3.0 carbon finance

PCF'S PRICING POLICY

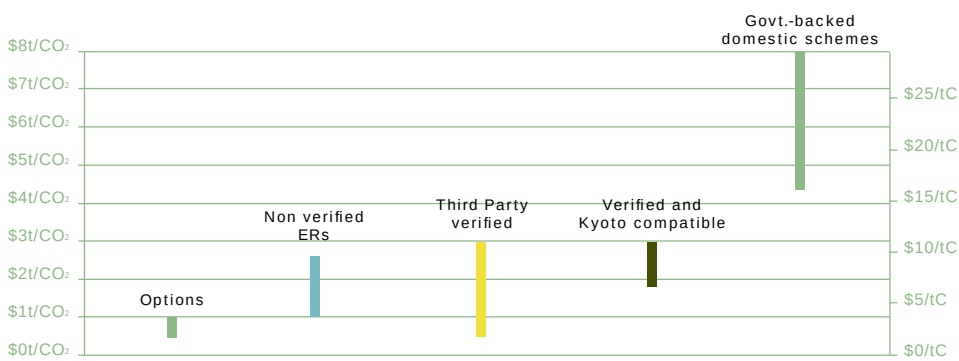
In the absence of a public, liquid market for emission reductions, and given the heterogeneity of the few transactions that have been executed, determining the price to pay for ERs is a challenge. The future evolution of ER prices is even more speculative. The PCF therefore considers several factors in determining its offer price for ERs, including:

- Consistency with evolving market prices,
- Equitable benefit sharing,
- Participants' willingness to pay, and
- Coherence across the PCF portfolio.

Consistency with evolving market prices

The PCF monitors the emerging carbon market to ensure that the price it pays for ERs is broadly in line with prices paid by other buyers under comparable transactions. Thus far, ERs have been valued across a wide price range—from about $1 per ton of carbon dioxide equivalent (tCO_2e) for non-verified ERs, to over $\$8/tCO_2e$ for permits that are recognized by governments under existing domestic schemes. ERs generated for the

Figure 3.1. Historic Prices for CO_2-Equivalent Emission Reductions

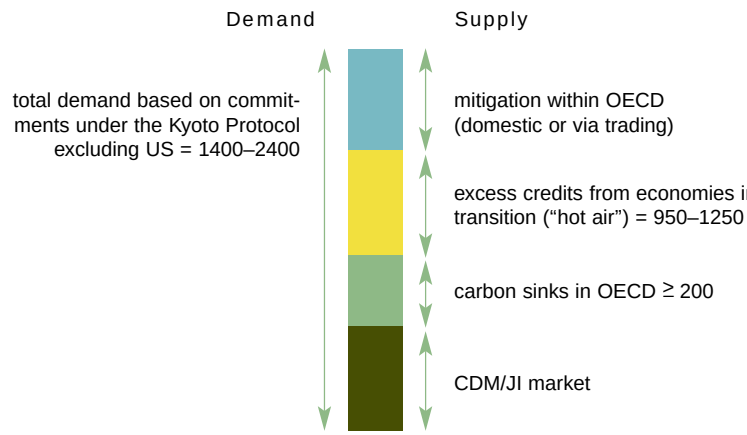


Credibility commands a substantial premium.

emerging CDM/JI market (that is, which are compatible with the emerging rules of the Kyoto Protocol) trade within a narrower band of about \$2-\$3/ tCO_2e *(see Figure 3.1)*. PCF-supported projects fall into this latter category.

Prospective market prices will depend largely on the evolution of demand and supply. Demand will depend upon factors such as economic growth in industrialized countries, voluntary corporate commitments, and potential US commitments. Supply will be influenced, among other things, by barriers to project development, abatement costs within OECD countries and emissions trading under Article 17 of the Kyoto Protocol, in particular by the attractiveness of "hot air." Figure 3.2 breaks down the elements of demand and supply, indicating that, depending on these factors, the future market for ERs from CDM/JI projects may be relatively small. This would imply possible prices ranging from zero to about \$7–\$8/tCO_2e in a medium-growth scenario excluding the US. If the US were to take commitments under the Protocol, prices would likely be substantially higher. *(Web version surveys the global carbon market and evaluates prospective demand and supply, based on recent market assessments commissioned by PCFplus.)*

Figure 3.2. Estimates of Potential Demand and Supply of Emission Reduction Credits (m tCO_2e/annum)



The size of the CDM/JI market will depend on evolution of supply and demand for ERs.

Equitable Benefit Sharing

In addition to mitigating climate change, the CDM is intended to help developing countries achieve sustainable development and enable them to share in the benefits of CDM projects. The PCF supports these objectives, not only because they correspond to the World Bank's mission, but also because a fair deal is likely to be durable—an important factor given that PCF may make ER purchase contracts for 10 years or longer. The PCF therefore seeks projects that will deliver sustainable *local* benefits beyond climate change, and seeks to negotiate prices and payment terms that will enable project entities to share equitably in the benefits of the ERs arising from these projects.

Willingness to Pay

The PCF's FMU has obtained guidance from the PCF participants on the parameters of their willingness to pay, notably in terms of the average outcome price they are seeking over the portfolio as a whole. The participants' willingness to pay may evolve as the market develops and as price signals become clearer. The FMU negotiates contracts at prices intended to enable the PCF to attain the target portfolio outcome price, after allowing for risk, overheads, and transaction costs.

Coherence across the PCF Portfolio

The prices paid by the PCF will vary over time and from contract to contract. They will depend on factors such as those noted above and, critically, on the level of risk inherent in the transaction and the underlying project. The PCF is willing to pay more for high-quality, low-risk ERs. However, because the fund's objectives go beyond maximizing return, the PCF expects that transactions that are first-of-a-kind, located in small or poor countries, or involve intermediaries that execute and aggregate small projects will cost more primarily because of higher transaction costs.

IMPACT OF CARBON FINANCE ON PROJECT INVESTMENTS

Based on the above factors, the PCF anticipates to pay around \$3/ tCO_2e on average (on delivery of ERs) under contracts it signs in the coming year.

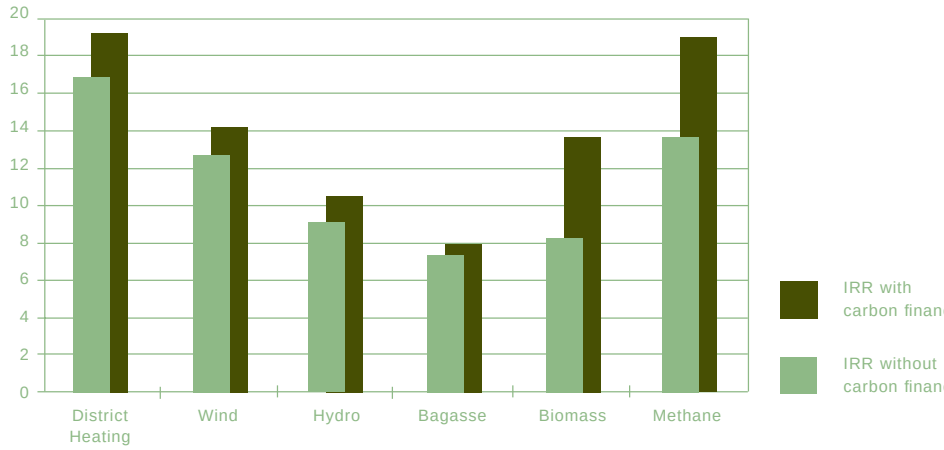
Even at this price, carbon finance can have an important impact on project viability by providing a high-quality stream of cash flows: it can boost financial internal rates of return (IRRs) substantially, and improve access to both public and private financing.

Impact on Project Financial Viability

The positive impact of carbon finance on the financial viability of projects is particularly important in projects that mitigate emissions of potent greenhouse gases such as methane. For example, for a proposed municipal solid waste project in India involving methane conversion and electricity generation, the sale of carbon offsets could provide revenues equivalent to over 2 cents/kWh. This increases the estimated project IRR by over 5 percent—from 14 percent without carbon finance to 19 percent with the sale of a share of ERs—making the project viable without subsidies. At the same time, the project would improve the sanitary conditions of waste management, reduce the space required for landfill, and create jobs.

The implications are important: carbon finance can help turn marginal projects, which might otherwise require either subsidies or public sector management, into freestanding projects capable of being privately financed and operated.

Figure 3.3. Impact of Carbon Finance on Sample Renewable Energy and Energy Efficiency Projects



Carbon finance can make marginal profits bankable.
(Web version provides IRR data for a range of projects, with and without carbon finance.)

Even for traditional renewables and energy efficiency projects, which achieve ERs by displacing carbon-intensive generation of power and/or heat, carbon finance can be catalytic. With the potential to boost project financial IRRs by 0.5 to 2.5 percent, it can make these projects competitive with thermal alternatives, thus providing the financial incentive to invest in environmentally friendly projects with local as well as global benefits. Figure 3.3 shows the impact of selling carbon at \$3/ tCO_2e on project IRRs for a range of technologies.

Among renewables, off-grid power generation projects provide the greatest climate benefit (and hence the greatest potential ERs per kilowatt-hour), because they generally displace more carbon-intensive generation than grid-based projects. For example, an off-grid hydro project in western Uganda could generate carbon credits worth about 0.5 cents/kWh (assuming an ER price of \$3/tCO_2e) by displacing small, inefficient diesel generation *(see Web Version for additional examples)*. Grid-based hydro projects generate only one-third to one-half of the ERs as compared to off-grid projects because they displace industrial-scale gas or coal generation, which is substantially less carbon-intensive.

Improved Access to Financing

The impact of carbon finance goes beyond boosting cash flows. An emission reduction purchase contract with the PCF represents a high-quality, contractual flow of foreign exchange with none of the cross-border risks (such as transfer and convertibility risk) that an investor faces on local-currency cash flows. In this sense, *carbon finance reduces the riskiness of the cash flows generated by the project and can therefore enhance its ability to attract private financing*.

Carbon finance can also facilitate the flow of development assistance as well as private financing. To illustrate, the Latvia Liepaja Solid Waste Management Project used PCF financing as matching funds, enabling it to receive over $5 million in grant funding from the European Union for which it would not otherwise have qualified.

More generally, the rigorous environmental and social assessments and monitoring required by the PCF (in accordance with the World Bank Group's safeguard policies) provide an implicit "seal of approval" that is attractive to aid donors and to the growing community of socially responsible investors. As noted above, this evidence of environmental, social and economic sustainability also enhances the value of the ERs.

MANAGING RISK AND UNCERTAINTY

Types of risk in carbon transactions

Carbon finance is inherently risky. It involves contracting to purchase an asset created by documenting the absence of invisible gases, generated by projects located in emerging markets, over a period of many years, where the host country must consent to transfer the asset to the buyer. Even if all goes well and the ERs are delivered, their value is highly speculative and their liquidity is not assured. Beyond the normative risks faced by any investor in an emerging-market project, carbon purchasers face additional risks, which can be grouped into four main categories:

- *Baseline risk* relates to the creditability of the ERs *(see Chapter 4)*. Is the project's baseline robust and will its assumptions remain valid, enabling it to generate the expected level of certifiable ERs on schedule? For CDM projects, will the Executive Board clear the baseline? Will the crediting period be renewed after 7 and 14 years?
- *Regulatory risk*, closely related to baseline risk, relates to the Kyoto Protocol and host countries' compliance with their obligations under the Protocol. Will the Kyoto Protocol enter into force? If so, will the ERs generated by the project be eligible for crediting? Will the host country (a) ratify the Kyoto Protocol, and (b) maintain compliance with the Protocol?
- *Market or price risk*. What is the expected price of ERs on delivery? This risk is high because little is known about the future evolution of the market.
- *Project risks* relate to the underlying project. Will it perform as expected, and hence will it deliver the expected quantity of creditable ERs? These risks include performance risk, contract risk, counterparty risk, and country risk. They are generic to the project and are faced to some extent by all of the financiers, including PCF.

(Web version provides more on the elements of risk.)

Risk assessment and management

The PCF manages these risks by systematically assessing each category of risk, ensuring that each specific type of risk is assigned to the party best able to manage it, and mitigating the risks it assumes itself through financial engineering and contractual clauses. *(Web version discusses PCF's risk assessment tools.)*

Structuring Projects to Mitigate Risk

The PCF manages its exposure to *baseline risk* by commissioning a rigorous *baseline study* and *monitoring and verification plan*, and having these, as well as the project concept, *validated* by a qualified, independent third party.

It mitigates *regulatory* risk by seeking commitment from host countries that they will ratify the Kyoto Protocol, maintain compliance, and transfer the ERs purchased by PCF.

The PCF is willing to assume the *market or price risk* for the ERs that it contracts to purchase from a project entity. It agrees in advance to pay a specific price on delivery of ERs, regardless of the actual price available in the market at that time. The PCF commissions periodic assessments of carbon purchase transactions (including those referred to above) to better understand the market risk it is assuming, to identify trends in market prices, and to update its participants on market risk and price trends.

The PCF manages and mitigates its exposure to *project risks* by measures such as:

- Commissioning independent risk assessments to evaluate risks identified in its own reviews,
- Overcollateralization, *(Web version defines and illustrates this.)*
- Purchasing ERs primarily in the early years of a project,
- Establishing the PCF's senior interest in ERs generated by each project,
- Purchasing ERs on delivery, and
- Requiring credit enhancement through security, insurance, guarantees, and/or other risk management tools.

LOOKING AHEAD

In the coming year, PCF will gain additional experience in structuring emission reduction purchase transactions. We expect this to yield:

- A range of transactions structured to mitigate risk, and priced to reflect the risks assumed by PCF,
- Good estimates of the cost of the CDM project cycle steps, and
- An increasingly systematic approach to project evaluation, risk assessment, pricing, and transaction structuring to improve the transparency of carbon purchases.

The PCF experience so far shows that carbon finance can improve the viability of projects, especially those involving the mitigation of methane emissions. Uncontrolled waste deposition ***(as above)*** can become a practice of the past.