Key Lessons from Potential Transition Credit Projects

Insights to inform methodology development from the Coal-to-Clean Credit Initiative

December 2, 2025

Objectives of this deck

Drawing on experience supporting potential transition credit pilots under the Coal-to-Clean Credit Initiative (CCCI), this deck:

- Summarizes the performance of the Verra transition credit methodology
- Identifies potential areas for further methodology development/calibration

Contents

Context & Executive Summary

Insights in this deck draw from experience in assessing 8 potential transition credit pilot projects under the Coal-to-Clean Credit Initiative*

Stages of pilot assessment

1 — *SCREEN TO ASSESS PROJECT ELIGIBILITY*

Qualitative assessment of a plant against the eligibility conditions in Verra's methodology

2 — *PROJECT SCOPING AND STRUCTURE*

Qualitative assessment of project scenarios, needed technical studies, and role of credits

3 — *DATA REQUEST*

Request for detailed data to conduct a quantitative assessment of initial feasibility of project

4 — *PRE-FEASIBILITY ANALYSIS AND RESULTS*

Quantitative analysis to assess required carbon revenues, estimated carbon price, and emissions impact

5 — *FULL DUE DILIGENCE AND PROJECT DESIGN*

More detailed assessment of baseline determination, replacement sizing and leakage, and credit structuring options

Stage 1: 3 projects did not pass initial screen

Driven primarily by plant type (e.g., mine mouth, CHP) and age

Stage 2: 2 projects at scoping phase

IPP plants

Stage 4: 3 projects undergoing / completed pre-feasibility

- Two IPP projects in the Philippines
- One additional SEA IPP

*CCCI is an initiative led by the Rockefeller Foundation. RMI has provided technical assistance for potential CCCI pilots and derived insights for this deck.

Summary of observations

Asset profile and market interest	▪ Strongest interest coming from **IPP-owned plants**, rather than utility-owned assets. ▪ **Mid-age plants** (with target retirement windows between 2027–2037) have shown the **greatest willingness to engage.** ▪ These plant types show a stronger potential to utilize **cost of capital coal transition mechanisms (CTMs)**, with **transition credits potentially layering on top** to incentivize even earlier retirement.
Replacement and system dynamics	▪ Project proponents show strong **preference for 100% (or near 100%) RE pairing,** but these pairing levels can be difficult to guarantee for IPP project proponents given requirements for competitive procurement ▪ Complementary technologies such as **BESS** are needed to **ensure grid reliability** alongside high RE pairing. ▪ Coal retirement & replacement require **close coordination** with and approval from the **system operator and regulator** based on detailed grid studies; the replacement RE is 'additional' to what would have been built if the CFPP had not retired
Baselining consideratio ns	▪ Current methods for determining financial and technical lifetimes are **highly conservative** – the methodology indicates an earlier baseline retirement date compared to detailed electricity system models (e.g., in PLEXOS) ▪ The conservativeness of the methodology means that some **credible projects may not be eligible**; specific **revisions to the methodology** may provide a fair but still robust assessment of additionality and the baseline.

Insights to inform methodology refinement

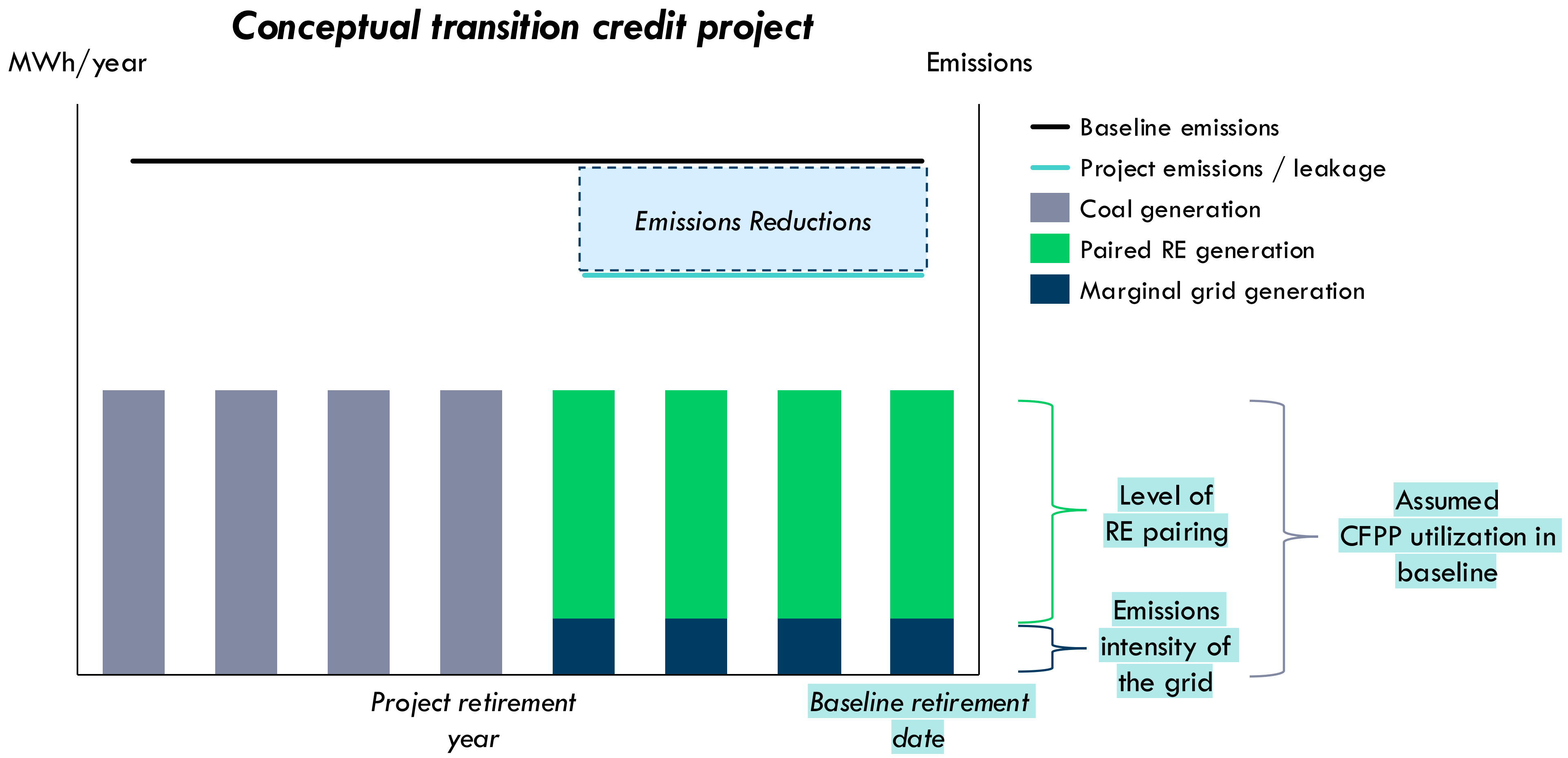
The methodology consistently provides highly conservative results for estimating emissions reductions and credit generation

Baseline retirement date is the earliest of:

- End of technical life
- Regulatory phaseout date
- Already committed CTM retirement
- End of PPA term
- Financially attractive early retirement

Replacement is based on:

- Modalities to demonstrate pairing
- Minimum thresholds for paired RE



Key parameters that drive emissions reductions

Area for potential methodology revision

Based on project experience, there are 8 recommendations for further methodology development

Methodology component	Recommendation	Impact of proposed revision on baseline emissions (observed)
Baseline – Technical life	**Rec 1:** Allow project proponents to utilize third-party assessments of technical life or extend default technical life to 40 years	Expands pool of eligible CFPPs.
Baseline – Financially attractive retirement	**Rec 2:** Allow project proponent to include decommissioning and just transition costs in the financially attractive retirement analysis.	May shift baseline slightly later (0-1 years); better reflects required costs of transition.
Baseline – Financially attractive retirement	**Rec 3:** Allow inclusion of BESS costs in the financially attractive retirement analysis, when BESS is part of the replacement portfolio; consider allowing other complementary technologies such as synchronous condensers.	May shift baseline 1–3 years later; better reflects replacement requirements to ensure grid reliability.
Baseline – Financially attractive retirement	**Rec 4:** Use the cost of the identified replacement portfolio to assess financially attractive retirement and replacement.	More practical assessment; better reflects realities for capacity-constrained grids.
Baseline – Financially attractive retirement	**Rec 5:** Replace the requirement to subtract 1 year from the financially attractive retirement date when determining the baseline with modeled or proportional uncertainty adjustment (e.g., Monte Carlo analysis)	Helps avoid outsized impact on crediting potential for projects with smaller crediting lifetimes.
Baseline – Closed CTM	**Rec 6:** Consider requiring assessment of the impact of refinancing and/or relevering project-level debt in the baseline assessment for IPP plants with long-term PPAs.	May shift baseline 5–10 years earlier for eligible IPP projects.
Paired RE – Pairing modalities	**Rec 7:** Consider limiting pairing modalities to on-site, regulatory, and contractual pairing.	Strengthens additionality assessment while keeping verification practical.
Paired RE – Pairing minimums and incentives	**Rec 8:** Do not increase pairing minimums, as this could make many private-sector led projects challenging.	Keeps projects commercially viable while retaining strong incentive to maximize pairing.

Recommendation 1: Allow project proponents to use third-party assessments of technical life or extend default technical life to 40 years

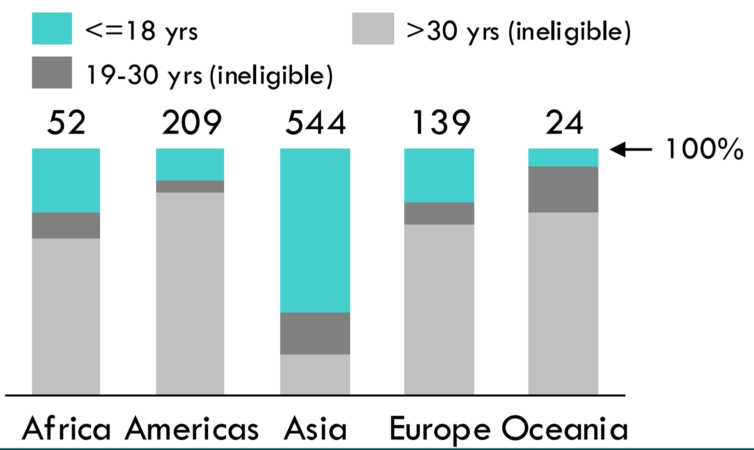
Current methodology guidance

- The methodology requires use of CDM *Tool10 to Determine the Technical Lifetime of Equipment* applied to key CFPP equipment (boiler, generator, steam turbine)
- According to the tool, these components have a **default technical life** of **25 years**
- The default must be used if it is less than a third-party assessed technical life

Implication

- Restricting baselines to 25-years limits plant eligibility to **~45% of operating** coal plants today[1, 2]
- While excluding older plants, it also excludes mid to younger plants where early retirement could still drive significant impact that may be riper for engagement today

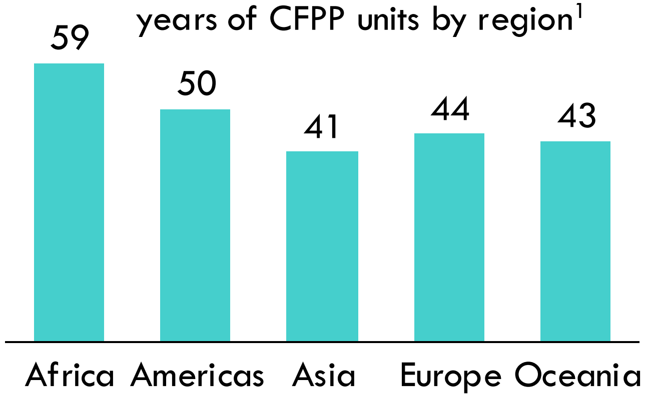
Plant age and assumed eligibility for credits (GW)



Proposed methodology revision

- Preferred: Allow for **third-party assessments of technical life**, OR
- Change technical life to **40 years**, which is in line with historically observed retirement age and typical design lifetimes

Average historical retirement age in years of CFPP units by region[1]



[1]Global Energy Monitor, Global Coal Plant Tracker July 2025; Excludes China
[2]Assuming minimum of a 5-year early retirement and that transition credit project would not be operational until 2027

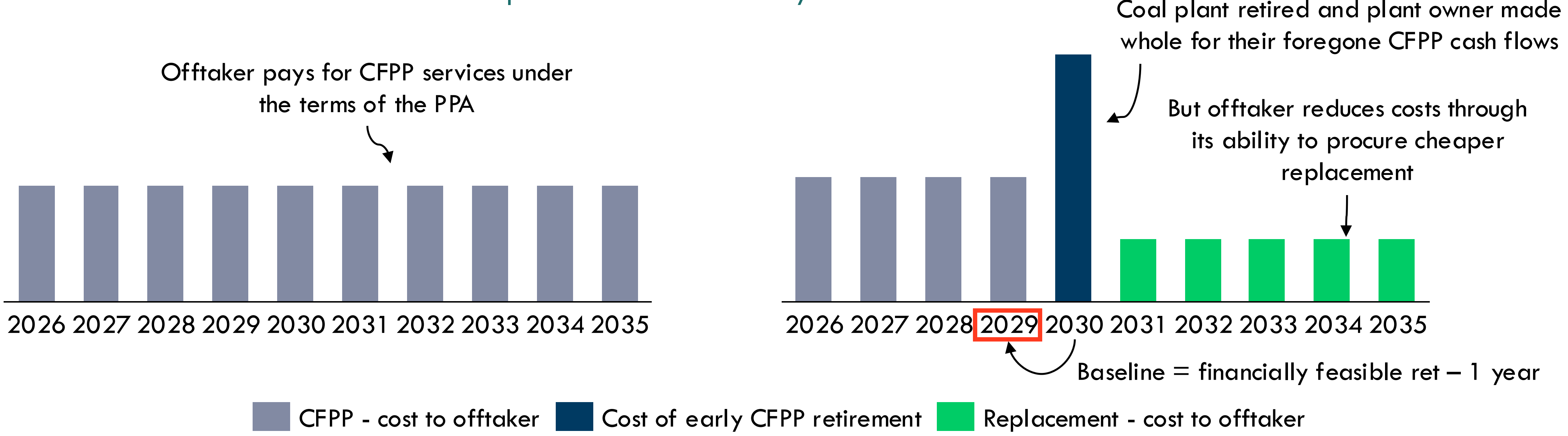
The methodology also requires a conservative assessment of whether retirement could be ‘financially attractive’ before the end of the CFPP’s technical life

Financially attractive retirement = Year in which the **costs savings of cheaper replacement** outweigh the **costs of CFPP retirement**

– 1 year for conservativeness

Example: IPP with a PPA - financially attractive assessment occurs when:

NPV of required revenues for offtaker in continued operation ≥ NPV of required revenues for offtaker in early retirement



Recommendation 2: Allow project proponent to include some additional costs of early CFPP retirement in the financially attractive retirement analysis

The below costs components are not currently considered in the financially attractive retirement analysis. However, they are all areas where additional finance, such as from credit revenues, would result in a more managed and just transition.

Cost component	Description	Share of total project costs / years of additional retirement	Difficulty in including in financial analysis	Recommendations for methodology revision
Decommissioning costs	Costs of decommissioning the CFPP, including any remediation/ reclamation costs.	1-5% (0 – 1 years)	**Low difficulty:** Decommissioning costs will likely need to be costed out as part of the analysis for pricing credits	**Include:** if needed, an upper bound based on regional or global benchmarks may be stipulated
Just transition costs	Costs associated with the plant-level just transition plan (stakeholder consultations, plan development & implementation)	1-5% (0 – 1 years)	**Low difficulty:** Just transition plans must be scoped–including an estimate of their cost—as part of project eligibility	**Include:** there are disincentives to inflate just transition costs because the JT plan must outline a plan for how costs will be covered
Complementary technology costs	The costs of complementary technologies needed to maintain grid stability and reliability if the replacement is primarily variable renewable energy such as solar PV	15-30% (1 – 3 years)	**Medium difficulty**: Costs may be difficult to project into the future given rapidly evolving costs of e.g., battery energy storage systems	**Include:** See next slide for details
Grid costs	Interconnection, transmission upgrades, substation investments needed to integrate replacement resources	10-25% (1 – 3 years)	**High difficulty**: Costs may not be known to a project proponent, especially if they are an IPP; costs can vary widely depending on RE siting, which may not be known at the time of project registration	**Don't include:** however, the additional costs mean that estimates will already be conservative, so additional conservativeness may not be needed

Recommendation 3: At a minimum, allow inclusion of BESS costs in the financially attractive retirement analysis, when BESS is identified as part of the replacement portfolio

Current methodology guidance

- Replacement resource calculations **only include generation technologies**, such as solar PV or wind
- Does not include **battery energy storage systems (BESS)** or other non-generation technologies needed to replace the coal plant while maintaining reliability and grid stability
- In most coal retirement projects, BESS is likely to be required as part of the replacement portfolio alongside variable RE

Implication

- Inclusion of BESS can shift the baseline retirement date later by **1-3 years**
- For the typical crediting periods of 7-10 years observed in projects, this can have a significant impact on credit volumes (e.g., ~25%)

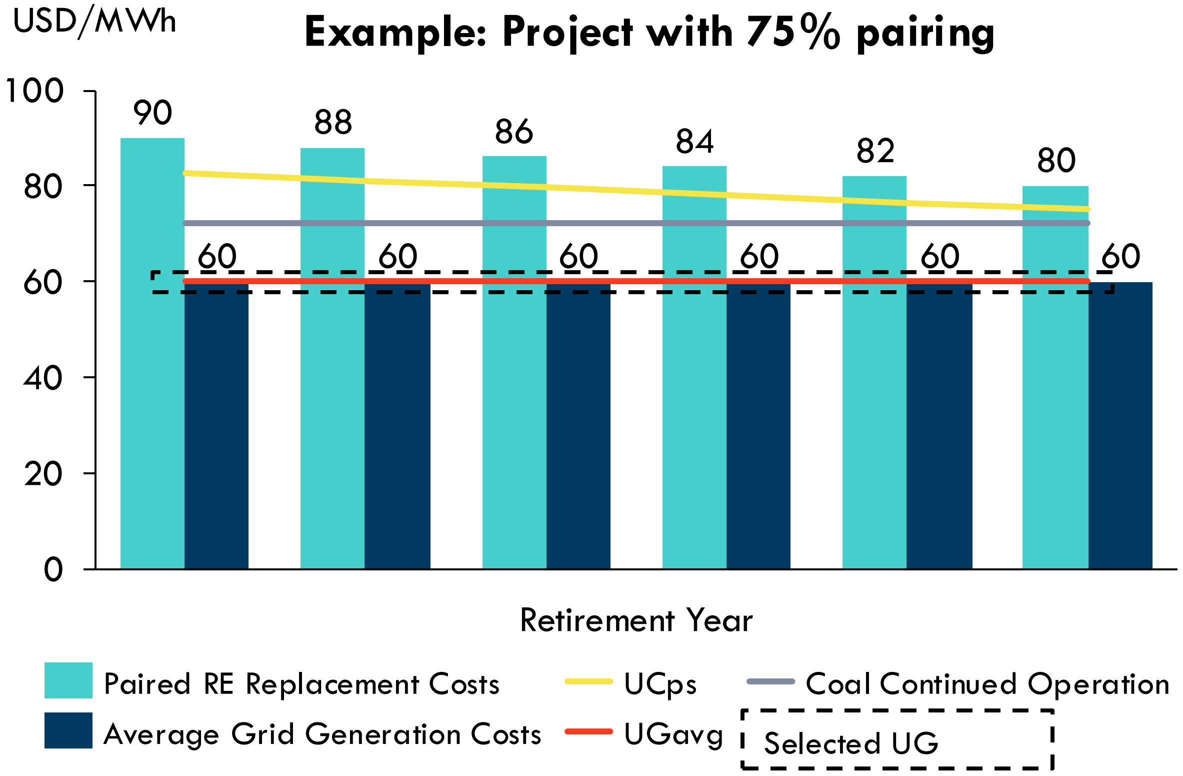
Proposed methodology revision

- Complementary technologies needed to maintain grid reliability and stability, as identified by the system operator, should be included in the cost of replacement
- At a **minimum this should include the cost of BESS** given it can be substantial, but there could be a list of allowable technologies for inclusion (e.g., synchronous condensers)

Recommendation 4: Use the cost of the identified replacement portfolio to assess financially attractive retirement and replacement

Current methodology guidance: The cost of replacement generation used in the financially attractive retirement analysis must be taken as the lower value of the average cost of generation in the grid (UG_{AVG}) and the weighted cost of replacement generation in the project scenario (UC_{PS})

$$UG = \mathrm{MIN}(UG_{AVG}, UC_{PS})$$



Current situation

UC_{PS} determines a 75%/25% weighted cost of replacement – which provides a **practical and still conservative** estimate of financial additionality. However, **since the system has lower grid generation costs, UG_{AVG} is selected** as the cost of replacement

Implication

For prospective projects in systems with relatively **low-cost resources** in their system (e.g., large hydro), **projects would be passed over** even if they are **higher cost than CFPP continued operation.** The average cost of generation also does not reflect the reality for grids that may be capacity-constrained.

Proposed revision

The methodology should use **UC_{PS}** (i.e. the cost of replacement stipulated in the project scenario) as the cost of replacement

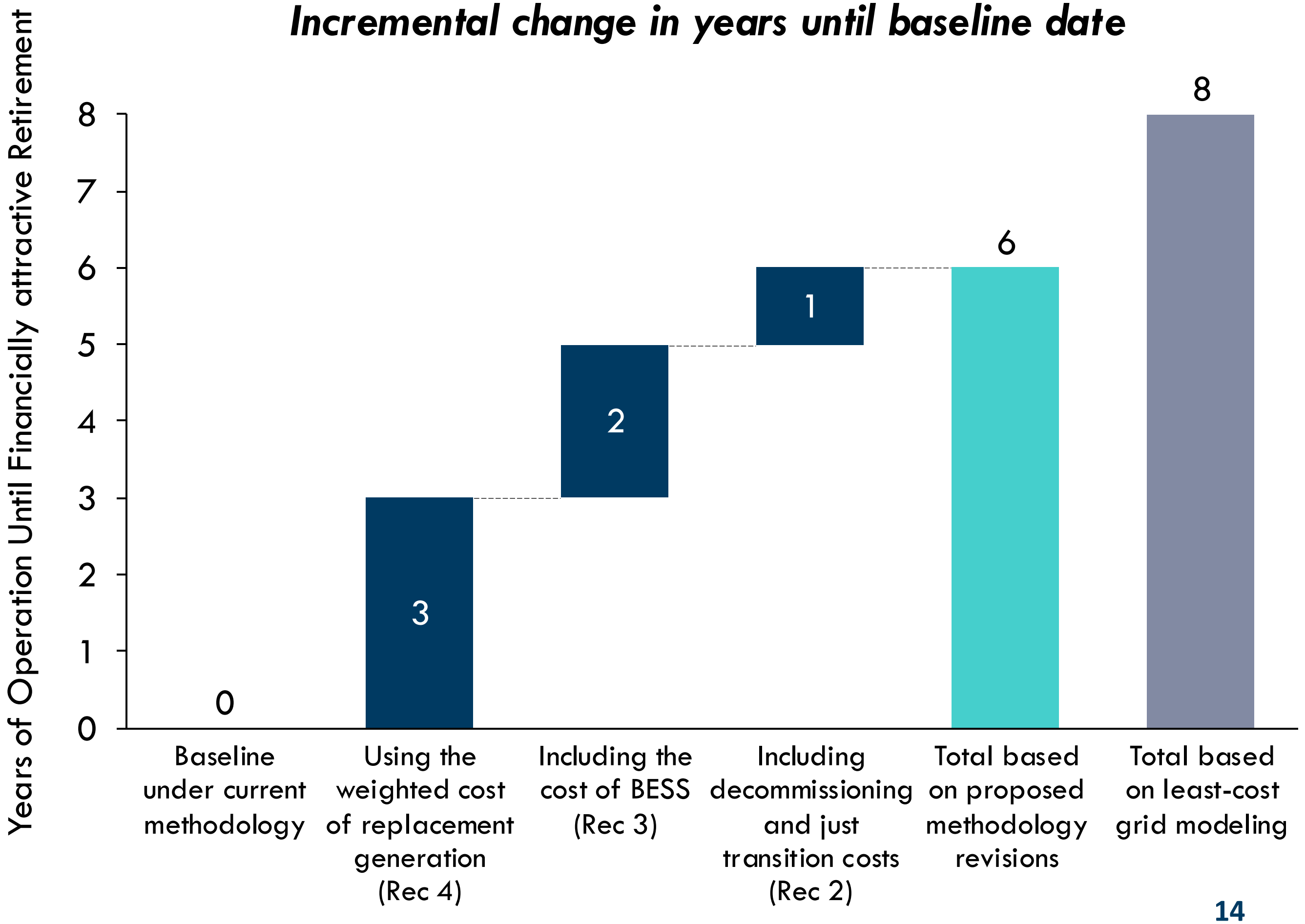
$$UG = UC_{PS}$$

Making these changes to the methodology would still result in a conservative baseline retirement date

Illustrative example using below assumptions

- Mid-sized CFPP; commercial operation in 2015
- High marginal costs of CFPP continued operation
- Solar + BESS project replacement portfolio
- Low average costs of grid generation

Incremental change in years until baseline date



Recommendation 5: Revise the requirement to subtract 1 year from the financially attractive retirement date when determining the baseline

Longer crediting periods further into the future typically would entail greater uncertainty. However, the methodology's approach to uncertainty creates a larger relative impact for shorter crediting period projects.

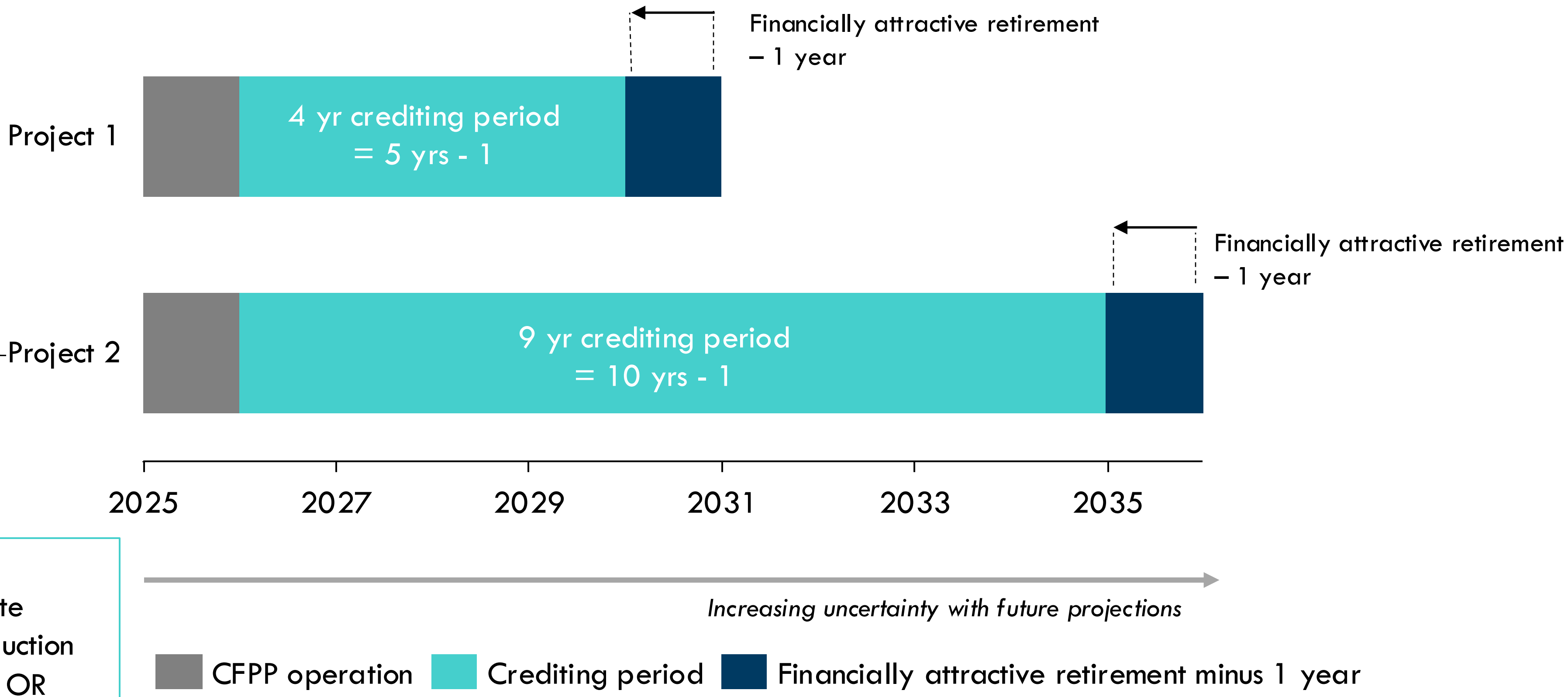
Project 1

- Financially feasible retirement in 2031→subtracting 1 year results in a baseline retirement of **2030**
- 4 years of crediting
- 1 year reduction in baseline results in **~20% reduction in credits**

Project 2

- Financially feasible retirement in 2036→subtracting 1 year results in a baseline retirement of **2035**
- 9 years of crediting
- 1 year reduction in baseline results in **~10% reduction in credits**, despite greater uncertainty of future projections

Hypothetical examples for CFPP retirement in 2026



Recommendation:

- Require modeling of uncertainty from a Monte Carlo analysis, applying a proportional deduction when uncertainty exceeds certain thresholds, OR
- Do not require reductions for uncertainty given baseline is already conservative

Recommendation 6: Consider requiring assessment of the impact of cost of capital CTMs in the baseline assessment for IPP plants with long-term PPAs

Current methodology guidance

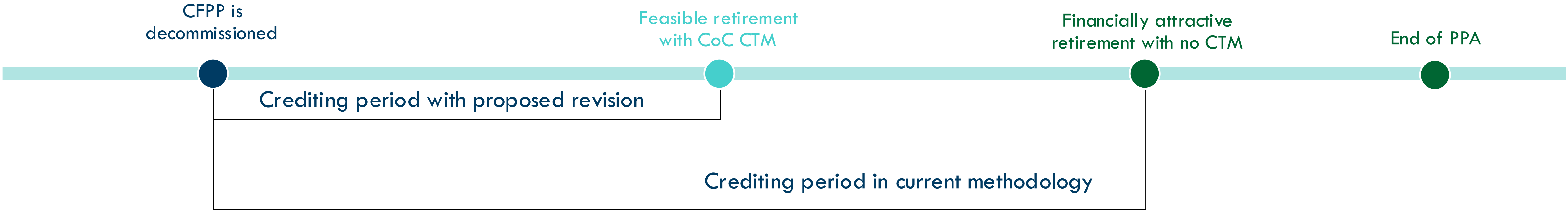
- The methodology requires project proponents to consider a **closed CTM** as one of the baseline retirement dates
- In practice, most projects will consider **CTMs and credits in tandem**; a CTM may not close before credits are pursued

Implication

- **Cost of capital (CoC) CTMs**, particularly refinancing and/or relevering of asset-level debt may be well-suited for plants with **long-term PPAs**
- Project evidence and initial modeling has shown that these CTMs can bridge a large share of the financing gap (ranging from **5-10 years**) ahead of the PPA end date[1]

Proposed methodology revision

- Require coal plants with **long-term PPAs** to assess the impact of **relevering** and, when interest rates are more attractive, **refinancing debt**[2]
- Guidance can be provided on how to conduct this analysis, for example by maintaining specific DSCRs and ensuring loan tenors do not extend beyond the CTM retirement year



[1] As observed in potential pilots as well as in analysis conducted by WEF of plants in the Philippines
[2] In practice there may be some practical barriers to relevering debt, as it increases contingent liabilities for an offtaker in the event of breach of contract.

All coal retirement projects assessed would qualify for regulatory pairing

Coal retirement process in practice	Implications for transition credit projects
Early retirement of a coal plant has required: • Close **coordination** with and **approval** from the **system operator and regulator** to ensure grid reliability and stability • A **grid study** to identify the timing, type, and size of the portfolio of resources needed to replace the coal plant • **Procurement** of those **replacement** resources, where the procurement process / development of replacement resources may often come *before* a coal plant is retired	• **Pairing modality:** Many projects will be able to demonstrate pairing through the regulatory pairing modality • **Additionality:** The baseline determination requires project proponents to show that coal retirement and its clean replacement is *not* financially attractive in the absence of credits, using a conservative approach ◦ As a result, the clean energy capacity that is identified to replace the coal plant would likely not have been approved or procured if the coal plant hadn't retired (i.e. the clean energy replacement is additional to the "BAU") • **Timing of replacement:** The replacement, even if it is developed before the coal plant is retired, should still be considered 'additional' to what would have been built if the coal plant were not planned for early retirement

Recommendation 7: If additional modalities for demonstrating clean energy pairing are desired, consider limiting pairing modalities to on-site, regulatory, and contractual pairing

On-site, regulatory, and contractual pairing modalities demonstrate a clearer case that the clean energy replacement would not have been built if the coal plant had not retired

On-site pairing

Replacement uses CFPP site, grid connection and plant components

Regulatory pairing

Regulator approves RE as explicit replacement of CFPP

Contractual pairing

CFPP PPA renegotiated to RE PPA

Financial pairing and counter-factual planning carry greater risk that the paired RE was already in the "BAU" pipeline

Financial pairing

Refinancing conditions are tied to new RE

Counter-factual planning

Integrated resource planning shows RE brought forward

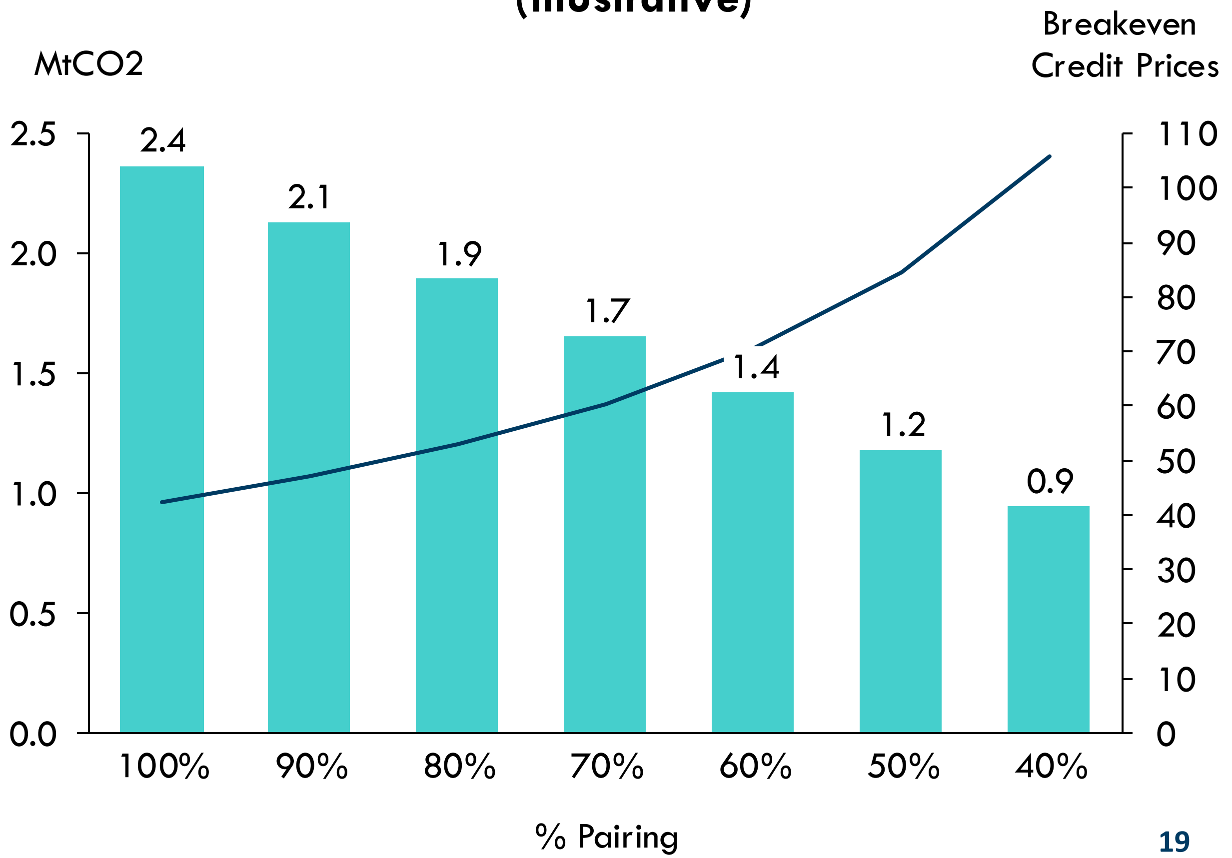
While minimum pairing levels are set at 40% of capacity, the methodology creates strong incentives to maximize pairing

At low levels of RE pairing, breakeven credit prices increase significantly, making the project increasingly unviable

Illustrative example using below assumptions

Parameter	Units	Value
Plant size	*MW*	100
Baseline capacity factor	*%*	60
Baseline annual generation	*MWh*	525,600
Plant emissions factor	*tCO2/MWh*	.9
Plant annual emissions	*tCO2*	473,040
Grid emissions factor	*tCO2/MWh*	.9
Years of project crediting	*Years*	5

Credit volumes and breakeven credit prices (illustrative)



Recommendation 8: Do not increase pairing minimums, as increasing minimums can make it difficult for private-sector led projects

- **Credit volumes** are strongly dependent on the share of **paired RE,** creating strong incentives to maximize pairing

- The project proponent will likely want to **own the paired replacement** generation in order to manage **credit volume risks**

- However, most markets require the clean replacement to be **procured competitively***

- As a result, it is **not guaranteed** that the **CFPP owner** will **own the replacement RE**

Implications for Transition Credit Project Implementation

- **Credit ownership:** Pairing modalities may make it harder for IPPs to be project proponents. A utility offtaker can own credits instead:
  - This could enable the utility to use credit revenues for system costs associated with the CFPP replacement (e.g., substation investments)
  - However, where the utility is a state-owned enterprise, there could be perceived risks/challenges with private sector credit buyers
- **Pairing thresholds/minimum:** While CFPPs are often replaced with higher shares of RE compared to the 40% minimum in the methodology, increasing pairing minimums can make it even more challenging for an IPP to bring forward a project in which it would own the credits, since it may need to competitively win those contracts

*For SLTEC in the Philippines, the CFPP owner was allowed to own the replacement generation