary financial modeling and scenario analyses were completed. The team returned to Chile to present the draft findings and proposed transition pathways to the same stakeholders, including the MEN, and target IPPs while also engaging new stakeholders such as the Coordinador Eléctrico Nacional and Civil Society Organisations including Sustentable Chile and Asociación Chilena de Energías Renovables y Almacenamiento. This visit featured a dedicated knowledge-sharing event aimed at socialising the study results, deepening engagement with IPP owners, and fostering dialogue on potential collaborative efforts to operationalise the proposed pathways.

The project culminated in a public launch event on May 30, 2025, co-hosted by CSV and consortium partners. This event showcased the transition pathway study, highlighting its findings and discussing practical, market-based approaches to accelerate the retirement of Chile's remaining CFPPs ahead of the 2040 target. The event was attended by representatives from government, academia, private sector, and CSOs, reinforcing broad-based support for a just and viable coal phase-out.

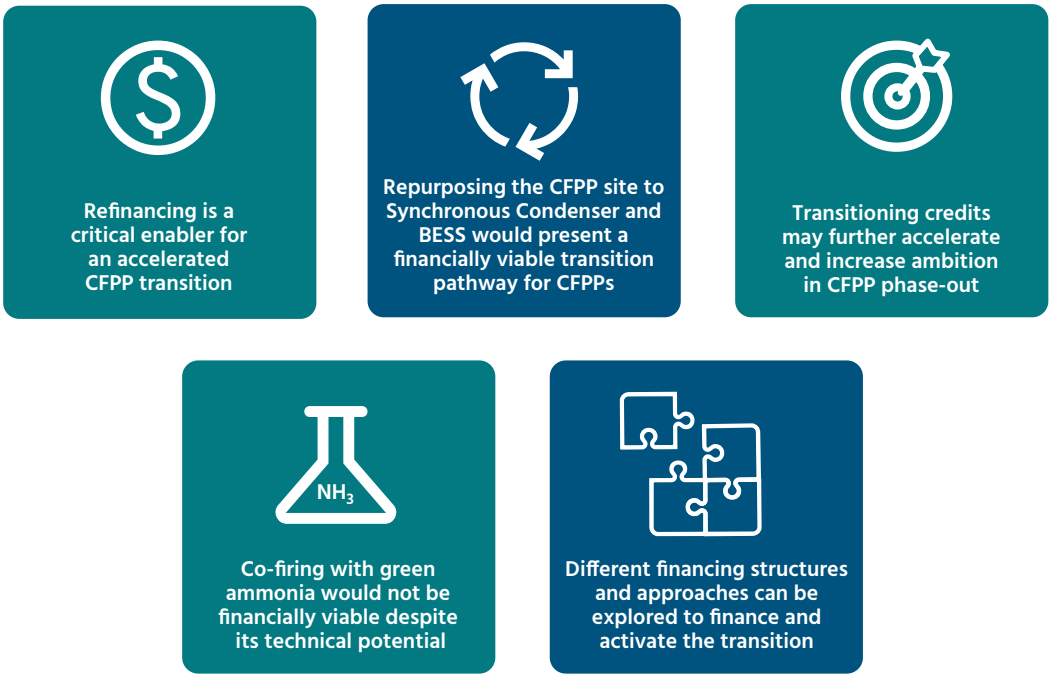
Figure 3. Photograph capturing the Knowledge Sharing Event.

Outcomes, Impact, and What Next

Results of Financial Analysis

Findings

Figure 4. Key Takeaways for Identified Transition Options in Chile



1. **Refinancing is a critical enabler for an accelerated CFPP transition.** By increasing leverage and reducing the cost of debt to below current market rates (as of 2024), refinancing enhances the financial viability of retiring the archetype CFPP ahead of Chile's 2040 coal phase-out target – bringing closures forward by 3 years. This approach offers asset owners a strong financial case to begin transitioning away from coal earlier, and an opportunity to invest in low-carbon technologies.
2. **Repurposing the CFPP site to Synchronous Condenser and BESS would present a financially viable transition pathway for CFPPs.** Adopting grid-forming and grid-supporting technologies, particularly synchronous condensers and BESS offers, a practical transition option. This approach allows asset owners to maintain or improve returns post-CFPP operations, maximise use of existing plant and transmission infrastructure, and provide employment opportunities while supporting long-term system needs. However, their development depends on market mechanisms that enable or incentivise their development (e.g., future infrastructure tenders).

   The MPO with Synchronous Condenser (Syncon) scenario also resulted in a 2037 retirement and a 12-year remaining life, saving three years through refinancing. It matched the 20% emissions reduction of the MPO scenario but delivered a slightly higher EIRR of 9.31%, suggesting that repurposing the plant into a synchronous condenser enhanced financial returns while supporting grid stability.

   In the MPO with Battery Energy Storage System (BESS) scenario, the combination of refinancing and repurposing allowed the plant to retire in 2035, saving five years in total,

three from refinancing and two from repurposing. This scenario achieved the highest emissions reduction among the repurposing options at 33%. Although the Equity Internal Rate of Return (EIRR) was positive, it remained below the BAU benchmark, indicating that while economically viable, it may require additional incentives to be competitive.

3. **Transition credits may further accelerate and increase ambition in CFPP phase-out.** Transition credits can bridge the financial gap between business-as-usual and the higher upfront costs of cleaner alternatives. Particularly in commercially challenging cases, the potential of transition credits prompts the need for establishing enabling mechanisms in Chile, such as a domestic carbon and Article 6 framework, the adoption of whitelisted methodologies for sovereign buyers, and the signing of bilateral agreements with potential sovereign buyers. The MPO with Transition Credits scenario offered the most accelerated retirement, bringing the closure date forward to 2030 and reducing the remaining life to just five years. It saved a total of ten years, three through refinancing and seven through transition credits, and achieved the highest emissions reduction of all scenarios at 67%. While the EIRR was not specified, the substantial emissions savings and shortened timeline suggest strong potential if supported by appropriate market mechanisms.
4. **Co-firing with green ammonia would not be financially viable despite its technical potential.** Uncertain high capital and fuel costs could limit the viability of ammonia co-firing as a transition strategy. IPPs have also raised concerns about complex logistics and supply uncertainty, citing challenges in ensuring stable and scalable delivery. Based on the assumptions considered, while co-firing can reduce emissions, it would not create additional value nor significantly accelerate the transition timeline. Both Ammonia Co-Firing scenarios maintained the 2037 retirement date and a 12-year remaining life, saving three years through refinancing. Emissions were reduced by 29% due to ammonia co-firing, but the financial analysis showed negative cash flow and a non-computable EIRR, making these options financially unfeasible under current assumptions.
5. **Different financing structures and approaches can be explored to finance and activate the transition.** Multiple financing structures can be explored to bridge the requirements of the IPP and potential capital providers, as well as their ability to participate and their exposure to the coal asset and the renewable energy project. The inclusion of transition credits as an option for creating additional years saved can also crowd in a new set of partners that can finance the transition.

Impact and Next Steps

The project successfully mobilised interest from IPP owners and secured support from key stakeholders, laying the groundwork for pilot initiatives. It strengthened institutional relationships, built technical capacity, and aligned actors around Chile's decarbonisation goals.

Next steps include:

- Advancing the archetype transition pathway model to guide pilot projects.
- Continuing engagement with regulators and market actors.
- Using findings to inform policy recommendations and investment strategies.

Lessons Learned

- The archetype model proved effective in overcoming data limitations and facilitating open dialogue with asset owners.
- Refinancing and repurposing offer actionable, scalable strategies for coal phase-out.
- Transition credits have potential but require enabling policy frameworks.
- Continued stakeholder engagement is essential for adoption and scaling.

This study provides a replicable framework for accelerating coal transitions in Chile and similar markets, balancing technical feasibility, financial viability, and social equity.