



LESSONS LEARNED

the First Auction of the Pilot Auction Facility



ACKNOWLEDGMENTS

This report was prepared on behalf of the World Bank Pilot Auction Facility for Methane and Climate Mitigation (PAF) by Caroline Ott, Scott Cantor, Tanguy de Bienassis, and Isabel Hagbrink with input from Claudia Barrera, Nina Chee, Felicity Creighton Spors, Akinchan Jain, Justin Pooley, Brice Quesnel, Shirmila Ramasamy, Stephanie Rogers, Fei Wang, and Vikram Widge (World Bank Group), and Ben Chee and Chantale LaCasse (NERA Economic Consulting). External input was provided by Rupert Edwards (ForestTrends) and Billy Pizer (Duke University).

The PAF team wishes to thank the following vendors, agents, and consultants that aided in the design and/or establishment of the PAF and the first auction: NERA Economic Consulting, Linklaters, Kommunalkredit Public Consulting GmbH, Citibank, and BNP Paribas. While the PAF could not have executed the first auction without the expertise and guidance of these organizations, all errors in this document remain our own.

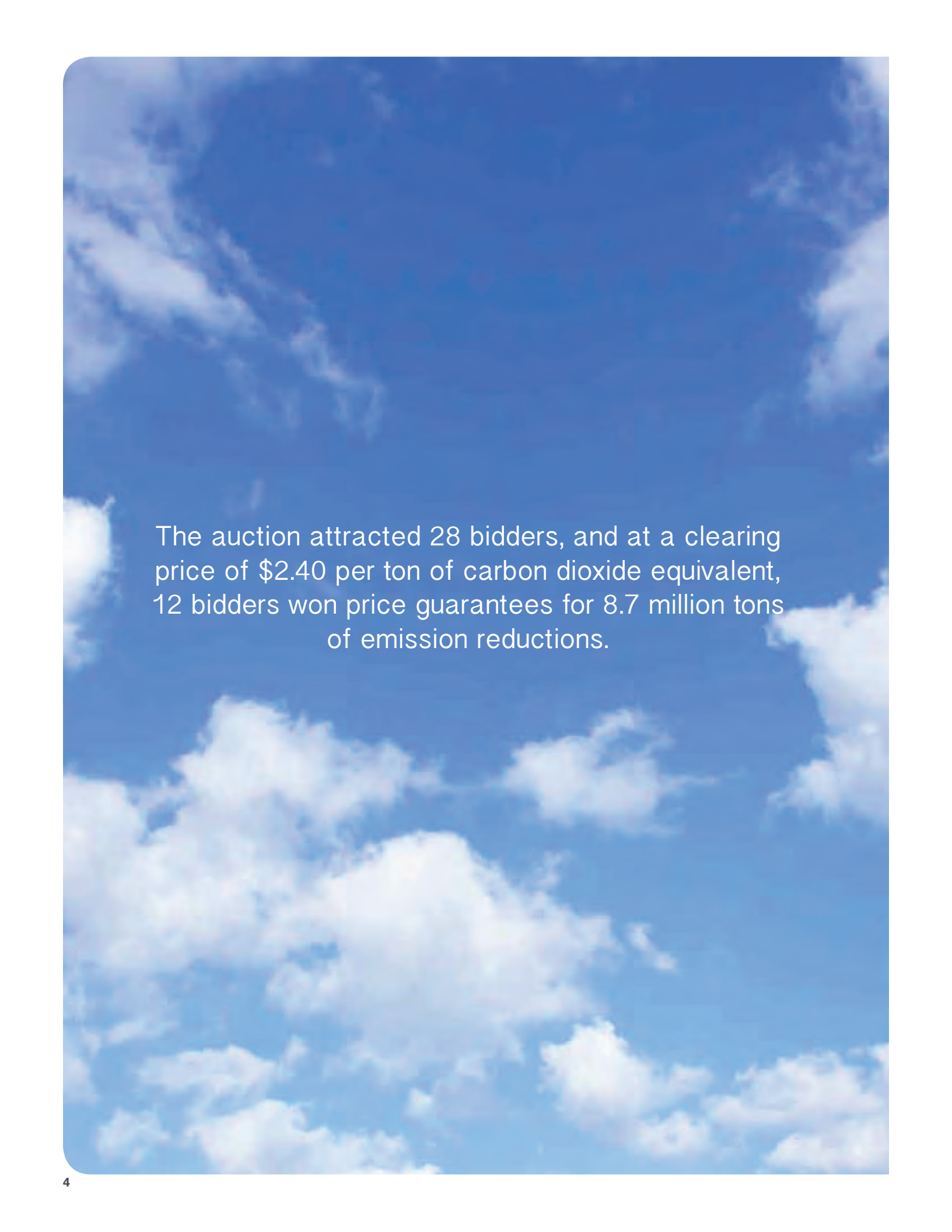
Attribution – Please cite this work as follows: World Bank Group. 2015. Lessons Learned: The First Auction of the Pilot Auction Facility. Washington, D.C.



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The background of the slide is a photograph of a clear blue sky with several fluffy white clouds scattered across it. The clouds are more prominent in the lower half of the image.

The auction attracted 28 bidders, and at a clearing price of \$2.40 per ton of carbon dioxide equivalent, 12 bidders won price guarantees for 8.7 million tons of emission reductions.

EXECUTIVE SUMMARY

On July 15, 2015, the Pilot Auction Facility for Methane and Climate Change Mitigation (PAF) conducted its first auction of price guarantees for emission reductions. The auction attracted 28 bidders, and at a clearing price of \$2.40 per ton of carbon dioxide equivalent, 12 bidders won price guarantees for 8.7 million tons of emission reductions. While these numbers capture the result of just one auction, a closer look at the PAF—how it was developed and how it may be replicated—offers several lessons on an innovative and scalable approach to climate finance.

The objective of the PAF is to demonstrate a new, cost-effective climate finance mechanism that incentivizes private sector investment in climate change mitigation in developing countries. The PAF originated from a report by the 2012 G8-requested Methane Finance Study Group, which sought to identify pay-for-performance mechanisms to incentivize investment in methane mitigation projects. The report identified 1,200 methane projects, capable of reducing 850 million tons of carbon dioxide equivalent, as dormant or incomplete due to low prices in the carbon markets.

Among other financing proposals, the Study Group recommended the formation of the PAF, a facility that would auction price guarantees for emission reductions. The PAF provides its price guarantees in the form of put options, which provide holders the right but not the obligation to sell future emission reductions at a pre-determined price. The PAF allocates these put options and sets the guaranteed price level through an auction, revealing the true abatement cost of the projects while also ensuring that only the lowest cost projects receive financing.

As a pilot facility, the PAF aims to promote learning, replication, and scale-up. In total, the PAF is planning three to four auctions in order to test different auction formats. Through this process, the PAF will provide a series of analyses for those seeking to adopt similar models. In this first report, the PAF identified over 40 lessons on the process of developing and delivering the first auction; this summary, written primarily for those seeking to replicate or scale the PAF mechanism, presents a diverse selection of these recommendations, considerations, and insights.

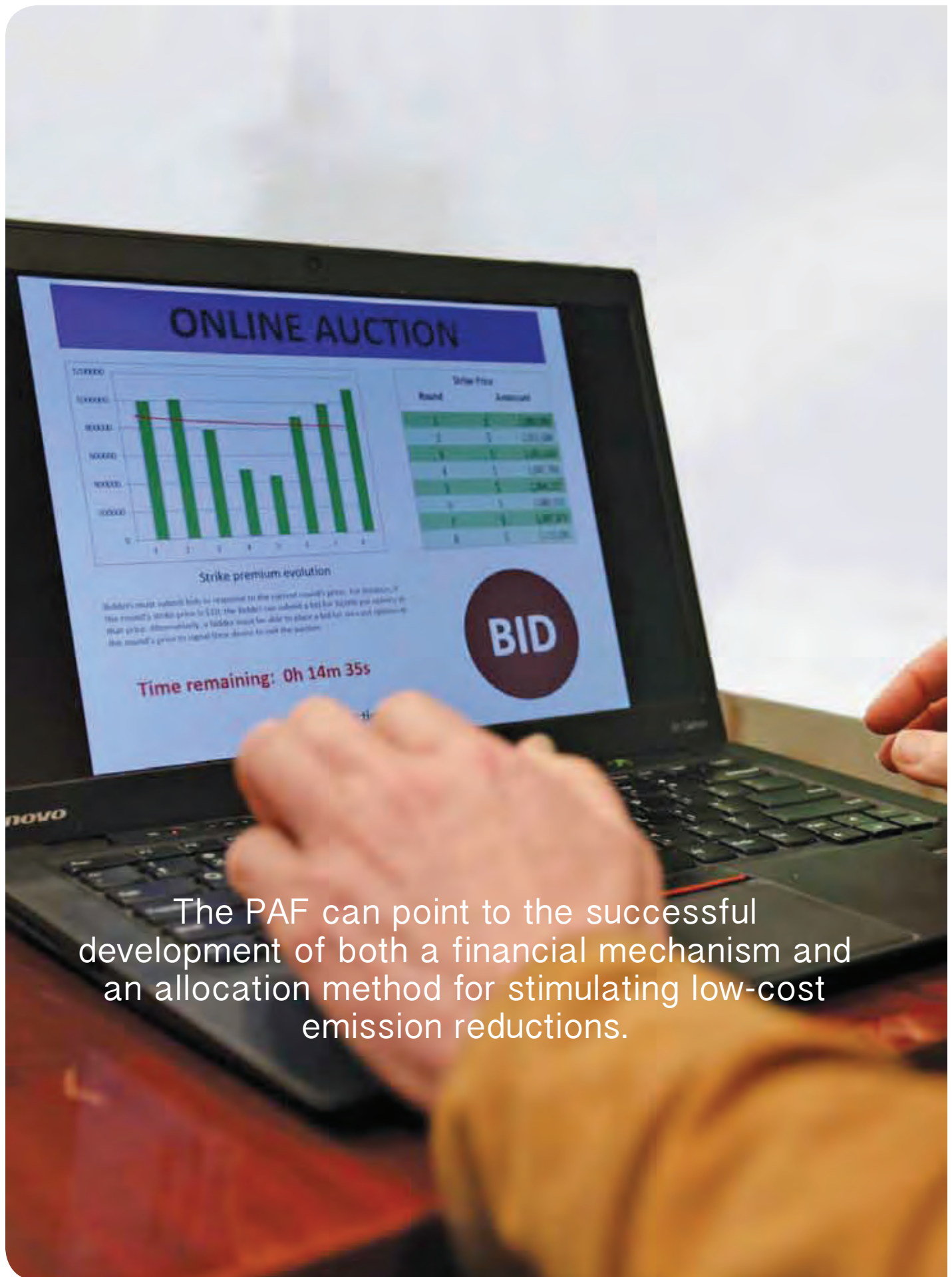
LESSON 1: Careful design decisions ensure a successful auction.

The PAF faced several design decisions in establishing the first auction. From an early stage, the PAF committed to delivering a live online auction in order to maximize participation, competitiveness, and transparency. Other crucial design decisions included single versus multiple round, forward versus reverse, uniform price versus pay-as-bid, and single versus multiple product auction. The PAF ultimately ran a multiple round, reverse, uniform price auction for a single product. Those seeking to replicate or scale the

PAF should consider the auction size, the number and type of participants, and the auction objectives in order to achieve a successful design.

LESSON 2: Project eligibility should be based on existing standards and systems.

In order for an auction winner to redeem the put options, the projects underlying these options must meet a set of requirements for how, where, and when emission reductions took place. The PAF selected the Clean Development Mechanism (CDM) as the sole eligible verification standard for its first auction because it had the largest pipeline and a thoroughly tested monitoring, reporting, and verification (MRV) scheme. By adopting CDM rules and procedures in the first auction, the PAF saved considerable time and money while also ensuring that qualifying projects satisfied its objectives. Those seeking to replicate the PAF should leverage existing MRV schemes to the extent possible, including, but not limited to the CDM. The PAF recognizes the existence of additional MRV schemes and will consider including other verification standards in future auctions.



The PAF can point to the successful development of both a financial mechanism and an allocation method for stimulating low-cost emission reductions.



LESSON 3: Webinars, in-person events, and professional networks are critical to attracting bidders.

In order to attract a robust bidder pool, the PAF marketed the auction through in-person events, webinars, email outreach, and a regularly updated website. The PAF found that webinars, professional networks, and direct email outreach attracted the highest number of participants. To achieve maximum participation, the PAF recommends conducting additional webinars, especially in the weeks approaching the auction date.

LESSON 4: Risk management ensures positive auction and delivery outcomes.

The PAF undertook risk management with regard to both projects and potential bidders. To mitigate project risks, the PAF developed a list of environmental, health, and safety (EHS) criteria. For put options won in the first auction, the PAF will require each project supplying emission

reductions to complete an EHS audit prior to redeeming the put options; the effectiveness of these criteria will be re-examined in a later report following the first redemption of put options. As for potential bidder risks, the PAF developed a set of integrity due diligence (IDD) criteria in order to ensure that bidders did not pose any reputational risks.

LESSON 5: Bonds offer an inexpensive and accessible put option delivery mechanism, but settlement presents some small hurdles.

Per the findings of the Methane Finance Study Group, the PAF sought to create a climate finance mechanism with two properties: tradability, or the right to transfer ownership of the contract, and optionality, or the ability to sell emission reductions to both the carbon market and the PAF, depending on future prices. The PAF materialized these concepts in the form of a zero-coupon puttable bond, which was the fastest and cheapest method for delivering the put option for the

World Bank. Those seeking to replicate or scale the PAF should similarly build from existing infrastructure. If using bonds to realize the put option, replicating entities should carefully review both the time and cost for winners to establish custodian accounts to receive and hold these bonds; due to time consuming know-your-customer requirements, it took many bidders longer than expected to open these accounts.

From developing a financial mechanism to establishing an online platform to attracting bidders, the PAF faced continuous uncertainty as to whether it could deliver the Study Group's vision. At this stage in the piloting process, the PAF can point to the successful development of both a financial mechanism and an allocation method for stimulating low-cost emission reductions. Moving forward, the PAF hopes that this experience will provide a solid ground for those seeking to learn from and build on this early success.



The key objective of the PAF is to demonstrate a new, cost-effective climate finance mechanism by providing a guaranteed floor price on emission reductions.

INTRODUCTION

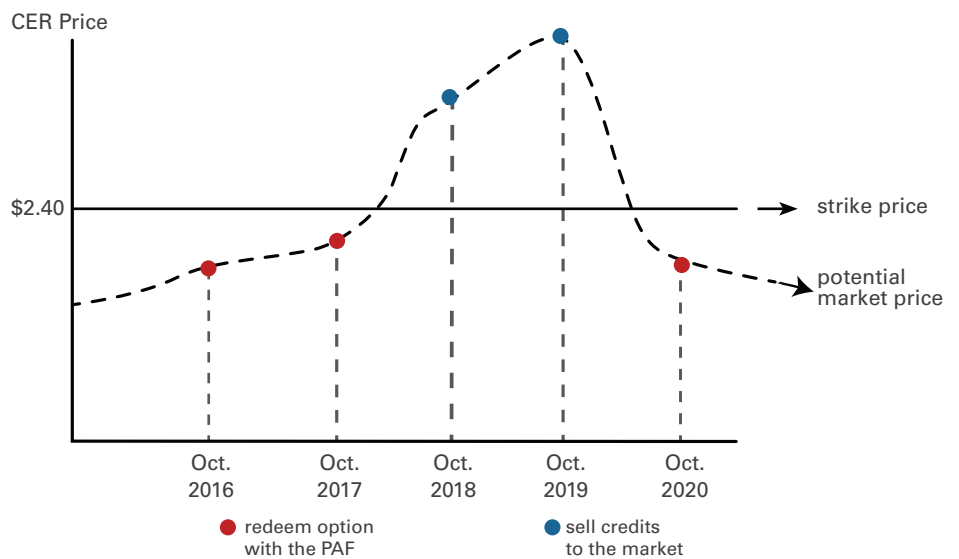
What is the PAF?

The PAF is an innovative climate finance model developed by the World Bank Group to stimulate private investment in projects that reduce greenhouse gas emissions, while maximizing the impact of public funds. The key objective of the PAF is to demonstrate a new, cost-effective climate finance mechanism by providing a guaranteed floor price on emission reductions. The PAF determines this floor price through the auctioning of put options. Once these options reach maturity, option holders may present eligible carbon credits and redeem their options for a guarantee floor price. This price is supported by funding from the PAF Contributors, comprising Germany, Sweden, Switzerland, and the United States.¹

The PAF consists of two key elements: the first, **a tradable put option** for emission reductions, provides option holders with the right but not the obligation to sell future emission reductions to the PAF at a pre-determined price (the option “strike price”). If carbon market prices rise above the strike price, owners of the put option could benefit by choosing to sell to other buyers in the carbon market rather than to the PAF. If market prices fall below the strike price, the put option owner has the right to sell emission reductions to the PAF at the strike price. The PAF’s put options are designed to be tradable, enabling holders to transfer ownership and maximize the likelihood that the PAF achieves emission reductions.

The second element of the PAF, **an auction platform**, provides a competitive and transparent means for determining the option strike price and allocating the put options. In the first auction of the PAF, participants bid in multiple rounds by submitting the quantity of put options demanded at a series of descending strike prices. Bidders dropped out as the price per emission reduction became lower than they were willing to accept. The

Figure 1: Tradable Put Option for Emission Reductions – Hypothetical Projection



competitive nature of the auction revealed the minimum price required by the private sector to make emission reduction investments, therefore maximizing the impact of public funds and achieving the highest volume of climate benefits per dollar.

As a pay-for-performance facility, the PAF will pay the strike price only for emission reductions that have

been independently verified through existing market infrastructure. In so doing, the PAF only pays for tangible results, thus maximizing the use of public funds.

¹ The PAF Contributors consist of the German Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety (BMUB); Swedish Energy Agency; Climate Cent Foundation (Switzerland); Swiss State Secretariat for Economic Affairs (SECO); and the United States Department of State. PAF Contributors have provided \$53 million in total resources as of October 2015.

How was the PAF developed?

At the request of the G8,² the World Bank in 2012 convened an international group of experts, the Methane Finance Study Group (“Study Group”), to identify innovative pay-for-performance mechanisms that would incentivize investment in methane mitigation projects. In 2013, the Study Group issued a report³ recommending the creation of a methane abatement facility that would auction put options to guarantee a price floor on independently verified emission reductions. The report introduced two critical features of the climate finance mechanism: tradability, or the right to transfer ownership of the option, as well as the ability to sell verified emission reductions to the carbon markets and/or the methane abatement facility. Following these recommendations, the World Bank, with the early encouragement of Sweden and the United States as well as several members of the Climate and Clean Air Coalition, began developing the Pilot Auction Facility.

Why focus on reducing methane?

Methane is a highly potent greenhouse gas, with a global warming potential 28 times that of carbon dioxide.⁴ Methane is also a short-lived climate pollutant, with an average lifetime in the atmosphere of around 12 years, meaning that actions today could significantly mitigate near-term warming.

Reducing methane provides a range of local and global co-benefits, including improved local air quality and improved food security through the avoidance of crop losses. In addition, captured methane can be burned for cooking or electricity generation, contributing to increased access to clean energy.

Commercial technologies that reduce methane emissions are relatively inexpensive and came into widespread use in many developing countries as the carbon market developed and offered prices sufficient to catalyze

PAF Key Terms

Put Option: a financial contract that gives the holder the right but not the obligation to sell assets at an agreed price

Strike Price: the guaranteed price that the PAF pays per emission reduction

Premium: the price paid by the auction winners to purchase the put option, also known as the PAFERN issue price

PAFERN: Pilot Auction Facility Emission Reduction Note, a World Bank issued, zero-coupon bond that delivers the put option

Redemption: Refers to redemption of the PAFERNS, which involves the payment of the strike price by the World Bank as issuer of the PAFERNS to PAFERN holders presenting eligible emission reductions

Maturity: the date on which the PAFERN holder can redeem the PAFERN

Reverse auction: an auction in which the premium is announced, and the bidders bid down the strike price

Eligibility criteria: requirements for how, when, and where emission reductions occur in order to qualify for redemption

investment. But with the collapse in carbon prices in recent years, carbon revenues are now insufficient to make these projects viable. The Methane Finance Study Group Report identified an estimated 1,200 methane projects, capable of reducing some 850 million tons of carbon dioxide equivalent, as dormant or incomplete as of 2012. The PAF similarly recognized these stranded projects—those that are either at risk of being decommissioned or have already been decommissioned—as the primary target for the first auction.

Where is the PAF now?

On July 15, 2015, the PAF held its first auction, resulting in the sale of put options to purchase 8.7 million tons of

carbon dioxide emission reductions at \$2.40 per ton. The first auction attracted 28 bidders—15 from developing countries—representing companies ranging from large multinationals to small local businesses. At the clearing price of \$2.40 per ton, 12 bidders won price guarantees, and on October 7, 2015, the World Bank issued the first Pilot Auction Facility Emission Reduction Notes (PAFERNs), a type of bond that delivers the put options.⁵

Following the success of the first auction, the PAF is currently developing parameters for a second auction to be held in 2016. In total, the PAF plans to conduct three to four auctions in order to test different variations of this climate finance model and to demonstrate impact.

2 The White House Office of the Press Secretary, Fact Sheet: G8 Action on Energy and Climate Change (May 19, 2012), available at: <https://www.whitehouse.gov/the-press-office/2012/05/19/fact-sheet-g-8-action-energy-and-climate-change>

3 Methane Finance Study Group Report: Using Pay-for-Performance Mechanisms to Finance Methane Abatement (April 2013), available at: http://www-wds.worldbank.org/external/default/WDSCContentServer/WDSP/IB/2013/08/16/000356161_2013081615413/Rendered/PDF/799830WPOREPLA0x0379797BB00PUBLIC0.pdf

4 The IPCC Fifth Assessment Report reports a global-warming potential for methane of 28. However, since the PAF in its first auction accepted only credits issued under the CDM, the PAF team has adhered to the global-warming potential approved by the CDM Executive Board, a value of 25.

5 See further the “Mechanism Design” section of this report.

What is the purpose of this report?

As a pilot facility, the PAF aims to promote learning, replication, and scale. This report is directed towards governments, development institutions, and private sector entities interested in learning about an innovative and efficient climate finance mechanism.

The purpose of this report is to:

- Present the lessons learned in the establishment and delivery of the first PAF auction;
- Provide a roadmap of the PAF's key decisions for those who may seek to replicate and/or scale the model; and
- Review the first auction to provide feedback and improve the model for future auctions.

This report examines the processes and decisions leading to the first auction in July 2015 and the issuance of the first PAFERs in October 2015. A subsequent analysis following the first redemption of the PAFERs in 2016 will provide additional insight on the impact of the facility.

This report is structured as follows: each section begins with an overview of the PAF's decision-making process with respect to the section title. Following this overview, each section includes a set of lessons learned, which are grouped into three categories: **recommendations** provide actions that a replicating entity is encouraged to take based on the experience of the first auction; **considerations** suggest changes that a replicating entity might consider for similar mechanisms; and **insights** include challenges and successes of the first auction, which do not necessarily require a change in practice, but are nevertheless worth recognizing.

Section titles and subtitles do not necessarily reflect a chronological account of events leading to the first auction, as many processes occurred in tandem. Thus, this report should be considered as a whole.

This report is directed towards governments, development institutions, and private sector entities interested in learning about an innovative and efficient climate finance mechanism.



FROM IDEA TO REALITY: Developing the Mechanism

OPTION DELIVERY MECHANISM

Following the Study Group's recommendations, the PAF sought to create a climate finance mechanism that delivered payments for independently verified methane emission reductions. The Study Group envisioned a results-based approach in which competitive auctions would determine the level of project funding; thus, the auction would reveal the funding required to reduce emissions and ensure that only the lowest cost projects would benefit.

The Study Group also recommended the use of a tradable instrument to ensure the greatest volume of emission reductions would be achieved at the lowest cost. With this guidance, the PAF faced a considerable challenge: how to translate these design concepts into a financial contract or security that would minimize transaction costs and the time required for development time without jeopardizing tradability and overall ease of use.

After considering a variety of mechanisms, the PAF ultimately settled on the use of World Bank-issued zero-coupon bonds termed PAFERs. Winners of the auction purchase PAFERs at the cost of a put option premium (also known as the issue price), which the PAF fixed and announced in advance of the first auction. As a zero-coupon bond, PAFERs do not pay holders any interest; unlike other zero-coupon bonds, however, PAFERs do not pay holders a traditional principal amount at maturity. Rather, upon delivering qualifying emission reductions, bond holders receive a redemption payment

The PAF ultimately settled on the zero-coupon bond structure in order to leverage existing World Bank bond infrastructure.

equivalent to the strike price multiplied by the quantity of emission reductions delivered. For the first PAF auction, the strike price was determined by the auction itself (see "Auction Format" section for more information). As with other World Bank bonds, the PAFERs are tradable, allowing owners to easily sell and purchase the bonds through a custodian bank.

The PAF considered alternate delivery mechanisms, namely the sale of put option contracts directly to auction winners, but ultimately settled on the zero-coupon bond structure in order to leverage existing World Bank bond infrastructure. Selling put options without the bond instrument would have required the World Bank to develop option contracts, involving significant time and coordination. In addition, the World Bank would have needed to develop the platform for sales, trading, and redemption, introducing additional risks and costs that were too burdensome given the size of the auctions in the PAF's piloting phase.

Having settled on the zero-coupon bond structure, the World Bank, in collaboration with the PAF Contributors, worked to establish the precise mechanics, including legal, financial, capital market, and auction elements. The World Bank worked with a law firm, Linklaters, to develop the legal language required

to finalize the bond terms,⁶ a set of five legal documents for each of the five bond maturities. The bond terms establish the process requirements for redemption, including the timeline for verification and delivery of emission reductions, the eligibility criteria for emission reductions, and the environmental, health, and safety requirements.

ISSUANCE OF PAFERs

Following the first auction, successful bidders were obliged to purchase PAFERs at the issue price. The premium in the first auction was set at \$0.30 per Certified Emission Reduction (CER).⁷ With winning quantities ranging from 100,000 CERs to 2 million CERs, bidders paid anywhere from \$30,000 to \$600,000 for the PAFERs. In order to receive and hold the PAFERs, successful bidders were required to establish a custodian account and make their full payment for the PAFERs before the issuance date of the PAFERs. For bidders in both developing and developed countries, the fees associated with opening custodian accounts in their local banks proved high. In response, the World Bank leveraged existing relationships with BNP Paribas and Citibank, which worked with winners to establish custodian accounts.

The process of establishing custodian accounts proved to be lengthy, due in part to the banks' comprehensive know

6 The World Bank, List of Select Recent Bonds, available at: http://treasury.worldbank.org/cmd/htm/World_Bank_Bond_Issuances.html

7 See "What's In and What's Out: Developing the Eligibility Criteria" for more information on the selection of CERs as the eligible credit type.

8 World Bank Issues First Pilot Auction Facility Emission Reductions Notes, Press Release (Oct. 7, 2015), available at: <http://treasury.worldbank.org/cmd/htm/World-Bank-Issues-First-Pilot-Auction-Facility-Emission-Reductions-Notes.html>

The premium in the first auction was set at

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per Certified Emission Reduction (CER).

Winning quantities ranged from

100,000 to 2M CERs.

Bidders paid \$30-\$600K for the PAFERNs.

The PAF facilitated communication between the winning bidders and the banks, ensuring that the winners knew what requirements to meet and by when. It would be safe to assume that other mechanisms for delivering the put options would require similarly substantial time and cost investments.

Insight: In the first auction, the PAF successfully established a relatively inexpensive and accessible option delivery mechanism using a World Bank bond. From the perspective of the PAF, there are few, if any, mechanisms that would make for a more efficient process. For those seeking to scale up the PAF model, however, alternative approaches to realizing the put option should be considered based on individual circumstances and the relevant sponsor or implementing agency.

Insight: Those seeking to replicate or scale the PAF should consider the cost for the auction winners to open and maintain custodian accounts, especially if small and medium sized firms join the auction. The fee that the winners paid to establish custodian accounts represents a fraction of the benefit to be received upon redemption of the put options. Still, unlike large multinationals, smaller and medium sized enterprises are unlikely to have pre-existing custodian accounts, so they may incur an additional cost to participate in the auction. Replicating entities may therefore consider using intermediaries to aggregate these smaller project owners. Moving forward, the PAF or replicating entities should review the cost of custodian accounts and attempt to facilitate partnership opportunities to provide long-term benefits for the custodians and the auction winners.

your customer (KYC) requirements. Once all custodian accounts were established and full payments received, the World Bank issued the PAFERNs on October, 7 2015.⁸

Recommendation: If using a zero-coupon bond as a method for delivering the put option, allow

sufficient time for auction winners to establish custodian accounts, especially if these winners are not regular capital market investors with pre-existing custodian relationships. In the first PAF auction, winning bidders took several weeks to provide the documentation needed for the custodian banks' KYC processes.

GOING, GOING, GONE: Designing the Auction

AUCTION MANAGER

In addition to developing the option delivery mechanism, the PAF sought to establish an auction platform for determining who would receive the options and at what price. The World Bank worked with a firm specializing in auction services and web-based auction software to design an auction for this type of contract. The auction design reflected several PAF objectives, including efficiency, competition, and accessibility. This firm also advised the World Bank to adopt a live online platform, through which participants would submit simultaneous bids.^{9, 10, 11}

To guide the development of this platform, the PAF ran a procurement process according to World Bank processes. The PAF, in September 2014, launched a notice of interest for an auction manager to deliver an online auction platform and to administer the auction. After releasing a request for proposals in December, and subsequently receiving submissions from a number of qualified and experienced firms, the PAF ultimately selected NERA Economic Consulting to serve as the auction manager.

Through an onboarding process, the PAF worked with NERA to divide responsibilities and liabilities. While NERA was responsible for guiding the auction design and delivering the online platform, the PAF retained the legal liability associated with potential bidders. This division of labor provided the PAF with the ultimate decision-making authority.

Whereas many online auctions involve both an auction manager and an auction monitor, the PAF did not find that the monitor role was required. In larger and more complex auctions, monitors provide neutral, third-party oversight of auction activities, ensuring



that the auction manager does not intentionally or unintentionally favor any auction participants. Given the current scale, the pilot nature of the PAF, and that neither the World Bank nor NERA had an interest in manipulating the auction outcome, the PAF chose not to hire a monitor.

Recommendation: There should be a clear delineation of responsibilities of the auction manager (in this case NERA) versus the administrator (in this case the World Bank). In particular, the specific roles to be assumed by the auction manager (e.g., the drafting of the bidding rules and other legal documentation) should be clarified.

Insight: Use a robust international competition process to select the auction manager. There are a number of experienced firms that specialize in the design and execution of online auctions. While no firm had direct

experience in auctioning put options for emission reductions, several firms had significant experience in related industries and sectors such as renewable energy generation, solar certificates, and carbon allowances. Those seeking to replicate or scale the PAF should have confidence that specialists are available to ensure a successful auction process and outcome.

AUCTION FORMAT

Given the objectives of the PAF and its decision to run a live online auction, the PAF faced a series of design choices. The PAF first needed to choose between a single versus multiple-round auction. In a single round auction, bidders submit one concealed bid. In a multiple-round auction, bidders participate in a series of rounds during which they submit bids relaying the quantity demanded

9 Power Auctions, "Pilot Auction Facility for Methane and Climate Change Mitigation: Auction Design": <http://www.pilotauctionfacility.org/sites/paf/files/Blueprint%20for%20Operational%20Structure.pdf>

10 Power Auctions, "Pilot Auction Facility for Methane and Climate Change Mitigation: Relevant Auction Theory": <http://www.pilotauctionfacility.org/sites/paf/files/Review%20of%20Relevant%20Auction%20Theory.pdf>

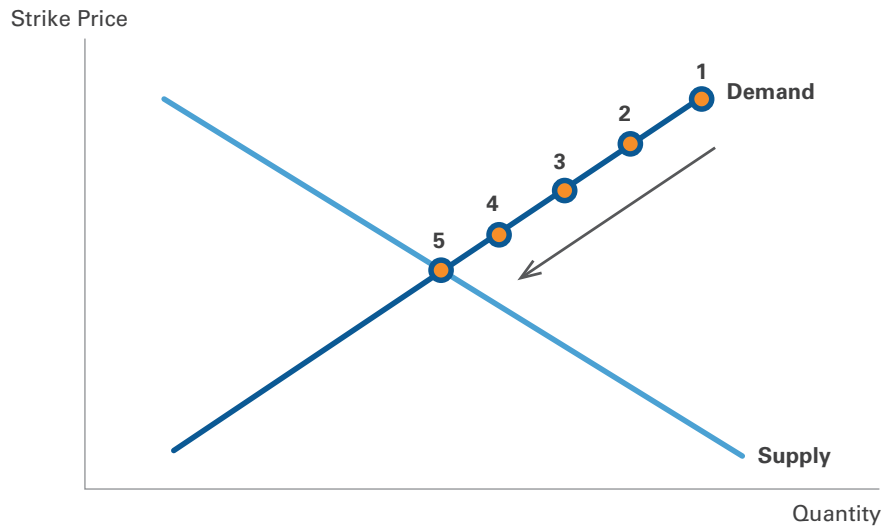
11 Power Auctions, "Pilot Auction Facility for Methane and Climate Change Mitigation: Relevant Environmental Auctions": <http://www.pilotauctionfacility.org/sites/paf/files/Review%20of%20Environmental%20Auctions.pdf>

for a given price level. At the end of each round, the auction manager reveals the aggregate demand at that price. The auction manager then announces a new price for the next round, and this process continues until demand no longer exceeds supply. The PAF determined that a form of multiple round auction, known as a clock auction, best served its objectives of efficiency and competition.

Having selected the multiple-round clock format, the PAF evaluated the pros and cons of reverse versus forward auctions. In a reverse auction, the PAF would fix the premium (or the issue price), and bidders would then bid down the strike price (or the guaranteed payment per emission reduction at redemption). In a forward auction, the PAF would set the strike price in advance, and bidders would bid up the premium. In theory, these auctions produce identical economic results. However, in practice, these formats may present tradeoffs: a forward auction may increase the likelihood of contracting with parties that can realize the emission reductions and may also lead to a more active secondary market; the reverse auction, however, may allocate more volume and may increase the number of smaller and less capitalized firms that participate. After evaluating these tradeoffs, the PAF decided to run a multiple-round, descending clock auction for the first auction.

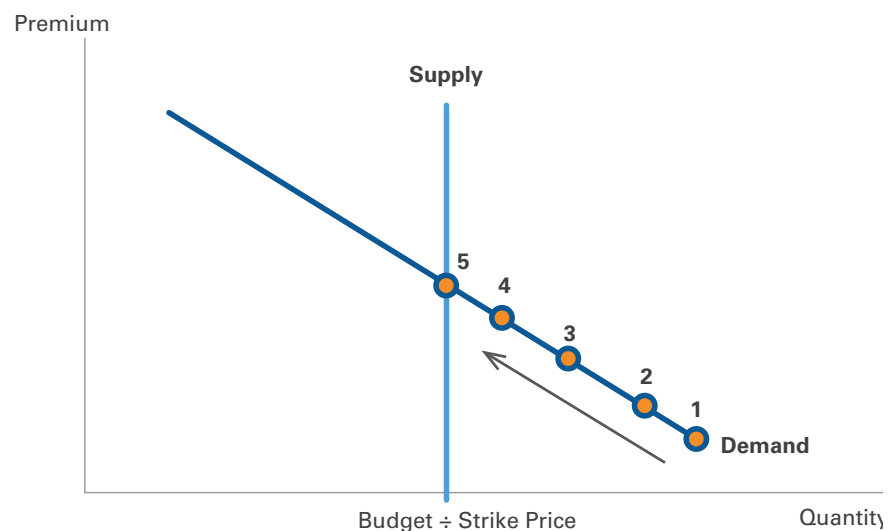
Another format decision was that of running a single as opposed to a multiple product auction. In a multiple product auction, the PAF could have auctioned multiple types of put options, for example, some that are only valid in a sub-set of countries, or some that are only valid for a certain sub-sector. The PAF also could have introduced a “pay-as-bid” rule where the put options were sold at different strike prices. In the interest of simplicity, the PAF decided to run a single product uniform price auction.

Figure 2: Reverse Auction



In the PAF context, a reverse or descending clock auction fixes the premium, and bidders bid down the strike price, in this example moving from point 1 to point 5. Demand decreases as the strike price decreases. Supply (which is equal to the budget divided by the strike price) increases as the strike price decreases. The auction clears when demand meets supply at point 5.

Figure 3: Forward Auction



In the PAF context, a forward or ascending clock auction fixes the strike price and bidders bid up the premium, in this example moving from point 1 to point 5. Demand decreases as the premium increases. Supply (which is equal to the budget divided by the strike price) is constant. The auction clears when demand meets supply at point 5.

Proxy Bidding

Having selected the multiple-round descending clock format and having determined that the auction would occur online, the PAF faced another set of decisions relating to how bidders participate in the auction. The first was whether to include proxy bidding. In an auction with proxy bidding, bidders can instruct the auction software to place a bid on their behalf as long as the round's price for the put option does not fall below the bidder's minimum price. The benefit of proxy bidding is that a bidder does not need to actively participate in the online auction, a feature that may prove especially appealing to bidders in distant time zones.

Given the geographical diversity of the potential bidders, the PAF decided to include proxy bidding in the auction platform. Somewhat surprisingly, however, proxy bidding was little used, and those who placed proxy bids did not appear to be constrained by their local time zone. Notably, none of the proxy bidders were winners in this first auction.

Exit Payments

Due to the format of the auction—a descending clock auction with a fixed budget—the auction manager recommended that bidders submit exit payments. In a reverse auction, bidders either retain or decrease their demand as the strike price decreases. In the PAF auction, if a bidder chose to withdraw a portion or all of its demand for the put options in a given round, it had to provide an exit payment or the lowest price it was willing to accept for the withdrawn quantity. For example, if a bidder demands put options that can be redeemed with 750,000 CERs at a round's price of \$4.50/CER but only 500,000 CERs at the next round's price of \$3.75/CER, the exit payment indicates the lowest price between \$4.50 and \$3.76 that the bidder would



accept for the 250,000 withdrawn CERs. In the final round of the auction, when demand falls below supply, the auction manager uses exit payments to determine the clearing price, thus maximizing the efficiency of the reverse auction.¹²

Recommendation: Those seeking to replicate or scale the PAF should consider a variety of auction formats. In subsequent auctions, the PAF will consider running a forward auction to gain insight on the pros and cons of these various formats.

Consideration: Depending on the size of the auction and the number of expected bidders, consider de-emphasizing proxy bidding. Through bidder training, the PAF and the auction manager ensured that bidders understood how to participate as both a live bidder and a proxy bidder. However, on the auction day, few

bidders elected the latter. For those seeking to replicate or scale the PAF, training may be better focused on live bidding.

Consideration: In a scaled-up version of the PAF, bidders may want to submit proxy bids for emission reductions generated by more than one project. So, a bidder may be willing to accept different strike prices for different quantities of emission reductions. In this case, the PAF or replicating entity should consider allowing the submission of multiple proxy bids by one bidder.

Consideration: Allow bidders to withdraw units at multiple exit prices.¹³ This has the possibility to increase the efficiency of the auction, but may also cause confusion among bidders, particularly small participants, and could also introduce several training challenges.

¹² See "Bidding Rules for the Pilot Auction Facility for Methane and Climate Change Mitigation," available at: http://www.pilotauctionfacility.org/sites/paf/files/PAF%20Bidder%20Rules_WORD%20VERSION.pdf

¹³ For more information see "Pilot Auction Facility for Methane and Climate Change Mitigation: Auction Design," Appendix 3: Intra-Round Bidding, available at: <http://www.pilotauctionfacility.org/sites/paf/files/Blueprint%20for%20Operational%20Structure.pdf>

Insight: The PAF succeeded in attracting live bidders across a range of time zones, and perhaps even overestimated the barrier posed by this geographic diversity. While the auction occurred at an inconvenient time of day for some, the start time did not stop East Asian participants from bidding late at night, or bidders in the Western Hemisphere from waking early.

AUCTION PARTICIPANTS

The first auction of the PAF targeted private sector investors and methane project implementers, although any institution type was eligible to participate. As a result, the auction hosted 28 bidders, ranging from large multinationals to small project developers. The PAF did not restrict the participation of consultants, affiliates, or aggregators, although the PAF or those seeking to replicate the PAF may consider participation guidelines to target specific types of institutions in future auctions.

Recommendation: For the first auction, it may be best not to restrict participation by organization type. By allowing a diversity of institutions to participate, the PAF was able to attract a sizeable pool of bidders, thus ensuring competition and efficiency.

Consideration: Review the role that aggregators could play in representing small project owners. The cost of applying and participating in an auction may outweigh the benefits for owners of small projects. Likewise, those running the training and handling the deposits may spend a disproportionate time working with small project owners, who in the end account for a small fraction of the auctioned supply. From the perspective of the PAF, the first auction revealed a clear tradeoff between inclusion and efficiency. Replicating entities may consider promoting or encouraging additional aggregators that would apply, register, and bid

on behalf of several small project owners, thus reducing administrative barriers for both bidders and those managing the auction. If encouraging the participation of aggregators, replicating entities may also consider additional auction rules in the interest of preventing collusion or monopolization.

AUCTION PARAMETERS

The auction parameters include the auction budget, the bid unit, the premium or bid unit price, the first round’s strike price, the maximum and minimum bid units, the bid deposit, and the decrement. The parameters below were developed for the first auction of the PAF, but should be subject to change in any replicated or scaled-up context.

For the first auction, the budget was set according to the PAF’s total resources in early 2015 (\$53 million) as well as its capitalization target (\$100 million). Participants submitted bids in terms of bid units, which in the first auction were defined as 10,000 CERs. Each bid unit comprises five lots of 2,000 homogeneous CERs. Thus for each bid unit won, the auction winner purchased five PAFERNs with consecutive annual maturity dates (Figure 5).

The PAF chose \$0.30 per CER as the issue price or premium, and \$8 per CER as the strike price in the first round. In setting the premium, the PAF chose a value high enough to attract committed bidders but low enough to ensure the participation of smaller or less capitalized firms. The strike price in

Figure 4: Auction Parameters for the First Auction

Auction Budget	U.S. \$25 million
Bid Unit	10,000 CERs
Issue price or premium	\$0.30 per CER
Strike price in round 1	\$8 per CER
Supply in round 1	3,120,000 CERs
Maximum bid	200 bid units (2 million CERs)
Minimum bid	10 bid units (100,000 CERs)
Bid deposit	\$.06 per CER
Maximum bid deposit	\$120,000
Minimum bid deposit	\$6,000
Decrement	Between 5% and 12.5% of the prior going payment

Figure 5: Bid Units for the First Auction of the PAF



the first round of \$8 per CER was set to attract the highest number of potential bidders while also minimizing the auction duration.

Maximum and minimum bids

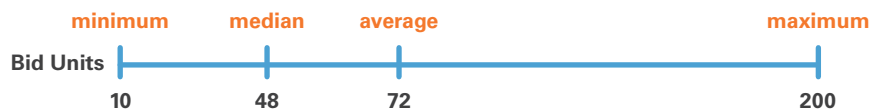
The maximum and minimum bids reflected multiple objectives of the PAF in the first auction. By establishing a maximum bid, the PAF facilitated a competitive environment: one in which a single bidder could not win all put options. By setting a minimum bid, the PAF mitigated the administrative costs associated with bidders interested in only a small quantity of options. The graph below shows the number of bid units won by the twelve winning bidders.

With a low of 10, high of 200, average of 72, and median of 48, bidders demanded the full range of bid units at the clearing price of \$2.40/ton. Again, this range reflects several objectives of the first auction, primarily the goal of attracting a range of participants.

Bid deposits

In the weeks approaching the auction, applicants submitted refundable bid deposits corresponding to their anticipated demand in the opening round. The deposit was \$0.06 per CER, so, if a bidder planned to bid for put options redeemable for 500,000 CERs in the opening round, it would deposit \$30,000. The minimum bid deposit was \$6,000 (corresponding to a minimum bid of 100,000 CERs or 10 bid units) and the maximum was \$120,000 (corresponding to a maximum bid of 2 million CERs). Applicants submitted deposits to a non-interest bearing escrow account. For auction winners, bid deposits were applied to the premium of \$0.30 per CER.¹⁴ For losing

Figure 6: First Auction Results – Bid Units



bidders, all bid deposits were refunded within two days of the auction.

Consideration: Decrease the starting price in the first round. The first auction of the PAF opened with a strike price of \$8 per CER, corresponding to a supply of 3.12 million CERs. This payment generated a demand of over 20 million CERs, suggesting that the strike price could have started lower in the opening round. At the same time, the high starting price likely played a role in attracting a high number of bidders, ultimately increasing the competitiveness of the auction. Depending on the available information (e.g., market data or accounts of prior auctions), those seeking to replicate the PAF may consider setting the opening strike price closer to the expected closing price.

Consideration: Allow bidders to submit letters of credit in place of, or in addition to, cash deposits. If the PAF or other entities pursue this option, they should be aware that processing letters of credit may add an additional layer of complexity.

Insight: In its first auction, the PAF established the minimum and maximum bid units in order to 1) stimulate competition, and 2) provide space for small project owners. The PAF was ultimately successful in reaching these goals, and those seeking to replicate or scale the PAF

should similarly ensure that the bid units reflect the auction's objectives.

Insight: Those seeking to replicate or scale the PAF may consider requiring a larger bid deposit or a non-refundable participation fee. The former would encourage the most committed bidders to participate, and the latter would help cover the administrative costs of the auction. In a post-survey auction to auction participants, the PAF asked whether a larger bid deposit or a participation fee would discourage participation in future auctions. Overall, respondents stated that they would be much less likely to participate if there were a non-refundable participation fee. While a larger bid deposit might discourage some participants, other survey respondents stated that they would be unaffected by this increase.

Insight: Some firms found the first auction too costly (even with no participation fee and a minimal deposit requirement). One survey respondent stated that "project owners who were able to bid did not seem to have cash flow issues." Those seeking to replicate or scale the PAF should be aware that increasing barriers to entry may exclude small, poorly capitalized firms. Should this be an unwanted effect, this barrier could be overcome by attracting aggregators or intermediaries so that small project owners do not need to bid directly but can still benefit.

¹⁴ While all winners owed the same premium per CER, some placed higher bid deposits than others. Therefore, the premium owed at the end of the auction depended on the ratio between initial eligibility and volume won. For bidders who won precisely one fifth of their initial eligibility, the deposit was equal to the premium (\$0.06 is one fifth of \$0.30). The majority of bidders won greater than one fifth of their initial eligibility, meaning they owed between \$0.01 per CER to \$0.24 per CER. In the first auction, one bidder won less than one fifth of its initial eligibility, so its deposit was actually greater than the premium owed; in this case, the PAF refunded the difference and then sold the bidder the put options.

What’s In and What’s Out: Developing the Eligibility Criteria

In order for an auction winner to redeem the put options issued by the PAF, underlying projects must meet a set of requirements for how, where, and when emission reductions took place. The PAF refers to these requirements as the eligibility criteria. In the first auction, the PAF translated the auction’s objectives into a set of eligibility criteria which specify the credit type, the project type, the country in which the emission reduction took place, and the generation and issuance period.¹⁵

ELIGIBLE CREDITS AND METHODOLOGIES

Eligibility Rule

In the first auction, only emissions that qualified as Certified Emission Reductions under the Clean Development Mechanism (CDM) were eligible. The CDM was established under the Kyoto Protocol and allows developed countries to purchase credits from mitigation activities located in developing countries, to comply with national mitigation limits. Emission reductions in developing countries occur across a range of sectors, although for the purposes of the first auction, the PAF focused on three sectors that reduce or avoid methane emissions: solid waste, wastewater, and agricultural waste.

The PAF website provided the list of corresponding eligible CDM methodologies, which refer to the project requirements and formulas that determine emission reductions from specific sources. Projects using a combination of methodologies were also eligible, as long as one methodology could be found on the list. Finally, eligible CERs could not be subject to an existing purchase agreement contract with a third party (i.e., projects had to be

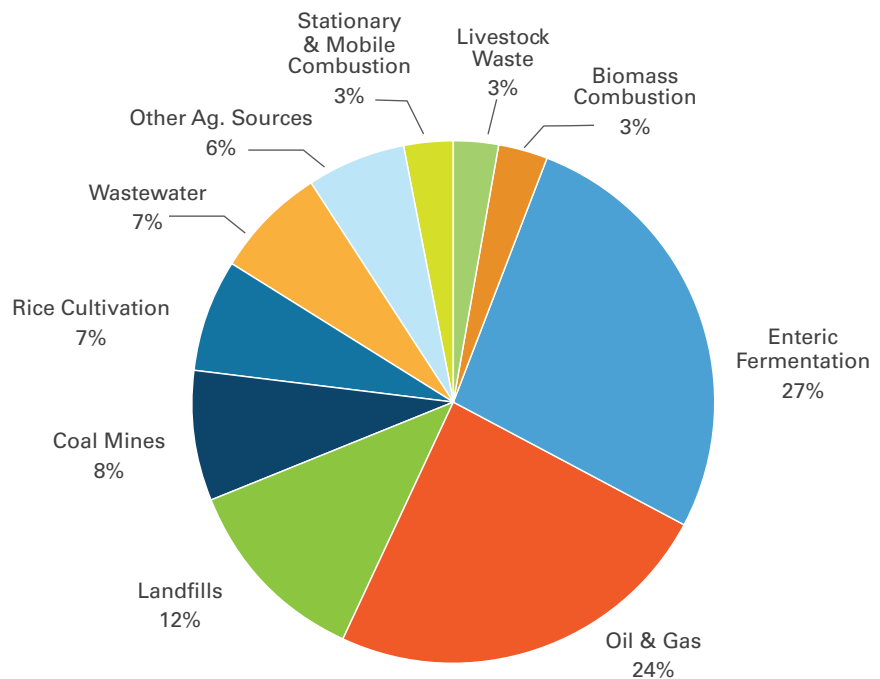


Figure 7: Global Anthropogenic Methane Emissions by Sector, 2015¹⁶

unencumbered); this requirement precluded projects from terminating existing contracts to get a potentially higher price from the PAF.

Developing the Criteria

In developing the eligibility criteria for credits and methodologies, the PAF sought to maximize emission reductions by including a diversity of sectors. At the same time, each additional sector introduced a range of costs, including the cost of developing sector-specific environmental, health, and safety standards.

The PAF selected the CDM as the sole eligible standard for its first auction because it had the largest pipeline and a thoroughly tested monitoring, reporting, and verification (MRV) scheme. As for methodologies, the PAF initially considered a comprehensive list of sectors provided by the Methane Finance Study Group Report.¹⁷ From this list, the PAF sought to include sectors with strong development co-benefits (e.g., providing clean energy or supplying fuel for cooking). The PAF also considered reputational risks associated with each sector and

15 First Auction Eligibility Criteria: <http://www.pilotauctionfacility.org/sites/paf/files/pictures/Auction%20one%20Eligibility%20Criteria.pdf>

16 U.S. EPA 2012. Summary Report: Global Anthropogenic Non-CO2 Greenhouse Gas Emissions: 1990-2030.

17 See Appendix 3 of the Report, available at: http://www-wds.worldbank.org/external/default/WDSContentServer/WDS/IB/2013/08/16/000356161_20130816155413/Rendered/PDF/799830WP0REPLA0x0379797BB00PUBLIC0.pdf

conducted research to confirm the existence of a sufficient pipeline to participate in an auction.

The World Bank engaged Kommunalkredit Public Consulting GmbH (KPC), as an independent third party verification agent, to determine at the point of redemption whether the CERs meet the eligibility criteria. The World Bank contracted KPC in order to resolve the potential perception of a conflict of interest between the World Bank as the administrator of the PAF and the World Bank as the issuer of the PAFERNs: the holders of the put options only receive payment if they can deliver eligible emission reductions. Having an independent verifier in the structure ensures that all decisions surrounding eligibility remain unbiased.

Recommendation: Those seeking to scale or replicate the PAF should take the following steps to determine the eligibility criteria for credit type and methodologies:

1. Develop the program and/or auction objectives.
2. Identify the sectors that correspond to these objectives.
3. Identify the tools for determining emission reductions that correspond to these sectors.
4. Consider the political, reputational, or other risks associated with these sectors.
5. Conduct research to ensure that there is sufficient interest and demand for the selected sectors for a competitive auction to take place.

Recommendation: Leverage existing MRV systems to the extent possible. In the first auction, the PAF successfully designed and communicated the eligibility criteria by working within an existing MRV system. The PAF saved considerable time by adopting CDM rules and procedures.

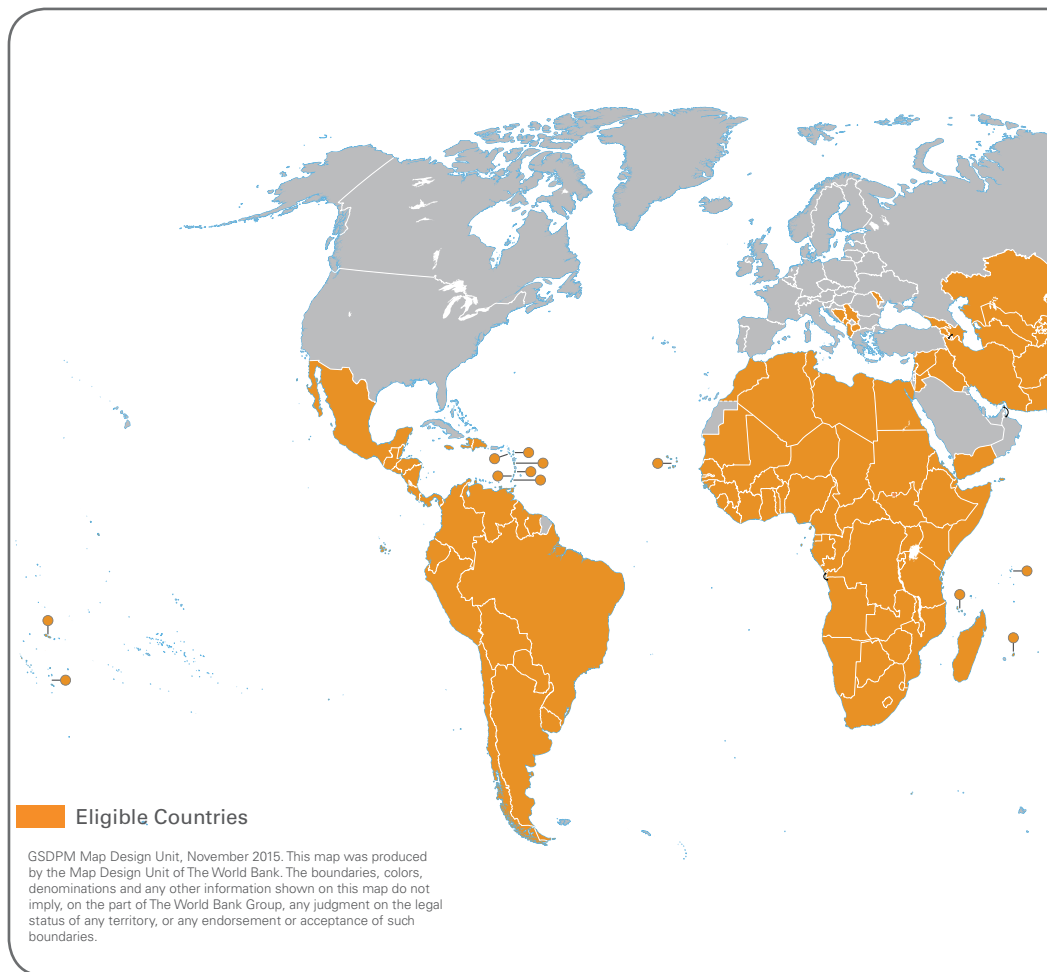


Figure 8: Map of Eligible Countries

Insight: The clarity of the eligibility criteria may have been one key to the PAF's success in the first auction. By working within existing standards and MRV processes, the PAF was able to eliminate any room for interpretation, ensuring that both PAFERN issuers and PAFERN holders understood the requirements for redemption. Those seeking to replicate the PAF in other areas of climate or development finance should invest heavily in the upfront development of eligibility criteria and identify the most relevant MRV system to reflect their program and auction objectives.

ELIGIBLE COUNTRIES

Eligibility Rule

In order to qualify for the redemption of put options, emission reductions must occur within a list of countries specified by the PAF; similar to the eligibility criteria for credits and methodologies, the country eligibility criteria applied only to the first auction and can be revised in PAF future auctions. If a project reduces emissions in multiple countries, all countries



must be included on the first auction eligibility list. For the first auction, eligible countries must have satisfied the following requirements at the time of the eligibility criteria establishment: 1) the country must be a non-Annex I country under the Kyoto Protocol (i.e., it must be eligible for the CDM), 2) the country must be a World Bank member, 3) the country must not be an OECD-DAC member, and 4) the country must not be developing an offset program.



Developing the Criteria

The PAF developed the country eligibility criteria beginning with the most inclusive list of CDM-eligible countries. The PAF then narrowed this list according to the PAF objectives. For example, the PAF's desire to avoid double counting meant that countries with pre-existing or planned emission reduction schemes were not eligible.

GENERATION AND ISSUANCE

Eligibility Rule

To redeem a put option, emission reductions must be generated and issued within a specified time frame that varies according to the maturity date of the option. In the figure below, "monitoring period" refers to the period over which the CERs must be generated, and "issuance dates" refers to the period during which the CDM issues the reductions.

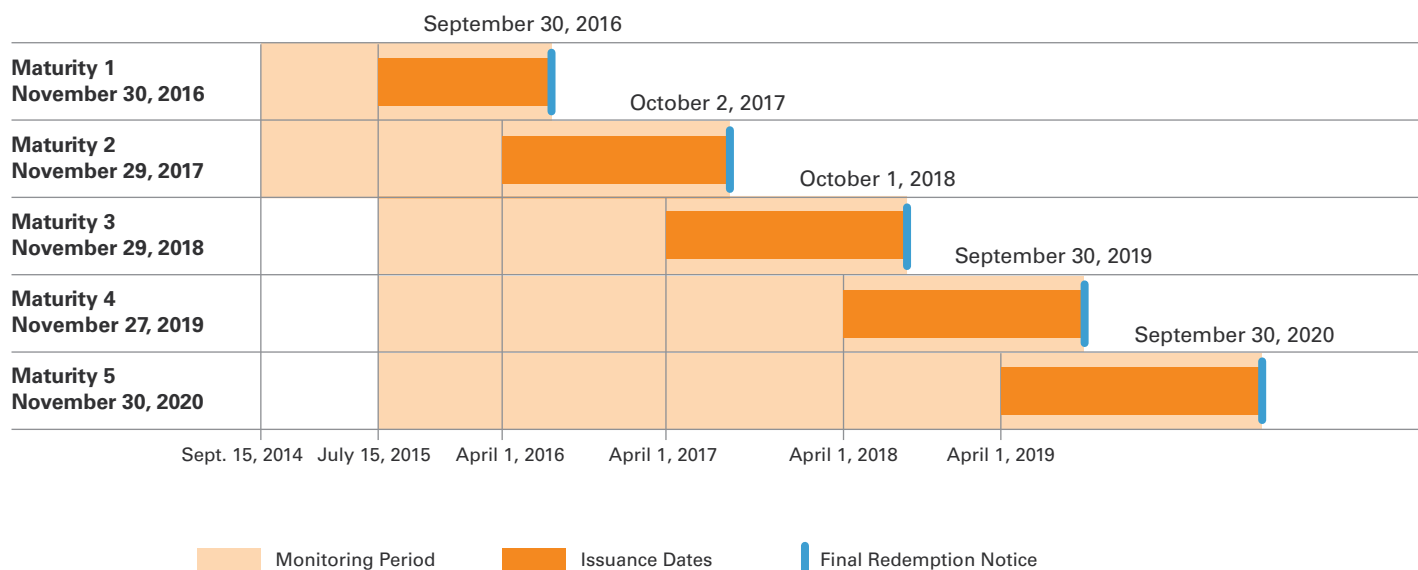
The dates below the bars represent the beginning of the monitoring

period, whereas those above the bars represent the end of both the monitoring and issuance periods, as well as the date by which option holders must submit their intention to redeem the option (the redemption notice). So, for example, an option with maturity one must generate emission reductions between the dates September 15, 2014 and September 30, 2016; it must issue credits between the dates July 15, 2015 and September 30, 2016; and if the option holder wishes to redeem the option, the notice of redemption must be received by September 30, 2016.

In developing the criteria for generation and issuance periods, the PAF wanted to ensure that credits issued prior to the auction did not qualify as eligible emission reductions. At the same time, the PAF recognized that CDM processes can take some time, and wanted to provide a sufficient period for projects to issue credits. The timeline above balances these two objectives.

Insight: In order to redeem a put option, the option holder must demonstrate that CERs occurred no earlier than September 14, 2014 for maturities one and two and July 15, 2015 for maturities three, four, and five. Project implementers with projects generating credits prior to these dates must therefore request a cut-off from a previous monitoring period ending on September 13, 2014 or July 14, 2015 (depending on the maturity), and the PAF will only accept credits documented in the monitoring period from then onwards. While these rules may be specific to the CDM, those seeking to replicate or scale the PAF by using a similar MRV scheme should know that reporting periods can depend on the type of project being targeted. In the first auction, many projects (and particularly large-scale projects) had continuous monitoring, meaning they were easily able to meet the PAF criteria. In addition, auditors are generally able to conduct verification for more than one monitoring report at a reasonable cost.

Figure 9: Monitoring and Issuance Periods for Five Maturities



If We Build It, They Will Come: Attracting Bidders

OUTREACH TO POTENTIAL BIDDERS

One of the key risks facing the PAF was the potential for low turnout in the application process. To mitigate this possibility, the PAF aggressively marketed the auction opportunity through in-person events, webinars, and direct email outreach. As seen in the figure to the right, the PAF conducted in-person events in Bangkok, New Delhi, São Paulo, and Bogotá due to the high number of methane mitigation projects in the countries and regions surrounding these cities. These events occurred from January through March 2015, months before the auction date. The PAF also ran numerous outreach webinars, including one with the International Solid Waste Association and one with Pakistani firms, organized by the Pakistani Designated National Authority of the CDM. As the auction approached, the PAF conducted webinars on the eligibility criteria, the legal terms, and the bidder application.

Figure 10: Schedule of Webinars and In-Person Presentations

- Bangkok – January 29, 2015
- New Delhi – February 2, 2015
- São Paulo – March 17, 2015
- Bogotá – March 19, 2015
- Pakistan – March 18, 2015
- Washington, D.C. – March 31, 2015
- Washington, D.C. – April 8, 2015
- Washington, D.C. – May 21, 2015
- Barcelona – May 28, 2015
- Washington, D.C. – June 10, 2015

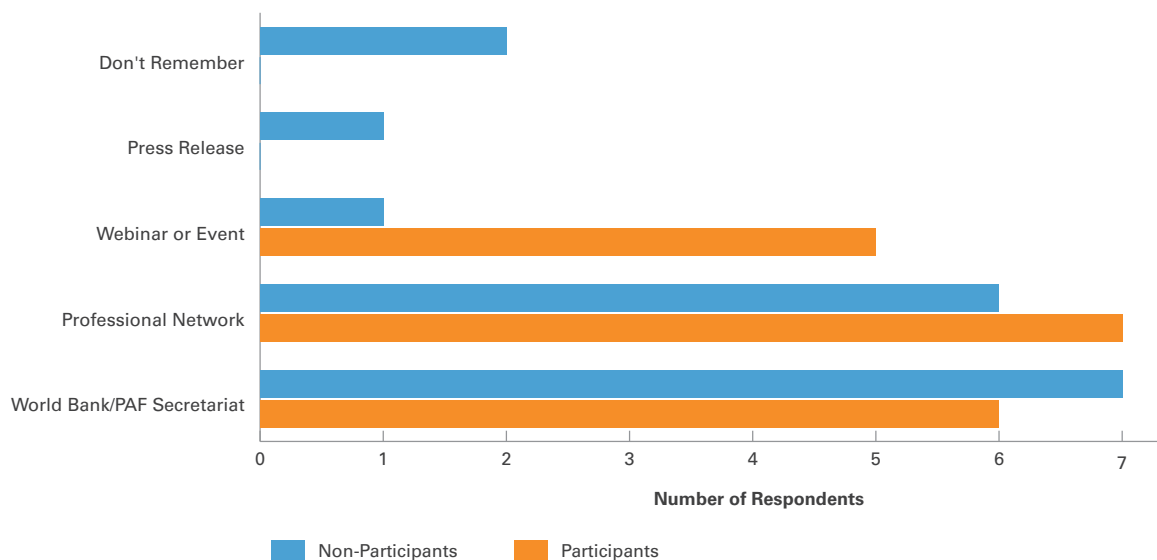
Complementing the in-person events and webinars, the PAF developed an email database using public sources of 1,200 project owners, investors, and other potentially interested stakeholders. Over the course of the outreach phase, a total of 500 individuals representing private firms,

governments, NGOs, and foundations attended events or independently expressed interest in the PAF.

Recommendation: Conduct additional webinars closer to the auction date, as many bidders only became interested in these webinars once the auction date was fixed. Those seeking to replicate or scale the PAF should also consider hosting in-person events and webinars on the eligibility criteria, redemption, and legal terms—particularly for auction newcomers.

Insight: In-person events and webinars were highly effective at attracting auction applicants. The post-auction survey revealed that auction participants were much more likely than non-participants to have attended an event or webinar. Both participants and non-participants were likely to learn about the PAF from their professional network or directly from the PAF.

Figure 11: Responses to the survey question “How did you learn about the PAF?”



WEBSITE AND COMMUNICATIONS

In the fall of 2014, the PAF launched www.pilotauctionfacility.org, a website hosting information on the PAF and the first auction. The website was continuously updated, for example with the eligibility criteria in March 2015 and with the final auction parameters in May 2015. The website also hosted a bidders' Q&A, which, as of the auction date, contained 109 questions and answers relating to eligible emission reductions, auction mechanics, redemption, bond structure, and the auction timeline. As of October 2015, the PAF had been viewed 35,000 times, with the most popular pages being the home page (9,000), the about page (3,300), the auctions page (2,300), and the eligibility criteria (1,900).

The PAF website also hosted two short videos, one providing an introduction to the PAF and one describing how the PAF uses auctions to determine the price of put options.

Recommendation: Ensure that the website is able to collect as well as share content by 1) including a

subscription link so that bidders can more easily join the mailing list, and 2) developing an online application or fillable form. The PAF website provided a critical resource for auction participants, and in a post-auction survey, most rated the website as either "excellent" or "good." These minor additions could make the website an even more user-friendly resource for auction participants.

Recommendation: To improve accessibility of the bidders' Q&A, update and/or revise questions received by bidders rather than posting all questions on the website. Those seeking to design a similar Q&A section might also make this page searchable by keyword.

Recommendation: Formalize the auction date announcement and other important milestones in order to attract media attention. In the first auction, the PAF engaged the media during the announcement of the eligibility criteria and the announcement of the auction date. Those seeking to replicate and scale the PAF should formalize these announcements in order to maximize outreach.

Consideration: Entities seeking to replicate or scale the PAF might consider translating training materials into other languages. The first auction of the PAF took place in English, but a significantly scaled-up version might consider incorporating additional languages.

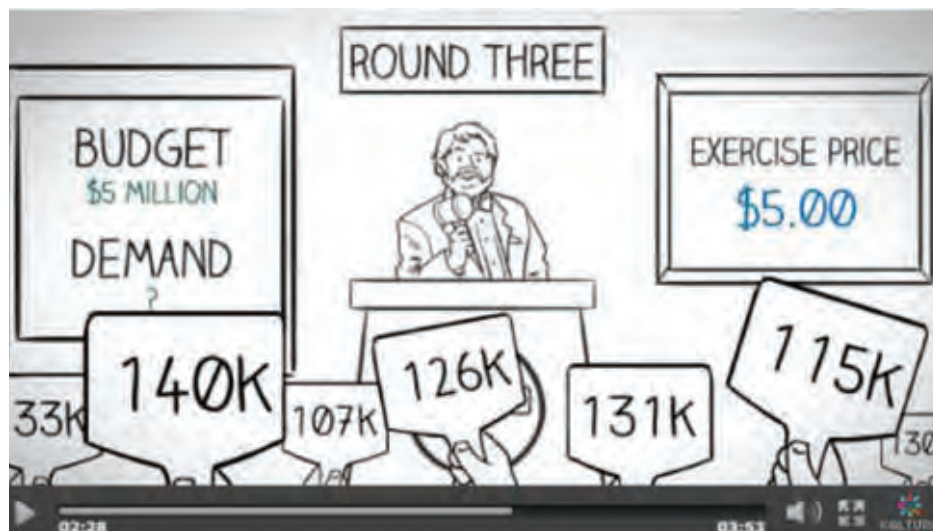
Insight: While the videos were very effective for in-person or webinar presentations, they were not a primary learning tool for those visiting the website. This may be because the videos provided a fairly basic introduction to the PAF, whereas many visiting the website were seeking more detailed information. Those seeking to replicate or scale the PAF should consider their audience when developing similar materials.

TRAINING

In addition to the webinars, the bidders' Q&A, and other documentation on the PAF website, the PAF provided training in the form of a mock auction two weeks prior to the auction date. Through this trial auction, which nearly all bidders attended, potential bidders familiarized themselves with the auction software, and placed bids in a series of rounds as they would on the auction date. Before the mock auction, the auction manager also provided a user manual to potential bidders.

Recommendation: Strongly encourage participation in the webinars and a mock auction. While participants encountered several issues in the mock auction, bidding on the auction day was seamless, suggesting that the mock auction provided a critical training tool. According to the auction manager, the timing of the mock auction was also important; by holding the mock auction soon after the application deadline and at least one week prior to the auction date, the PAF was able to provide last-minute

Figure 12: Screenshot from the video "Introduction to the PAF"



training and keep the bidders engaged in the days leading to the auction.

Consideration: Consider hosting separate mock auctions for proxy and live bidders, given the different online processes, and allow potential bidders interested in testing both methods to participate in both mock auctions.

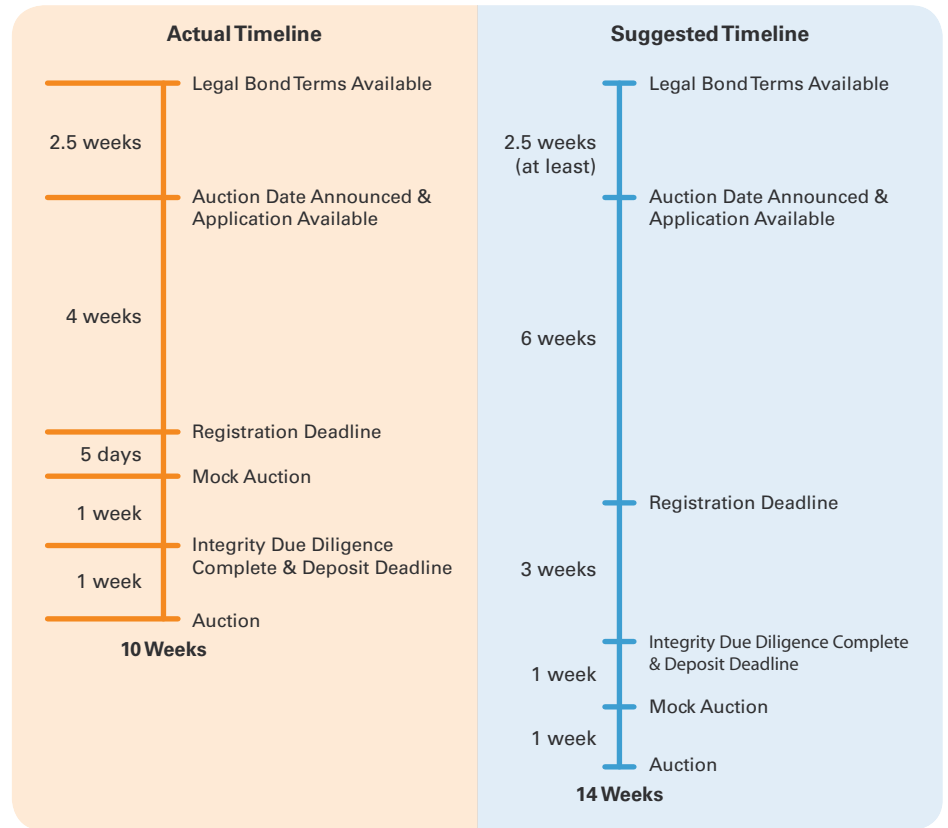
Insight: Potential bidders demonstrated a range of knowledge regarding the PAF and the auction process, and this divide persisted through the auction date. Those seeking to scale or replicate the PAF should ensure that training materials (e.g., webinars, videos, and a mock auction) are widely utilized. Replicating entities may also consider working with aggregators for small-project owners in order to close the knowledge gaps.

APPLICATION PROCESS

Potential bidders faced several milestones in the application process, beginning with the announcement of the eligibility criteria in late March 2015. In early May 2015, the PAF released the draft PAFERN documentation that explained the rules for payment. At the end of May, the PAF announced the auction date and released the application, which included additional legal documentation in the form of the Bidder Participation Agreement. Several milestones ensued in the following seven weeks, including the registration deadline, the mock auction, the deposit deadline, and finally the auction. The figure below depicts this actual timeline, as well as a suggested timeline for those hosting similar auctions.

Recommendation: In a replicated or scaled up version of the PAF, the auction administrator should consider the number and type of entities bidding in order to determine the length of the application process. If

Figure 13: Actual and Suggested Timelines for the Application Process



running an auction for the first time, the PAF recommends a six week period between the application release and the application deadline. For later auctions, a shorter application window may be appropriate, but the timeline should again reflect the auction size and objectives.

Recommendation: Allow five weeks (as opposed to three) between the application deadline and the auction date. In the first auction, the integrity due diligence process (see “Risk Management” section) took two weeks, whereas future auctions should provide three weeks for this process. Additionally, the deposit deadline should occur prior to the integrity due diligence process in order to ensure

that the entity administering the background checks spends its time on committed applicants only. The mock auction should occur once deposits have been received.

On the Safe Side: Managing Bidder and Project Risks

Environmental Health and Safety

Since the PAFERs are not a World Bank investment project financing activity, the Bank's operational policies and procedures for investment project financing—including those relating to environmental and social safeguards—do not apply to the PAFERs. However, given the environmental and social context underlying emission reduction projects related to the bonds, it was determined prudent to mitigate any residual risks that could arise for the World Bank and for the PAF Contributors' reputations. As such, the PAF developed a list of environmental, health, and safety (EHS) criteria for each eligible sub-sector, consulting with PAF Contributors as well as the designated operational authorities (DOEs) that would ultimately verify the credits and complete the EHS reports. In the first auction, the PAF required each project supplying emission reductions to complete an EHS audit with the DOEs prior to redemption.

In developing these criteria, the PAF confronted a number of questions: What are the kinds of impacts that cause reputational risk? How can the EHS criteria strike the balance between adequately covering risks on the one hand and not over-burdening the bidders on the other? The result was a set of criteria guided by the World Bank's safeguard requirements pertaining to private sector projects, falling under eight categories:

1. Assessment and management of environmental and social risks and impacts
2. Labor and working conditions
3. Resource efficiency and pollution prevention
4. Community health, safety, and security

5. Land acquisition and involuntary resettlement
6. Biodiversity conservation and sustainable management of living natural resources
7. Indigenous peoples
8. Cultural heritage

Brief, practical criteria were identified and tailored for application to each of the three sectors: landfill, wastewater treatment, and agricultural waste.

Recommendation: Build a small and pragmatic EHS team, but consult widely. The development of the EHS criteria was a successful process largely because it avoided an overly rules-based bureaucratic approach and brought the most appropriate experts to the table. Had the PAF attempted to initially develop the EHS criteria through a larger peer review process, it likely would have been overwhelmed by feedback and suggestions from the start.

Consideration: For governments seeking to replicate the PAF, a national-level permit and regulatory system may provide sufficient coverage for reputational or political risk. In the case of the PAF, the World Bank integrated a range of criteria from countries with differing national EHS and social systems. However, a government seeking to implement a similar system domestically may defer to its own national regulations.

Insight: It should be noted that since the EHS criteria apply to projects at the point of redemption, the PAF will continue to examine how these criteria play out in practice. A subsequent analysis to be completed after the first redemption will provide additional insight on the effectiveness of the EHS criteria.

INTEGRITY DUE DILIGENCE

In addition to the reputational risks associated with the EHS performance of the underlying projects, the PAF conducted an integrity due diligence (IDD) on the companies that would potentially win the auction and buy PAFERs. The World Bank generally lends to the public sector and is very familiar with its lending partners. To uphold the reputations of the PAF and the World Bank while engaging with new private sector partners, the PAF developed a set of criteria to evaluate potential put option buyers as well as those related to these companies.

In partnership with the World Bank Group's private sector-facing institution, the International Finance Corporation (IFC) and its Integrity Risk division, the PAF developed the criteria and a due diligence questionnaire that was included in the application package. The questionnaire asked potential bidders to disclose their legal name, senior management, board of directors, owners directly or indirectly owning 10% or more of the potential bidder, and the legal name of any parent companies, subsidiaries, and significant affiliates. The questionnaire also asked bidders to disclose information about allegations, investigations, convictions, or debarments.

The PAF team procured two specialized firms to conduct background research on the applicants. Following a very quick turnaround (see "Application Process"), IFC's Integrity Risk team evaluated the research and made recommendations to the PAF team regarding the eligibility of the potential bidders. As a result of this process, the PAF team received quality information on prospective bidders and was able to make qualification decisions.



Recommendation: Allow at least 10 business days and ideally 15 business days to conduct due diligence on the applicants. Similarly, potential bidders should be allowed two business days to respond to any follow-up questions on the IDD questionnaire. In the first auction, the IDD team had only 10 calendar days to complete due diligence, and firms receiving follow-

up questions had just one day to respond.

Insight: While the World Bank hired specialized firms to assist in conducting research, organizations seeking to replicate or scale the PAF may consider conducting due diligence in-house, but only if they have the appropriate skills. For entities that

outsource background research, it is helpful to onboard at least two firms as even the largest firms may not have multiple staff with the appropriate research and language skills. For this same reason, replicating entities should consider distributing applications from the same country across multiple firms.

Game Time: The Day of the Auction

The PAF hosted its first auction on July 15, 2015. A total of 28 companies competed to win put options, and 12 won, for a total volume of 8.7 million tons of carbon dioxide equivalent in emission reductions to be reduced over five years. The auction cleared at a price of \$2.40 per ton of carbon dioxide equivalent.

Due to the wide geographic range of the bidders, the auction began early in the morning for participants in the Western Hemisphere and late at night for bidders in Asia. The pre-auction phase, during which proxy bidders place their bids, began one hour prior to start of the live bidding. At the close of the pre-auction phase, four bidders had placed proxy bids, leaving 24 live bidders.

Following the pre-auction phase, active bidding began at \$8 per CER. While the first round allowed for a slightly longer bidding period, most rounds took 30 minutes to complete: 10 minutes for the bidding phase, during which bidders placed their bids; 10 minutes for a calculating phase, during which the auction manager verified the results; and 10 minutes for the reporting phase, during which the price of the next round was announced along with the aggregate demand for the completed round.

In total, the PAF conducted 11 rounds. In the final round, the auction manager lowered the strike price to \$2.23, at which point supply finally exceeded demand. In order to allocate the most PAFERs, the auction manager used exit payments to calculate a uniform clearing price of \$2.40 per CER.

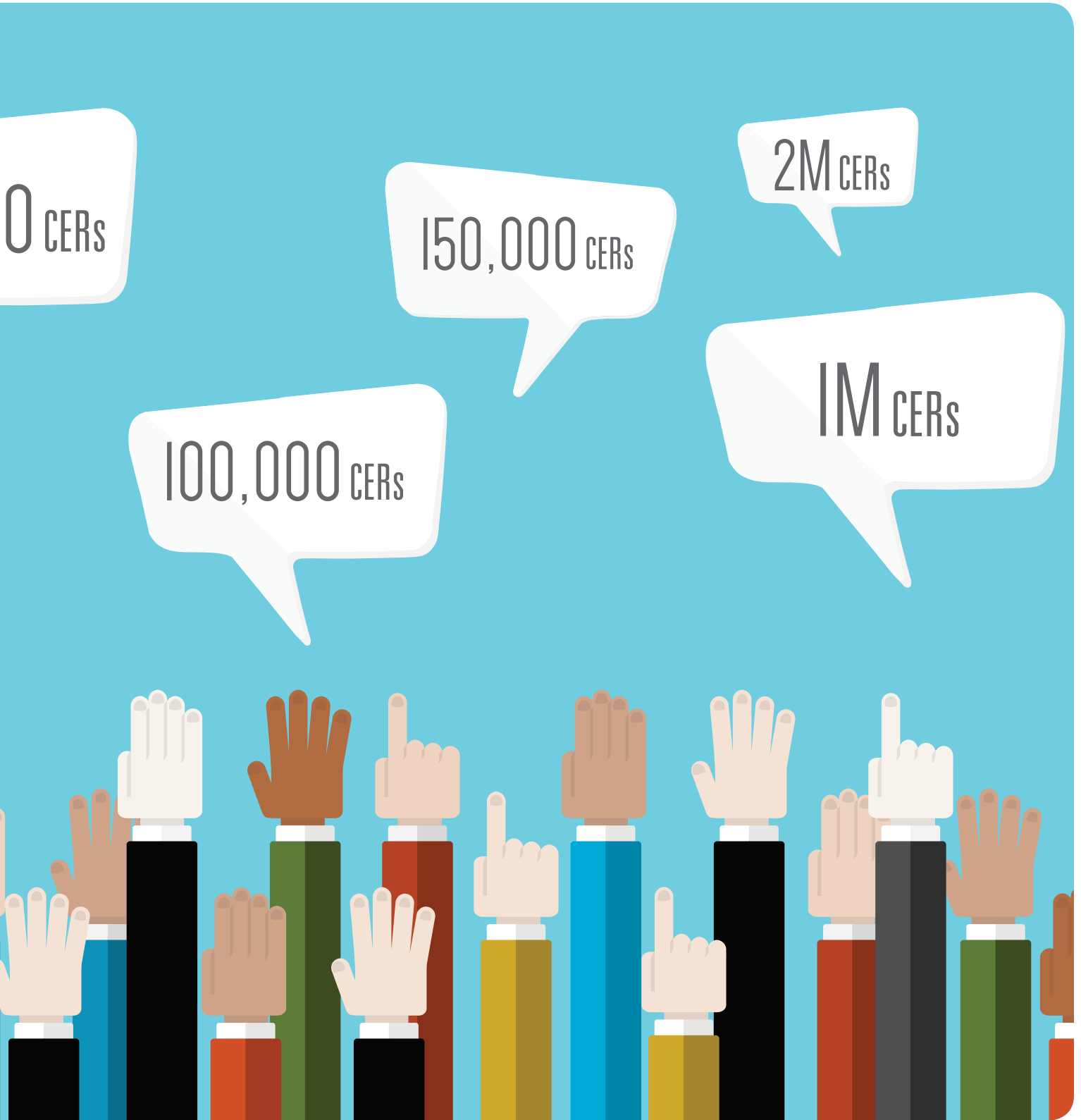
Recommendation: Ensure that bidders understand that in the final round, the calculating phase may take additional time. In the final round, prior to announcing the clearing price,

the auction manager took time to review the exit payments and bidding behavior. The bidders, however, may not have anticipated this process. Those seeking to replicate or scale the PAF should ensure that bidders are trained on the end-of-auction procedure.

Consideration: Consider reducing the length of the rounds. Several participants commented on the auction length: “Any participant has weeks to prepare and determine a price level. The lengthy process (of the auction) even creates a risk of missing a bid session as one can get distracted.” At the same time, the auction manager needs time to consider the bids and set the strike price for subsequent rounds, a critical stage of the process that should not be rushed. Furthermore, bidders using aggregate supply in previous rounds to inform their demand in subsequent rounds will require sufficient time to place their bids.

Insight: The PAF in its first auction succeeded in attracting a high number of bidders. These bidders came from 17 different countries, and represented multinational firms, carbon aggregators, and companies that own or are direct investors in methane reducing projects in developing countries. These positive results confirm the strong potential of the PAF as an efficient tool to deliver climate finance and leverage private sector investment.







CONCLUSION

The PAF hopes that this report will provide the groundwork for the replication of an innovative climate finance mechanism, particularly among those seeking to mobilize climate finance at a large scale.

Moving forward, the PAF will host a series of auctions in order to test various iterations of this model. The PAF will also seek to replicate and scale up the mechanism, for example through emission reductions from the oil and gas sector.¹⁸ Through subsequent lessons learned reports, the PAF may also study the post-auction redemption of put options as well as the secondary trading of PAFERs.

With one auction complete, the PAF team perceives much optimism surrounding the future of this mechanism, and looks forward to sharing subsequent successes and lessons with those seeking to achieve similar climate finance results.

¹⁸ "Pilot Auction Facility for emission reductions in the oil and gas sector": http://www.pilotauctionfacility.org/sites/paf/files/PAF%20briefing%20note%20on%20flaring%20and%20methane_FINAL.pdf



