Catalyzing carbon markets globally to realize the promise of Paris: The power of markets to increase ambition

EDF Submission to the Talanoa Dialogue Platform
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Summary

It is widely understood that carbon pricing policies lower the costs of achieving a given target emissions level, by creating a powerful economic incentive for businesses and individuals to reduce emissions as cost-effectively as possible and thereby spurring innovation in cleaner and cheaper technologies. What is less commonly emphasized—but more important for the health of the climate and the future of the planet—is how those cost savings can translate into deeper cuts in climate pollution. By lowering total abatement costs and creating economic opportunities, market-based climate policies offer the potential to achieve greater reductions at a given cost. Even if policy makers do not explicitly set a cost "target," policies are established iteratively over time. By helping to achieve initial targets more easily and inexpensively than expected, carbon pricing policies can lower political resistance to setting more ambitious targets in the future.

This submission presents the results of an analysis that attempts to estimate the potential for carbon markets to yield deeper reductions. We employed EDF's carbon market modelling framework to conduct a quantitative analysis of the cost savings under various scenarios for domestic and international emissions trading—as well as the corresponding escalation in reductions that would result if those cost savings were translated into greater ambition. [1] *In the spirit of the Talanoa Dialogue, this submission organizes the results of EDF's analysis in the context of three key questions: where are we, where do we want to go, and how do we get there?*

Where are we?

Current Nationally Determined Contributions (NDCs) under the Paris Agreement and trajectories of emissions put the world on course for temperature rise greater than 1.5 and 2˚C. According to EDF's

[1] Our assumptions, methodology, and results are described in P. Piris-Cabezas and R. Lubowski. (2018). "Carbon prices under carbon market scenarios consistent with the Paris Agreement: Implications for the Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA)" Environmental Defense Fund. Washington, DC. Available at: https://www.edf.org/sites/default/files/documents/CORSIA%20Carbon%20Markets%20Scenarios_0.pdf.
Also see: P. Piris-Cabezas and R. Lubowski. (2018). "Catalyzing carbon markets globally to realize the promise of Paris: The power of markets to increase ambition." Environmental Defense Fund. Washington, DC. Manuscript.

analysis[2], NDCs achieve less than one third of the emissions reductions needed from 2020 to 2035 to keep global temperatures from rising more than 2°C.

To estimate the potential for carbon markets to yield deeper reductions, we employed EDF's carbon market modelling framework to conduct a quantitative analysis of the cost savings under various scenarios for domestic and international emissions trading—as well as the corresponding escalation in reductions that would result if those cost savings were translated into greater ambition.[3]

We first estimated total global costs for meeting countries' Paris Agreement pledges from 2020 to 2035 based on their existing use of markets and estimates of current sectoral plans and policies. This "base case" assumes the achievement of countries' NDCs under the Paris Agreement, using domestic or regional carbon pricing policies that are already in place.

We estimate that current pledges entail a cumulative global reduction of 77 $GTCO_2e$ (billion metric tons of CO_2e)[4] relative to "business as usual" from 2020 through 2035. This scenario roughly stabilizes global emissions at current levels, with emissions peaking in 2024 and falling to just under 2017 levels by 2035. This trajectory achieves less than one third of the estimated 249 $GTCO_2e$ of emissions reductions necessary to be on consistent with keeping global temperatures from rising more than 2°C.

Where do we want to go?

*Expanding the use of markets as an **enabling policy** can make a significant dent in that "ambition gap" even without increasing total cost.*

By lowering total abatement costs and creating economic opportunities, market-based climate policies offer the potential to achieve greater reductions at a given cost. Even if policy makers do not explicitly set a cost "target," policies are established iteratively over time. By helping to achieve initial targets more easily and inexpensively than expected, carbon pricing policies can lower political resistance to setting more ambitious targets in the future.

We quantified the cost savings under different scenarios for international emissions trading, where participating countries can lower their costs of meeting emissions limits by taking advantage of cost differentials across sectors, countries, and over time. We estimate that global emissions trading could reduce the total mitigation cost of meeting current Paris pledges by 59 percent and 79

[2] See sources in footnote 1.

[3] We use a partial-equilibrium model based on estimated marginal abatement cost (MAC) curves for major sectors within each country and region. We grounded our analysis in the projected emissions and estimated MACs from the Prospective Outlook on Long-term Energy Systems (POLES) model, a global energy-economic simulation model widely used by the European Commission, which examines the energy, transport and industry sectors, including CO2 as well as non-CO2 gases. These data were obtained from Enerdata (See: https://www.enerdata.net). We supplemented the estimates from POLES with estimates for the costs of REDD+, based on the global land-use modeling cluster of the International Institute of Applied Systems Analysis (IIASA). Emissions from the global agricultural sector were added into the estimate of global business as usual (BAU) emissions based on projections from the Food and Agriculture Organization (FAO) of the United Nations, but mitigation potential from agriculture was not included in this analysis.

[4] All emissions figures in this analysis are in metric tons of CO2-equivalent using standard 100-year global warming potentials.

percent—or about $300 and $400 billion in current value terms—over 2020-2035, with the high end of the range assuming that credits from Reducing Emissions from Deforestation and forest Degradation (REDD+) are included in markets.[5]

Next, for each scenario we calculated the quantity of additional emissions reductions that would be economically feasible at zero additional cost as a result of international emissions trading, relative to the base case without such international markets.

How do we get there?

Significant opportunities for strengthened action and ambition exist through market-based climate policies, which offer the potential to nearly double climate ambition relative to current NDCs at the same total cost.

The global use of carbon markets could allow the world to nearly double climate ambition relative to current NDCs, meaning that we could achieve almost double the emissions reductions at the same total cost. In particular, we estimate that holding total discounted abatement cost constant, cumulative emissions reductions over the period 2020-2035 would increase from 77 $GTCO_2e$ in the base case to 147 $GTCO_2e$ in a scenario with full global emissions trading—an increase of 91 percent, as illustrated in Figure 1 below. However, achieving the Paris two-degree objective will require significantly more mitigation, and hence additional costs. The estimated reductions of 249 $GTCO_2e$ required for meeting the two-degree target are also shown in Figure 1.

Expanding the use of markets from the base case to the "full trading" scenario can be divided into two steps: first, broadening the use of emissions trading as an instrument of domestic policy, with the "full trading" scenario assuming that every country in the world uses an internal carbon market to meet its NDC; second, linking those markets through international trading. Both steps yield cost savings, and thus potential increases in ambition. Our modelling suggests that the lion's share of the gains from global markets are due to international linking, with a much smaller share coming from increased use of domestic carbon markets. While this conclusion needs further analysis, it has potentially striking implications, suggesting that carbon pricing policies that encourage international cooperation—such as carbon markets—may be able to capture significantly more cost savings, and thus increased ambition, than carbon pricing policies that are less prone to linkage.[6]

[5] A report by the World Bank estimated that international emission trading could reduce the total abatement costs of achieving current Paris pledges by about a third by 2030, while cutting total mitigation costs in half by 2050 in a 2°C consistent scenario.(World Bank, Ecofys, and Vivid Economics, State and Trends of Carbon Pricing 2016 (Washington, D.C.: World Bank, 2016). We estimate greater potential savings from markets—and correspondingly greater potential to help finance additional emissions reductions—compared to this study t, because we consider a broader range of mitigation activities: while the World Bank analysis only considers CO_2 emissions from the energy and industrial sectors, we consider all GHGs and the potential role of REDD+ in an international market. We also consider a longer time period (2020-2035, vs. 2030 only). Our analysis still potentially underestimates the benefits of markets, as we did not consider opportunities for trading of non-CO_2 emissions from agricultural activities and we limited our consideration of forestry to reducing deforestation and degradation, without including the potential of reforestation and improved forest management.

[6] This finding comes with an important qualification due to the nature of our model. While the model is fairly disaggregated *among* countries, it is relatively coarse *within* countries, because only four sectors are modeled: energy, transport, industry, and forestry and land-use. Because our model assumes least-cost abatement in each sector within each country (including within the EU-region aggregate), it effectively assumes the use of within-sector emission trading or other market-based policies, rather than more costly

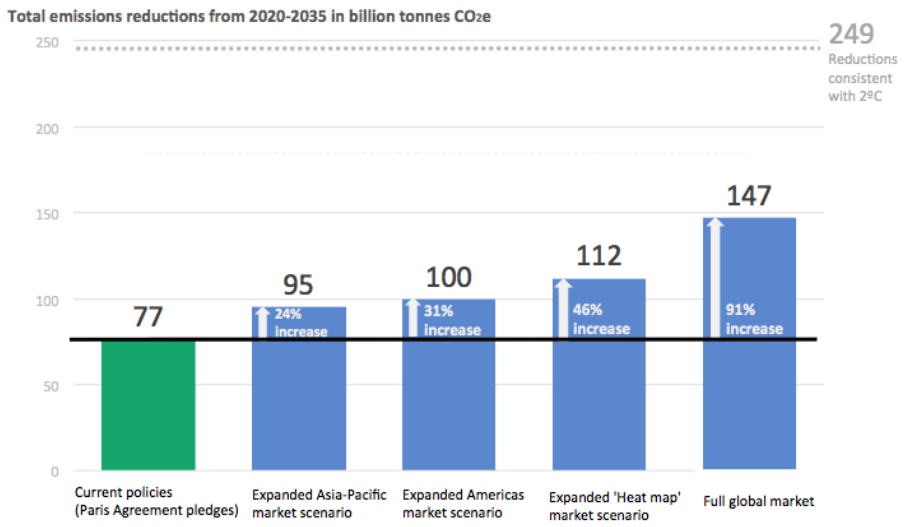

Figure 1. Emissions reductions under various scenarios for market coverage, holding total cost constant. Estimated emissions reductions achievable under the base case (current policies) and four scenarios for increased international market coverage, holding total cost constant.

Significant opportunities for strengthened action and ambition exist through market-based climate policies even with constrained international emission trading.

A fully global carbon market may be unrealistic, especially over the 2020-2035 time horizon of our analysis. However, we find that more plausible scenarios with only a portion of the world's emissions linked through international carbon markets could yield a quarter to half of the potential increase in ambition. In particular, scenarios with at least partial coverage of the United States, EU, China, and emissions from international aviation, together with either a regional carbon market in the Asia-Pacific region or a regional market across the Americas, would raise total cumulative emissions reductions to 95 and 100 $GTCO_2e$, respectively (increases of 23 to 30 percent over the base case)—again, at zero additional cost. A more ambitious scenario, including participation from the U.S., China, EU, international aviation and 25 countries we identify as being best placed to move on carbon pricing based on a "heat map" analysis, would achieve an estimated 112 $GTCO_2e$ of cumulative emissions reductions at the same total cost (an increase of 45 percent over the base case). These scenario findings are illustrated in Figure 1, above.

Significant opportunities for strengthened action and ambition exist: Reducing deforestation is a key driver of greater ambition

command-and-control measures. More fine-grained sectoral coverage would yield greater estimated cost savings due to greater within-country trading. Nonetheless, a striking conclusion from our analysis is that virtually the entire cost savings (96 percent) are due to international linking, with just 4 percent of estimated cost savings coming from increased use of domestic trading. At the very least, this suggests that the potential for gains from international trade are significantly greater than the gains from intersectoral trade within each country.

Reducing deforestation is a key driver of greater ambition. Because avoided deforestation is a large source of relatively low-cost emissions reductions, including a market for jurisdictional-scale REDD+ credits from tropical forest jurisdictions deforestation reduces total costs significantly, raising ambition accordingly. In the "full international trading case," REDD+ accounts for just over half of the estimated increase in total achievable abatement from the expanded use of markets. Similarly, starting from the more limited carbon market coverage scenarios, extending market-based REDD+ to other tropical forest countries allows for an additional roughly 20 $GTCO_2e$ of emissions reductions at no additional cost (Figure 2). As a result, intermediate trading scenarios with expanded REDD+ markets are able to realize half to three quarters of the potential increase in emissions reductions achievable with full global trading.

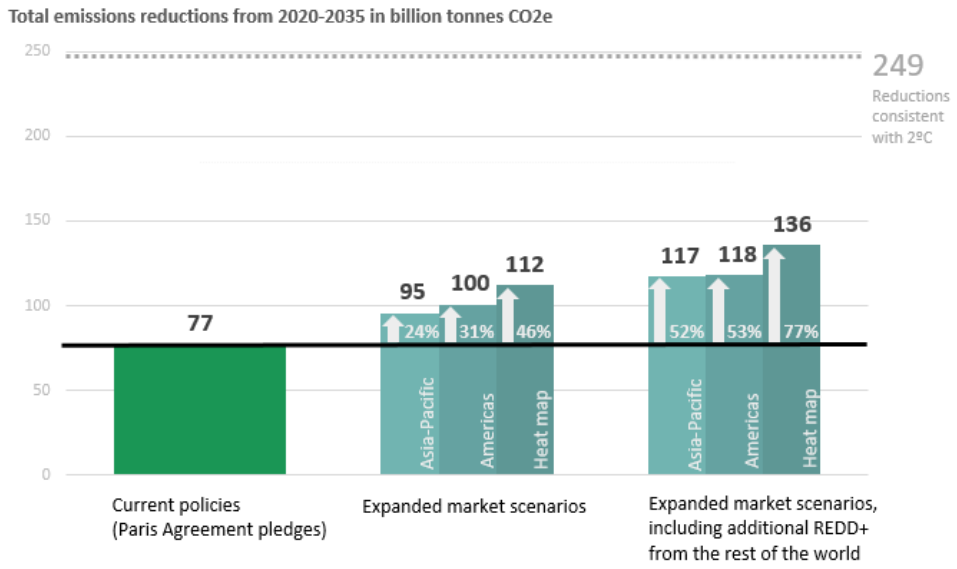

Figure 2. Additional emissions reductions achievable from reduced deforestation. For each of the three intermediate market scenarios in Figure 1, the chart shows the additional emissions reductions made possible by extending REDD+ markets globally.

NOTE: The conclusions presented in this submission are robust to scenarios in which market actors are uncertain about the future in the sense that they do not fully anticipate the reductions required under NDCs (or any additional ratcheting-up of ambition) and therefore delay emissions reductions relative to the least-cost scenario. If market actors are forward-looking such that they anticipate the future ratcheting-up of ambition, they would have incentives to act early to take advantage of lower-cost abatement opportunities, in order to avoid future cost increases. Forward-looking actors would thus accelerate their mitigation investments, with significant further potential to help close the near-term ambition gap.