

Renewable Energy Mini-Grids and Distributed Power Generation Program

ADB response¹ to the Trust Fund Committee with regard to questions from:

1. Germany (received 21 March 2014)
2. Brazil (received 21 March 2014)
3. United Kingdom (received 25 March 2014)
4. The Sierra Club (via WRI) (received 25 March 2014)
5. Canada (received 26 March 2014)
6. France (received 3 April 2014)

Questions from Germany

1. *Why is ADB going to invest a share of the CTF allocation in impact funds (instead of investing the whole amount directly)?*

ADB: Including impact funds in the Program will likely increase the diversity of investments and allow it to support additional projects that may not be reached by ADB. Impact funds under consideration are specifically focused on the mini grid and distributed generation market, and generally have a stronger on-the-ground presence in this sector than an international lender like ADB. Impact funds are typically better designed for administering financial products on a smaller scale, and have more streamlined processes for dealing directly with smaller companies.

2. *Specific information is rare, e.g. no mentioning of the final borrowers, "an indicative financing plan for the Program cannot be estimated at this time" (p. 7).*

ADB: The pipeline of companies and funds under consideration is presented in Appendix 5 of the proposal (p. 25). Names and details that would make the companies identifiable by third parties were not included in the proposal in accordance with the CTF Private Sector Operations Guidelines². With regard to an indicative financing plan, please refer to the revised proposal (p.7 and 8) for updated information on expected returns and financing instruments, including the provision of new limits on investment for certain instruments and pricing floors (also explained in the response to q.3 below). Financing plans will be determined for each investee or borrower and reported at financial close in accordance with CTF guidelines for private sector programs.

3. *Risk assessment is difficult without knowing the financial products and terms. However, we appreciate the commitment to limit the use of equity (p. 13), but 50% of the program for equity still is much without knowing "the minimum or likely rate of return" (p. 9).*

ADB: ADB conservatively expects minimum returns on these projects of 6-12% in real terms. In line with discussions with the TFC and additional work on quantifying risk, the updated proposal contains several additional provisions on investment limits and pricing

¹ Further, ADB held subsequent discussions and teleconferences with TFC members to clarify concerns and propose solutions to such concerns.

² https://www.climateinvestmentfunds.org/cif/sites/climateinvestmentfunds.org/files/Private_sector_operational_guidelines_revised_OCT2012.pdf

floors to address potential investment risks (p.7 and 8). This includes a \$10 million limit on equity investments and a \$20 million combined limit on equity investments and subordinated debt instruments. As separately discussed with concerned loan contributors, the projected net income generated from these investments will mitigate potential defaults or losses. The remainder of investment funds will be available for senior debt. Additional supporting information on the financial viability of mini grid and distributed power generation companies has also been added to the updated proposal (p.13).

Throughout the due diligence process, all investments will be analyzed in accordance with ADB standards on financial viability. In addition, it is worth noting that ADB and CTF financing will not fulfill all funding requirements of investees, and investments will only proceed if co-investors are also convinced on the financial viability of the projects from their own due diligence. This will strengthen the monitoring and risk management of investee companies.

4. *Replication potential (p. 10) seems to be exaggerated (factor 60!).*

ADB: Please refer to the revised proposal for additional information on replication potential (p.10). The upper limit for replication potential in pilot countries (based on 388 million people currently with no access to electricity) was estimated at 15,520 MW³. ADB refined this upper limit to a “market potential”, based on additional factors such as assessments of off-grid markets in pilot countries^{4,5,6}, commercial attractiveness, project readiness, capacity for private sector involvement, nature of local regulatory and commercial environment, and track record of investment. The market potential was approximately 7.5% of the upper limit, or 1,190 MW. The replication potential of the program was then conservatively estimated to reach roughly half of the market potential with 600MW of new capacity. This estimate is conservative compared with for example India’s stated aim of installing 2,000 MW of off-grid solar PV by 2022 under its National Solar Mission.

5. *Will ADB cofinance all of the projects where CTF allocations are used for?*

ADB: We refer to section 15 of the CTF private sector guidelines in this regard (see below)⁷. For effective deployment of human and financial resources, ADB will naturally seek to co-invest whenever possible and feasible. However, there may be cases where certain internal rules on ADB’s co-financing (e.g., single borrower limits which are determined on a company’s net worth) would limit the efficiency and effectiveness of CTF funds being deployed. It is anticipated that there could be some cases where the role of MDB financing would be better suited to a later stage, for example when funding raising requirements are larger and companies have the capacity (e.g., balance sheet) to

³ Based on 200W per household and 5 people per household

⁴ cKinetics, 2013. Financing Decentralized Renewable Energy Mini Grids in India: Opportunities, Gaps, and Directions. cKinetics, September 2013.

⁵ Australian Trade Commission, 2012. Market Research Report, Trade Opportunities, Low Emissions Technology and Services (LETS), Indonesia. Australian Government, April 2012.

⁶ Intellectap (Intellectual Capital Advisory Services Private Limited) for International Finance Corporation, 2012. Lighting Asia: Solar Off-Grid Lighting Market analysis of: India, Bangladesh, Nepal, Pakistan, Indonesia, Cambodia and Philippines, February 2012.

⁷ According to the CTF private Sector Operations Guidelines (section 15): “To achieve greater leverage, private sector Projects and Programs will seek to blend CTF financing with MDB financing in the most efficient and effective way possible.”

absorb larger investments. There may be other cases where ADB has already made an investment, and would not be able to re-invest alongside CTF funds without breaching single borrower limits (for example Simpa Networks, where ADB has already made a \$2 million equity investment⁸). It would appear that taking a rather strict interpretation that the CTF private sector guidelines require mandatory MDB co-financing would unnecessarily limit the Program's effectiveness for these non-traditional clients.. Please note that for all investments ADB would carry out its fiduciary duties for CTF and would conduct due diligence in an identical manner to that conducted for ADB's non CTF investments.

6. *Regulation in Indonesia: PLN has a monopoly and so far, permission has not been granted (p. 5): isn't that an obstacle?*

ADB: There are off-grid areas in Indonesia where PLN has no existing infrastructure, and would not be involved in generation or distribution. There may also be cases where PLN (or a subsidiary/subcontractor) would be involved only in distribution and mini grid and distributed power generation companies would be responsible for generation. ADB also anticipates that engaging with utilities such as PLN, through the MDB platform (based on relationships established through a long history of public sector lending) would be an effective way of de-mystifying issues surrounding off-grid energy supply and establishing an enabling environment more conducive to private sector involvement.

7. *Last but not least: The TFC could make better informed decisions, if in case of use of "innovative" financial products (products other than senior loans) the Trustee would provide an assessment based on the CF-Model. We are concerned about the management of the risk exposure of the CTF through the TFC decision making process, which from our perspective still is not very transparent. Individual decisions impact on the financial situation at the projected date for the recalculation (June 2028) and they might go beyond the margin, that can be absorbed, while at and at the same time also other proposal could increase the risk exposure significantly.*

ADB: This issue is currently being discussed between the MDBs, the CIF AU and the Trustee, which solely manages and administers the CF-Model. For the purposes of this program proposal, ADB has assessed the forecast net cash flows from estimated investments in line with loss assumptions made by the Trustee and using pricing terms and conditions as outlined in the revised proposal. ADB proposes to manage such financial risks through the establishment of minimum pricing floors that would provide sufficient net income to CTF to cover any potential losses. Therefore, ADB believes approval and implementation of this Program will not negatively impact the CTF CF-Model *ceteris paribus*.

Questions from Brazil

8. *We believe that the comments provided by Germany are pertinent. In order to understand the potential impact and the conditions for this Program, we would need further information on financial products and terms, and more clarity on how CTF resources will be used (such information is expected for any country project that comes forward to the Committee, and the same applies in this case).*

⁸ <http://www.adb.org/projects/46931-014/main>

ADB: Please refer to the responses provided to questions from Germany.

Questions from the United Kingdom

9. *How is the DPSP supporting additional activity that the ADB would be unable to support alone?*

ADB: CTF funds would be used to strengthen the financial case for investment from ADB. Some target companies do not have sufficient financial resources and lack the strength in their balance sheets needed for investments to pass minimum risk hurdles. Therefore CTF funds would increase ADB's capacity to extend financial support to the sector.

10. *What is the track record for the ADB doing similar mini-grid investments either with the public sector or the private sector?*

ADB: ADB has been active in providing energy access since 2003 with a total aggregate investment in this area to date of \$5.4 billion⁹. ADB's Energy for All Initiative and Partnership, established in 2008¹⁰, has been the recent focus of this work, and has supported investments across Asia and the Pacific (in particular in Bangladesh, Bhutan, Cambodia, India, Indonesia, Myanmar, Nepal, Pakistan, Papua New Guinea, and the Philippines¹¹). Additional information on the Initiative can be found in Appendix 8 of the updated proposal. The Initiative has been involved in identifying high-impact investment opportunities and supporting scale up through a focus on project development, knowledge management, capacity building and investment facilitation. The Partnership aims to provide access to safe, clean, affordable modern energy to an additional 100 million people in the region by 2015. Please also see the above response to question number 5.

11. *In the Table on Program Performance Indicators Table on pg.16 could ADB revise the expected mobilised private and public finance figures to be congruent with their expected leverage of 1:3 (or 1:2)?*

ADB: The expected leverage ratio is 1:2 (admittedly conservative). CTF funds of \$34.325 million are expected to leverage \$60 million of additional funds (\$20m ADB + \$40m private sector). Please refer to the updated proposal for revised figures (pg. 17 and Appendix 6).

12. *Citing from pg. 28 "For the Program, the average cost per MW of mini-grid capacity installed was assumed to be \$3 million per MW." It is unclear why then with 1:2 or 1:3 leverage ratio (to be clarified), ADB only expects up to 10MW of new generation*

⁹ This includes improved transmission and distribution projects.

¹⁰ <http://www.energyforall.info/>

¹¹ Also in Afghanistan, Armenia, Azerbaijan, China, People's Republic of, Cook Islands, Fiji, Georgia, Kazakhstan, Lao People's Democratic Republic, Maldives, Marshall Islands, Micronesia, Federated States of, Mongolia, Samoa, Solomon Islands, Sri Lanka, Tajikistan, Thailand, Tonga, Uzbekistan, Vanuatu, Viet Nam.

capacity. Could ADB include any additional generation capacity through the leveraged finance in the results framework?

ADB: CTF funds combined with leveraged funds (\$90 million of direct investment) are expected to result in the installation of 30MW of new mini grid capacity. Please refer to the updated proposal for revised figures (pg. 17 and Appendix 6).

13. *At the Oct 8, 2013 TFC meeting there was a decision that each proposal needs to report on the cost-effectiveness of projects in the following way: "In addition to CTF investment per ton of CO₂-equivalent reduced, an estimate of total project costs (CTF investment plus co-financing) per ton of CO₂-equivalent reduced should also be provided." In our understanding this was required in order to provide a close proximate to the marginal abatement cost of the project. Based on only the 10 MW installed capacity the total investment cost per tonne of this RE MG and DPG projects is quite high at (\$90M/630 973 t of CO₂ =) \$142.6 per tonne compared to the average of the current CTF portfolio of 30\$ per tonne. Could ADB provide a total investment cost per tonne based on their realistic expectation of leveraged finance and installed capacity?*

ADB: With total estimated emission reductions of 1.4 million tCO₂e over 20 years, CTF funds (\$34.325m) would deliver a cost effectiveness of \$24 per tCO₂e. Total funds including leveraged finance (\$94.325m) would deliver a cost effectiveness of \$66 per tCO₂e. Please refer to the revised proposal for updated figures (Appendix 6).

14. *Is it possible to provide any evidence of the marginal abatement cost of hybrid mini-grid?*

ADB: The marginal abatement cost of hybrid mini-grids varies according to the local baseline, the system size and location, the characteristics of local RE resources (solar, wind, hydro, biomass), the composition of sources of generation for the mini-grid, potential storage elements (e.g. batteries), and a range of site specific factors (e.g. O&M costs). Due to high variability between systems, generic marginal abatement cost curves are not produced for mini grids. However, as a proxy reference, marginal abatement cost curves for a range of mitigation activities in India, Indonesia and the Philippines are provided in the appendix of this document.

It should be noted that, with the exception of Indonesia, the baseline for these marginal abatement cost curves is the national electricity mix, not diesel generators. Minigrid and distributed generation systems that displace diesel-generated electricity will almost always have a higher impact in terms of GHG emission reductions compared with activities that displace electricity from national grids. The national combined grid emission factors for India, Indonesia and the Philippines are 0.8957, 0.7570 and 0.5109 tCO₂/MWh respectively¹², all lower than the emission factor for diesel fuel of 1.08 tCO₂/MWh. However, it should also be noted that an abatement premium (in dollar terms) should be applied for mini grid based activities to account for additional costs associated with remote area power supply.

15. *On the emission factors: Instead of referring to a UK specific DECC/Defra document for the emission factor, it would be better if ADB detailed the counterfactual*

¹² Kuriyama, A., 2014. List of Grid Emission Factor. Database 2014/03. Institute for Global Environmental Strategies, Japan.

used to derive the 1.08 tCO₂/MWh emission factor. (e.g. assumption on direct CO₂ factor from diesel combustion, grid size, local generator efficiency).

ADB: The emission factor for diesel fuel (100% mineral diesel) used in calculations was 3.2413 kg CO₂/L¹³. This is an inherent property of the fuel and was assumed to be consistent with diesel sourced in Asia. The efficiency of average diesel generators in India, Indonesia and the Philippines (sized between 20kW and 2,250 kW, and varying from quarter to full load) was assumed to be 3.0 kWh/L¹⁴. Therefore the emission factor for the average diesel generator was 1.0804 tCO₂/MWh (3.2413 divided by 3.0). Please refer to the revised proposal for clarification on figures (Appendix 6).

16. *Could you provide a clear explanation of how the project will realise its 600MW replication potential with the resources currently allocated? What is the Theory of Change? What role will the technical assistance component play and how will it support knowledge sharing and lesson learning to help realise this goal? This should include taking into account lessons that are being learned from mini-grid programmes that are being implemented in each region.*

ADB: Please refer to information provided in response to question 4. In addition, please refer to the following:

The theory of change is that barriers to scale-up may be overcome by addressing them with appropriate resources. Private sector involvement in this sector is showing strong potential, and there are companies being established and growing in pilot countries. However, additional resources are needed to target specific barriers to enable a transformation in off-grid energy access. The main barriers can be categorized into financial, regulatory, policy and project-specific barriers.

In relation to financial barriers, additional investment capital is expected to deliver the scale needed to attract commercial financing and “mainstream” mini-grid development in CTF pilot countries. Sector analysis indicates that financial institutions in pilot countries are focused on asset-based lending and are not yet comfortable with risks associated with financing off-grid electricity projects and companies, many of which are early stage private sector entities. Thus, seemingly viable business models are constrained by the lack of available financing. This is demonstrated, for example, by significant risk premiums and tenors of debt instruments; typical lending rates in India, Indonesia and the Philippines vary between 3.5-8%, but debt financing for off-grid projects (if available at all) is in the order of 12-15%. Tenors are often short, in the order of 1-3 years, ill-suited for financing capital intensive projects. The program’s investment component is designed to be large enough to provide a range of tangible examples to form a track record of scale up in the sector, and to “de-risk” business models in the eyes of financiers and regulators.

¹³ AEA, 2012. 2012 Guidelines to DEFRA / DECC's GHG Conversion Factors for Company Reporting Produced by AEA for the Department of Energy and Climate Change (DECC) and the Department for Environment, Food and Rural Affairs (DEFRA). 28 May 2012. https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/69554/pb13773-ghg-conversion-factors-2012.pdf

¹⁴ Based on http://www.dieselserviceandsupply.com/Diesel_Fuel_Consumption.aspx. Note this data was for the US, and the average value was 3.28 kWh/L. Diesel engines available in India, Indonesia and the Philippines are considered to be slightly less efficient, leading to an average efficiency of around 3.0 kWh/L

In relation to regulatory, policy and project-specific barriers, the technical assistance forms significant component of the program (10% of CTF funds), and is designed to address barriers by sharing knowledge, disseminating lessons learned and engaging with stakeholders. Specific stakeholders for the TA include governments, policy makers, financial institutions, investment funds, project developers, energy service providers, utilities, regulators, academia, civil society, and development partners. For project developers, benefits from the variety of lessons learned by individual early movers will be shared with the larger audience of companies, a concept proven to accelerate market development in other sectors. For policy makers, regulators and utilities, it is anticipated that a targeted approach to engagement, delivered through the MDB platform (and based on relationships established through a long history of public sector lending) would be an effective way of de-mystifying issues surrounding off-grid energy supply by the private sector. Sharing technical knowledge on renewable energy policy and topics such as, permitting, licensing, grid standards, metering, and feed-in tariffs is expected to reduce regulatory barriers and enhance the enabling environment. For technology providers, an increased flow of investment will enable them to build capacity, reduce barriers such as importation and taxation procedures, and streamline operations. Further to these efforts, broader outreach through the TA to academic institutions, civil society and development partners is anticipated to create increased awareness of energy access issues and create momentum for expanding the sector.

17. *Please can you clarify how the gender elements of the project will be monitored?*

ADB: Gender elements and other performance indicators will be monitored according to ADB's design and monitoring frameworks (DMFs), which will be created for individual investments¹⁵. The main sources of data for these would be reporting obligations from obligors and investees, project documents, mid-term reviews, and site visits. Gender elements of investments will be designed in line with ADB's gender toolkit for energy, which specifically addresses energy access projects¹⁶.

Questions from the Sierra Club (via WRI)

18. *Financing structure. What form will this capital deployment take? It sounds like both direct equity and debt investment on a project/company scale as well as early stage equity via financial intermediaries - which is good, but loan guarantees (via financial intermediaries) that bring long-term scalable debt are also needed. If at least a portion could be used to guarantee long-term debt (and not just short or medium term loans as the proposal states), that would be beneficial.*

ADB: Capital will be mostly deployed through investment directly into companies and perhaps indirectly through impact investment funds. In pilot countries, tenors for corporate loans from domestic financial institutions (usually commercial banks) are typically in the range of 3-5 years. At this stage of market development, tenors of up to 10 years are expected to overcome immediate financial and first mover barriers, and unlock "mainstream" investment. However, offering longer tenor guarantees at this stage may not help, as lenders (usually commercial banks) would still be required to fund the

¹⁵ <http://www.adb.org/documents/guidelines-preparing-design-and-monitoring-framework>

¹⁶ <http://www.adb.org/documents/gender-tool-kit-energy-going-beyond-meter?ref=themes/gender/publications>

underlying loan. Over the medium to longer term, as the market develops, builds a stronger track record and becomes further de-risked, longer tenors would likely be appropriate, particularly in the case of non-recourse project financing.

19. *Scale of projects. The lower bound power output of mini-grids to be funded by the program is 100kW. This means that small-scale power generation and solar home systems (SHS) companies which are doing smaller scale mini grids would be excluded from this program. While recognizing that the ADB PSOD already seems to already have a pipeline of projects, it could be useful to have the flexibility to allow companies to aggregate their installations to be at least 100kW, rather than 100kW per installation. This would also be beneficial in case it was found to be difficult to deploy the \$30 million effectively or efficiently in mini-grid only so there would still be the option of helping providing some SHS providers scale.*

ADB: This is in fact our intent. ADB is currently evaluating companies contemplating projects ranging in aggregate capacity from 100 kW to 5 MW. Individual system sizes may vary from approximately 1kW to 1MW. Please refer to the revised proposal for updated figures (pg. 5).

20. *Technical Assistance component. The TA, or other ADB support, could be used to examine why successful business models have failed to scale-up, and why financing has remained a barrier despite the successful demonstration of many firms operating mini-grids in these geographies. The proposal would be strengthened if it addresses how these business models would be improved to attract commercial financing and made scalable to mainstream mini-grid development.*

ADB: Please refer to the updated proposal for inclusion of this element into the TA (p.6) and refer to question 16 above from the UK for further elaboration on the TA program

Questions from Canada

21. *We do, however, have concerns regarding the request for CTF DPSP financing described under this program and, in this regard, we support the comments made by Germany and Brazil.*

ADB: Please refer to responses offered to questions from Germany and Brazil.

22. *In addition, we note that the mini-grid program proposal includes CTF stand-alone financing, which is not consistent with the CTF Private Sector Operations Guidelines requirement for MDB co-financing (as per section 11.F). Should a case be made for the Committee to reconsider this part of the Guidelines, it should be done separately and brought to the Committee as a new item for discussion.*

ADB: Please note we were unable to find reference to MDB co-financing in section 11. F of the CTF private Sector Operations Guidelines¹⁷. However, please refer to question 5 for a response on this issue.

¹⁷

https://www.climateinvestmentfunds.org/cif/sites/climateinvestmentfunds.org/files/Private_sector_operational_guidelines_revised_OCT2012.pdf

Questions from France

23. *What is the process and timing that is considered for the governance of the program by ADB and the appropriate reporting to the CTF TFC regarding sub-project selection, commitment of funds, disbursement and impact evaluation?*

ADB: Investments would be made over a three period following approval of the CTF funds. Funds would be disbursed gradually for individual investments once they have gone through comprehensive due diligence, investment committee review and endorsement and ADB board approval.. Individual investments would be evaluated and reported on according to normal ADB and CTF procedures and guidelines.

24. *The project is designed to test innovative business model (p14), we would appreciate to have more information regarding those models.*

ADB: Private sector business models vary significantly according to, inter alia, the location of projects, the regulatory environment in which they are licensed to operate, characteristics of end users, characteristics of the developer, characteristics of service providers, technologies employed, feasible methods of payment collection, and underlying financing considerations. For more detailed discussion of different business models in literature, please see the following:

- ADB: *The Future of Mini-Grids: From Low Cost to High Value*¹⁸,
- IFC: *From Gap to Opportunity: Business Models for Scaling Up Energy Access*.¹⁹, and
- Rolland and Glania (2011): *Hybrid Mini-Grids For Rural Electrification: Lessons Learned*²⁰

25. *The lack of access to commercial capital (debt and equity) from domestic financial institutions is presented as one of the main barriers to the scale up those mini-grid projects. Could you develop how the program is willing to tackle this specific issue? How will the program try to change domestic commercial banks risks perception, which is a necessary condition to any replication of such pilot program otherwise than by financing first movers with concessional finance? Which does not seems enough to overcome the presented financial barrier.*

ADB: In new areas of financing, the risk perception of commercial banks is largely dependent on the track record and precedent of investment. The growth of microfinance is a good example, which began to develop in the 1980s due to the establishment of a track record in Indonesia, Bolivia, China, India, Kenya, Tanzania, and Vietnam²¹. In the

¹⁸ <http://www.energyforall.info/resources/>

¹⁹ International Finance Corporation, 2012.

http://www.ifc.org/wps/wcm/connect/topics_ext_content/ifc_external_corporate_site/ifc+sustainability/publications/publications_report_gap-opportunity

²⁰ Simon Rolland and Guido Glania, 2011. *Hybrid Mini-Grids For Rural Electrification: Lessons Learned*, Alliance for Rural Electrification (ARE), Brussels March 2011.

²¹ Robinson, Marguerite S., 2001. *The Microfinance Revolution Sustainable Finance for the Poor Lessons from Indonesia* The Emerging Industry. The World Bank, Washington, D.C. Open Society Institute, New York. <http://www->

1990s, microfinance began to develop as an industry due to mainstream de-risking, and now it is common place in developing countries. Project finance is another similar example, which began from the development of the Panama Canal, and the US oil and gas industry during the early 20th century, and in the North Sea oil fields in the 1970s and 1980s. Today, project finance is available from commercial banks largely due to the track record, which allows for better quantification of uncertainty and risk.

The underlying characteristics of the mini grids and distributed power generation sector show strong potential for commercial viability (please refer to the response provided to question 3, and by investing in companies with strong potential, the program can deliver a track record of investment. Once commercial banks are able to see that these are viable investments, and the business models become proven, it would be unlikely for them to not move into this sector to upscale financing activities.

26. *The program will implement the concept of « minimum concessionality » could you develop how this concept will be operationalized and how will it be documented to the CTF TFC?*

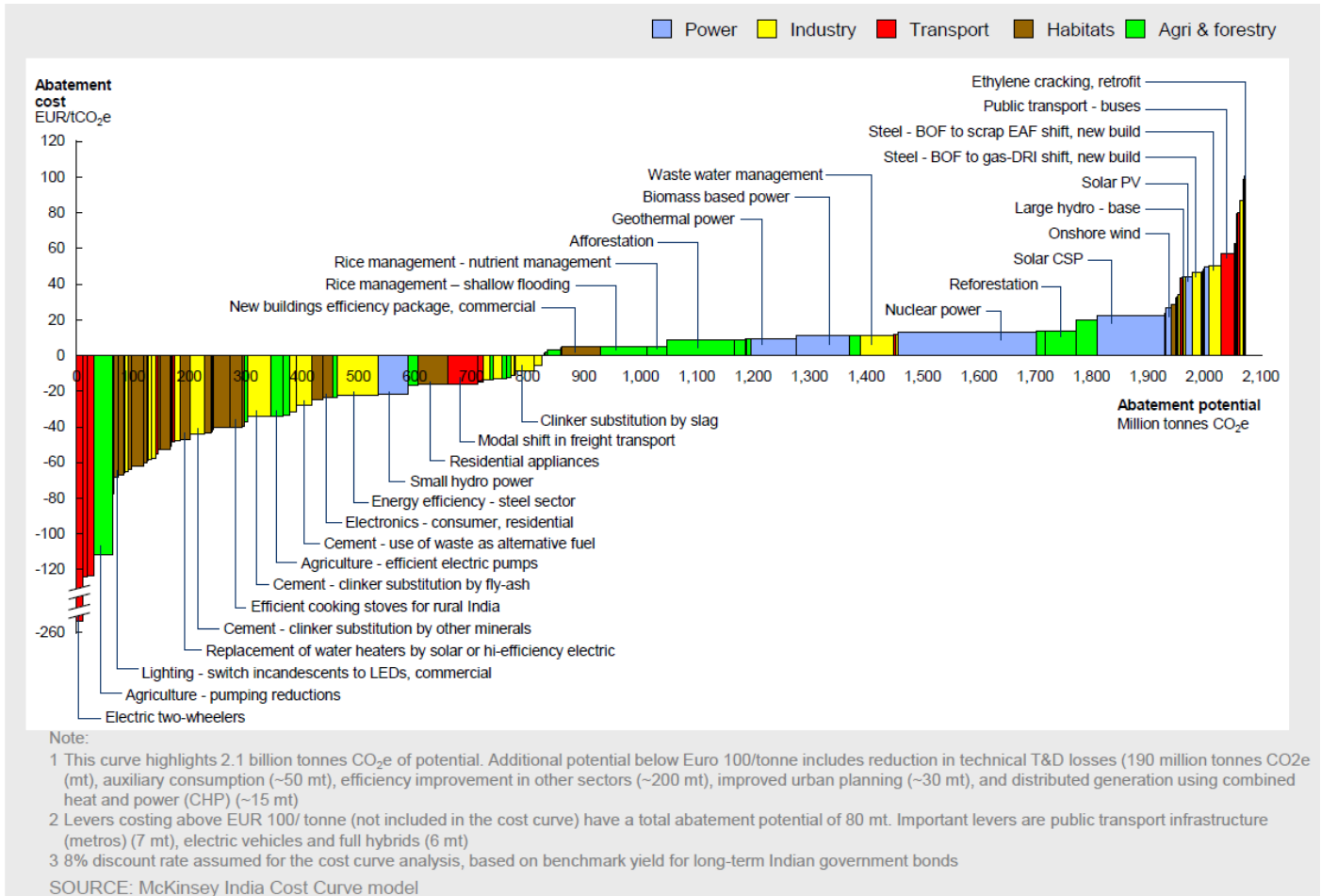
ADB: Pricing floors have already been established according to the principle. The level of concessionality may differ by project type, technology, sector and the country in order to account for specific market conditions and different incremental costs. As with all CTF programs, the concept of minimum concessionality will be applied and documented in accordance with the CTF Private Sector Operations Guidelines²².

wds.worldbank.org/external/default/WDSContentServer/WDSP/IB/2007/08/23/000310607_20070823152333/Rendered/PDF/232500v10REPLA18082134524501PUBLIC1.pdf

https://www.climateinvestmentfunds.org/cif/sites/climateinvestmentfunds.org/files/Private_sector_operational_guidelines_revised_OCT2012.pdf

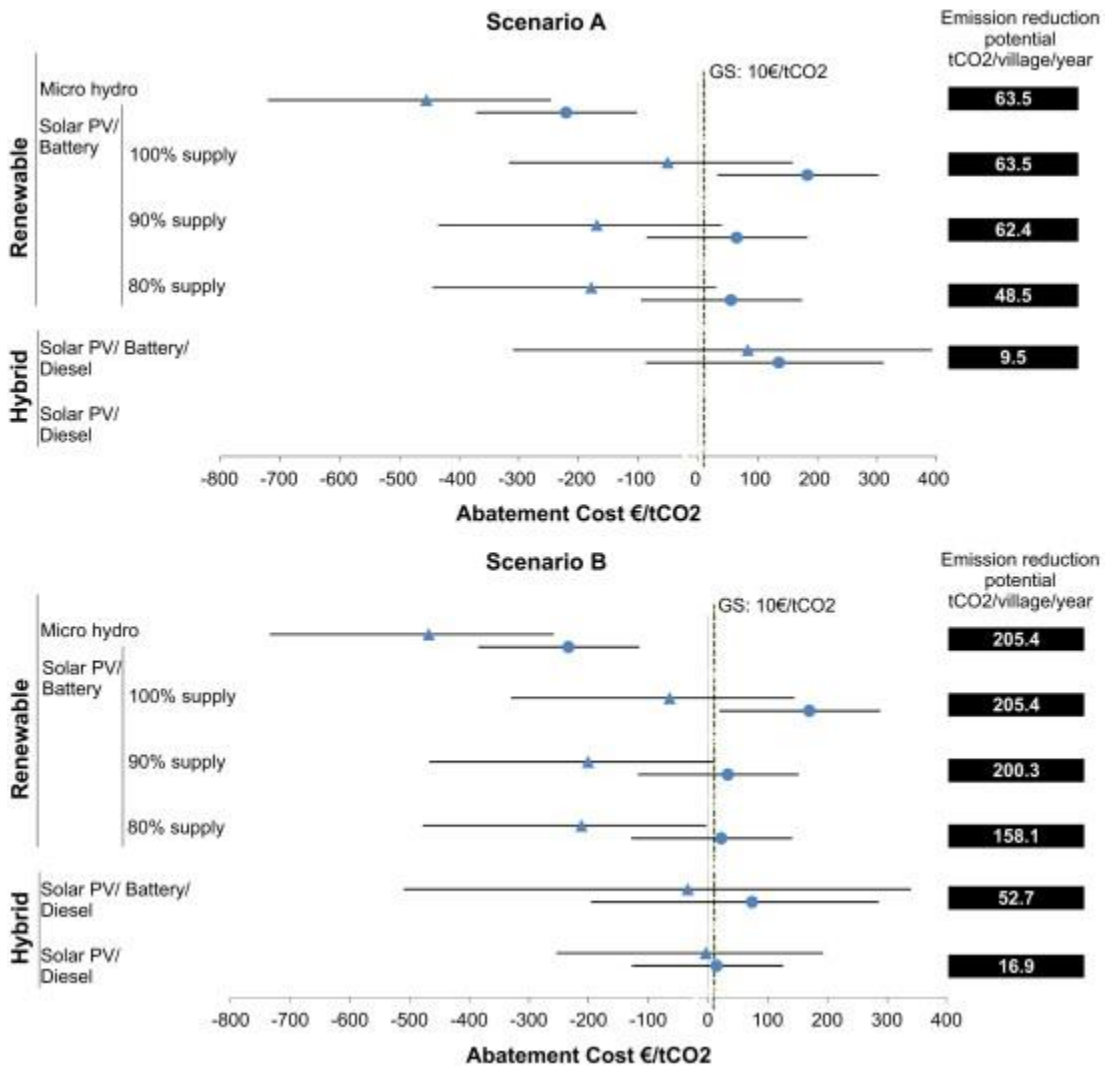
Appendix 1 - Carbon marginal abatement cost curves for India, Indonesia and the Philippines

Figure 1 – INDIA - Carbon abatement cost curve for 2030²³



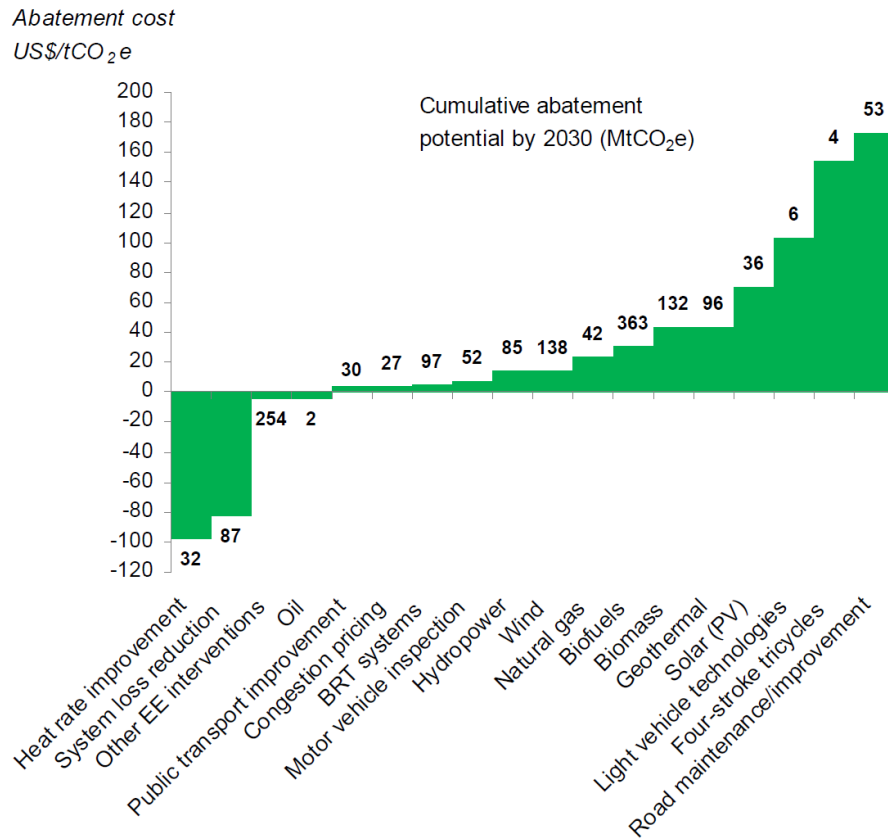
²³ McKinsey & Company, Inc., 2009. Environment and Envery Sustainability: An Approach for India. August 2009.
http://www.mckinsey.com/client_service/sustainability/latest_thinking/greenhouse_gas_abatement_cost_curves

Figure 2 – INDONESIA - Abatement costs and emission reduction potentials of renewable energy based and hybrid village grids in compared to the conventional diesel baseline²⁴



²⁴ Nicola U. Blum, Ratri Sryantoro Wakeling, Tobias S. Schmidt, Rural electrification through village grids— Assessing the cost competitiveness of isolated renewable energy technologies in Indonesia, Renewable and Sustainable Energy Reviews, Volume 22, June 2013, Pages 482-496, ISSN 1364-0321, <http://dx.doi.org/10.1016/j.rser.2013.01.049>.

Figure 3 – PHILIPPINES - Abatement Cost and Cumulative Abatement Potential for the Power and Transport Sectors, 2008-2030²⁵



²⁵ Transport And Traffic Planners (TTPI) Inc., CPI Energy Phils., Inc., 2010. A Strategic Approach to Climate Change in the Philippines An Assessment of Low-Carbon Interventions in the Transport and Power Sectors.
http://siteresources.worldbank.org/INTPHILIPPINES/Resources/PH_Low_Carbon_Transport_and_Power.pdf