Framework Convention on Climate Change

TEC/2019/18/4

Technology Executive Committee

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Copenhagen, Denmark, 25–27 March 2019

Updated evaluation of the Poznan strategic programme on technology transfer

Background note

I. Introduction

A. Background

1. At its forty third session, the SBI invited the TEC to update the evaluation report of the Poznan strategic programme on technology transfer (PSP), with the aim of enhancing the effectiveness of the Technology Mechanism. At its forty ninth session, the SBI noted the ongoing work of the TEC in updating its report on the evaluation of the PSP with a view to completing its updated evaluation report at its 18th meeting for consideration at SBI 50.

B. Scope of the note

2. The annex to this document contains the draft updated report of the TEC's evaluation of the PSP, as prepared by the task force on climate technology financing.

C. Possible action by the Technology Executive Committee

3. The TEC will be invited to agree on the updated evaluation report for submission to SBI 50.

Annex

Updated evaluation of the Poznan strategic programme on technology transfer

Contents

List of abbreviations

ACTFCN	African Development Bank: Pilot Africa Climate Technology Finance Centre and Network
AA	Action Agendas
ACP	Asia Climate Partners
ADB	Asian Development Bank
CATIE	Centro Agronómico Tropical de Investigación y Enseñanza
COBP	Country Operations Business Plan
CONACYT	Consejo Nacional de Ciencia y Tecnología
CPS	Country Partnership Strategy
CSP	Concentrated Solar Power
CTCN	Climate Technology Center and Network
CTNFC	Climate Technology Network and Finance Centre
CTPM	Climate Technology Promotion Mechanism
DG	Distributed Generation
DMC	Developing Member Countries
EE	Energy Efficiency
EST	Environmentally Sound Technology
FINTECC	Finance and Technology Transfer Centre for Climate Change
FIRI	Food Industries Research Institute
GWP	Global Warming Potential
HCFC	Hydrochlorofluorocarbons
HFC	Hydrofluorocarbon
HFO	Hydrofluoroolefin
IIE	Electrical Research Institute
INEEL	National Institute for Electricity and Clean Energy
IP	Investment Prospectus (SE4All)
KMUTT	King Mongkut's University of Technology Thonburi
LAC	Latin America and the Caribbean
LCT	Low Carbon Technology
MEM	Máquina Eólica Mexicana
MPO	Marketplace Operator
MTR	Mid-Term Review
NDE	National Designated Entity
NSTDA	National Science and Technology Development Agency
ODP	Ozone Depleting Products
ODS	Ozone Depleting Substances
PE	Private Equity
PEAs	Project Executing Agencies
RDB	Regional Development Bank
RE	Renewable Energy
REGEP	Rural Economic Growth and Employment Project
SCCF	Special Climate Change Fund
SE4All	Sustainable Energy for All
SEFA	Sustainable Energy Fund for Africa
SENER	Secretaría de Energía
SME	Small and Medium-Sized Enterprise
SPPs	Small Power Producers
SWH	Solar Water Heater
US EPA	US Environmental Protection Agency
TA	Technical Assistance
VC	Venture Capital

I. Introduction

A. Mandate

1. The SBI, at its forty third session, invited the TEC to update the evaluation report[1] of the Poznan strategic programme on technology transfer (PSP), with the aim of enhancing the effectiveness of the Technology Mechanism, for consideration by the COP no later than at its twenty-third session (November 2017), through the SBI.[2] In doing so, the SBI invited the TEC to draw upon the experiences gained and lessons learned from (i) the PSP climate technology transfer and finance centres and (ii) pilot projects of the fourth replenishment of the GEF.[3] The source of information for the experiences gained and lessons learned is the mid-term evaluation reports on these activities.[4]

2. The SBI, at its forty fifth session, noted the ongoing work of the TEC in updating its report on the evaluation of the PSP[5] in accordance with the invitation of SBI 43. The SBI invited the TEC to submit the evaluation report as part of its annual report to the COP for consideration at the session of the SBI to be held in December 2018.

3. The SBI, at its forty ninth session, noted the ongoing work of the TEC in updating its report on the evaluation of the PSP with a view to completing its updated evaluation report at its 18th meeting for consideration at SBI 50.[6]

B. Scope of the report

4. This report presents the updated evaluation of the PSP, undertaken by the TEC with the aim of enhancing the effectiveness of the Technology Mechanism. The TEC prepared this report in accordance with the terms of reference of the evaluation.[7] The chapters of the report are based on the elements of the scope of work of the evaluation as outlined in the terms of reference.

C. Purpose of the evaluation

5. The purpose of this evaluation is to provide an update of the evaluation report of the PSP, with the aim of enhancing the effectiveness of the Technology Mechanism. Due to the early stages of implementation of the PSP in 2015, mid-term evaluations had not been carried out yet, hampering the evaluation of the effectiveness and efficiency of the PSP, and identify lessons learnt. Since 2015, the majority of the PSP projects have undergone a mid-term evaluation.

6. The scope consists of an updated evaluation of two PSP windows:

(a) The pilot regional climate technology transfer and finance centres; and

(b) The pilot projects of the PSP under the fourth replenishment of the GEF.

D. Methodology

7. The methodology undertaken to evaluate the PSP is consistent with the evaluation's terms of reference[8] as prepared by the TEC. The terms of reference outline the:

(a) Aim;

(b) Scope of work;

[1] FCCC/SBI/2015/16.
[2] FCCC/SBI/2015/22, paragraph 79.
[3] Idem.
[4] FCCC/SBI/2015/22, paragraph 78.
[5] FCCC/CP/2017/7, annex, paragraph 173.
[6] FCCC/SB/2018/2, paragraph 30.
[7] https://bit.ly/2LBn45b.
[8] Idem.

(c) Process for conducting the evaluation;

(d) Activities undertaken in conducting the evaluation;

(e) Information sources;

(f) Outputs and timeframe.

8. The main source of information for the evaluations are the available mid-term reviews (MTRs). In addition, updated information on project progress was requested where appropriate, supplementing the information provided in the MTRs.

II. Background

A. The Poznan Strategic Programme

9. COP 13 requested the GEF to elaborate a strategic programme for scaling up the level of investment for technology transfer. This was undertaken with the aim of helping developing countries to address their needs for environmentally sound technologies.[9]

10. In 2008, the GEF Council approved a strategic programme on technology transfer.[10] The programme had three windows:

(a) Technology needs assessments (TNAs);

(b) Piloting priority technology projects linked to TNAs;

(c) Dissemination of GEF experience and successfully demonstrated environmentally sound technologies.

11. COP 14 renamed this programme the Poznan Strategy Programme on Technology Transfer and requested the GEF to, inter alia, consider the long-term implementation of the PSP and report back to COP 16.[11] The GEF submitted to COP 16 a plan for the long-term implementation of the PSP.[12] This plan contained five elements:

(d) Support for climate technology centres and a climate technology network;

(e) Piloting priority technology projects to foster innovation and investments;

(f) Public-private partnership for technology transfer;

(g) TNAs;

(h) GEF as a catalytic supporting institution for technology transfer.

12. The GEF noted that three of the elements (piloting projects, TNAs and GEF as a catalytic supporting institution) were a direct continuation and scaling-up of the original program approved in 2008.[13]

13. The GEF funded the initial PSP under the fourth replenishment period of the GEF Trust Fund (GEF-4) and the GEF submitted a plan for the long-term implementation of the PSP to COP 16 during the fifth replenishment period of the GEF Trust Fund (GEF-5). Funding for the initial PSP totalled USD 50 million with USD 30 million coming from GEF Trust Fund country allocations, USD 5 million from the GEF Trust Fund set-aside and USD 15 million from the Special Climate Change Fund (SCCF). The GEF reported co-financing for these activities to be USD 228.8 million.[14]

14. GEF-5 funding for the elements of the long-term implementation of the PSP was primarily through a combination of country allocations under the system for the transparent allocation of resources (STAR) (for mitigation projects) and global and cross-focal area set-asides (for TNA global projects and public-private partnerships (PPPs). The SCCF and the LDCF funds adaptation

[9] Decision 4/CP.13, paragraph 3.
[10] GEF/C.34/5/Rev.1.
[11] Decision 2/CP.14, paragraphs 1 and 2.
[12] FCCC/SBI/2010/25, annex.
[13] Refer to FCCC/CP/2013/3, annex, paragraph 140.
[14] FCCC/SBI/2015/INF.4, appendix 3.

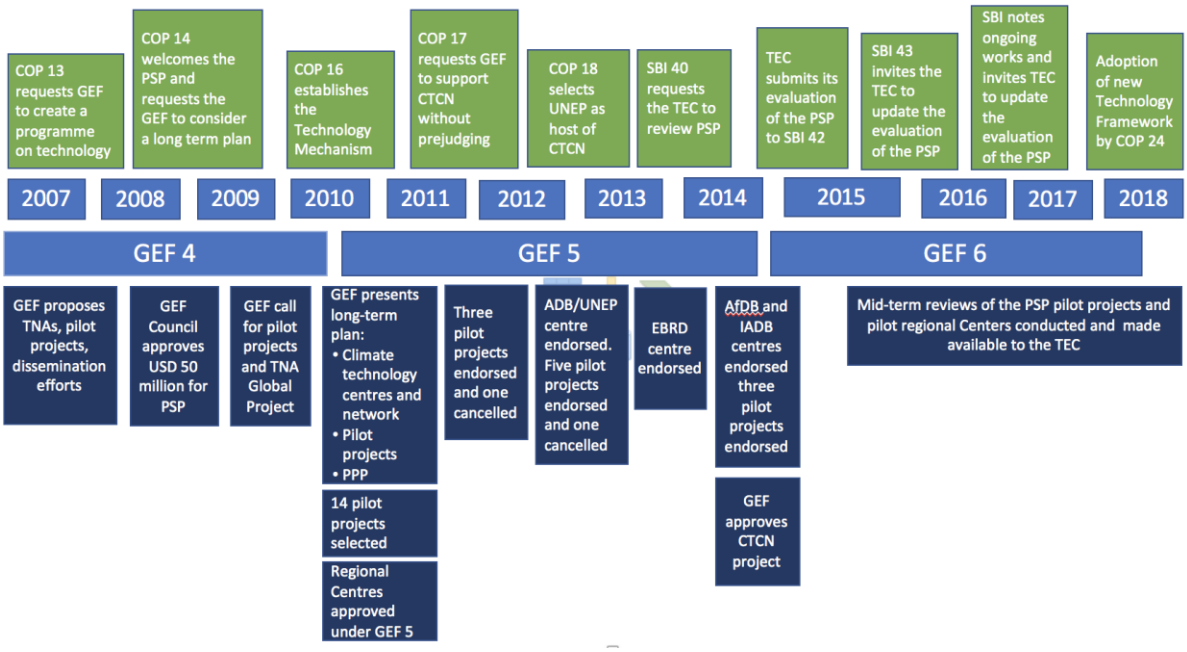
pilot projects. The GEF reports that all mitigation and adaptation GEF-5 projects that have technology-related objectives are part of the PSP.[15] In the sixth replenishment period of the GEF Trust Fund (GEF-6), funding for one of the elements, TNAs, has continued through a focal area set-aside for LDCs and SIDS.

15. The GEF does not set aside funding for the PSP in its replenishment periods. Nor does the PSP form part of the replenishment period strategies. Rather, as noted above, technology transfer is embedded into the GEF programming strategy, along with elements of the PSP, which are funded through country allocations or set-asides in each funding period. These elements are then reported together as the GEF's work on technology transfer to the Conference of the Parties. Further background on the GEF and the PSP can be found in annex I and II.

B. The Technology Mechanism

16. The COP established the Technology Mechanism in 2010, two years after the PSP was created, with the objective of facilitating enhanced action on technology development and transfer. It mandated the TEC and the Climate Technology Centre and Network (CTCN), in accordance with their respective functions, to facilitate the effective implementation of the Technology Mechanism, under the guidance of the COP. Figure 1 illustrates key milestones of the PSP and the Technology Mechanism.

Figure 1
Milestones of the PSP and the Technology Mechanism



Abbreviations: ADB = Asian Development Bank, AFDB = African Development Bank, COP = Conference of the Parties, CTCN = Climate Technology Centre and Network, EBRD = European Bank for Reconstruction and Development, GEF = Global Environment Facility, GEF-4 = Fourth replenishment period of the GEF Trust Fund, GEF-5 = Fifth replenishment period of the GEF Trust Fund, GEF-6 = Sixth replenishment period of the GEF Trust Fund, IDB = Inter-American Development Bank, PPP = public–private partnership, PSP = Poznan strategic programme on technology transfer, SBI = Subsidiary Body for Implementation, TEC = Technology Executive Committee, TNA = technology needs assessments, UNEP = United Nations Environment Programme.

[15] FCCC/CP/2014/2, annex, paragraphs 136 and 137.

III. The effectiveness and efficiency of the Poznan strategic programme

17. This section reviews the effectiveness and efficiency of each of the pilot regional Centers and pilot projects of the PSP and provides a synthesis of the overall effectiveness and efficiency of each of the two elements, and how it has contributed to scaling up the level of investment in climate technologies, in accordance with the overall objective of the PSP. The reviews are entirely drawn from information contained in the MTRs, and in some cases also from updated information provided by the project implementing agencies. Where external material is used, references are provided.

18. Effectiveness is a measure of the extent to which a project has attained its objectives. Efficiency assesses to what extent available resources (human, material and financial) were used efficiently to reach stated goals and whether objectives were achieved on time. It is premature to assess impact at the MTR stage, but it is nonetheless covered as under contribution to scaling which is an indicator of impact. Similarly, short descriptions of challenges are integrated in the effectiveness narratives of each of the projects. A synthesis and analysis of contribution to scaling and replication of the PSP projects is presented in Chapter V.

A. The regional/global pilot climate technology transfer and finance centers

19. The four regional pilot centre projects differ in their implementation modalities, scope and thematic emphasis. The IADB centre places strong emphasis on the creation of networks and working through national and regional executing agencies to achieve its objectives, operating mostly outside regular IADB operations. In contrast, the EBRD centre offers incentive grants for introducing climate technologies with low market penetration rates as complement to EBRD financing, as well as technical assistance. The project in Asia-Pacific was jointly implemented by ADB and UNEP. The ADB Centre mainly provided technical assistance services to its operational departments, as the instrument to 'mainstream' new climate technologies in its regular public sector operations. The ADB centre also has a significant private sector investment component. UNEP provided TA related to strengthening of stakeholder networks and centres of excellence, and the development and implementation of EST transfer policies and programmes. Finally, the AfDB centre adopted a dual approach: mainstreaming in its regular operations for the adaptation activities, which focus on water projects and policy reform, and supporting the SEforALL initiative for the mitigation activities of the centre.

20. The four centres are at different stages of implementation, with the ADB centre nearing project closure. The IADB started later than the other centres and is the least advanced. All four have completed an MTR, with the exception of the UNEP component of the ADB centre.

21. Overall the effectiveness of the Centres was rated satisfactory, with the exception of some components that were assessed as having a low probability of achieving their targets. In terms of outcomes, it is premature to assess effectiveness at the stage of the MTR as no investments had been made yet as a result of the Centres.

22. In addition to the four regional Centres, the GEF has supported from its 5th Replenishment Period, under the PSP, a specific technical assistance program of the CTCN with 1,8 million dollars: "Promoting accelerated transfer and scaled-up deployment of CCM technologies through the CTCN". With this funding CTCN has been able to take a number of key steps in addressing technology transfer needs, including addressing needs for technical assistance related to climate technologies in a pilot of 7-9 developing countries.

23. The CTCN technical assistance project has not undergone a MTR and is therefore not covered here.

EBRD: Finance and Technology Transfer Centre for Climate Change (FINTECC) (MTR, 2017)[16]

Description

24. The Centre is designed to kick-start the market for climate technology investments in ETCs by addressing existing market barriers through (i) establishing the 'Regional Technology Transfer

[16] EBRD-GEF Finance and Technology Transfer Centre for Climate Change (FINTECC) Midterm Review Report.

Networks', the primary purpose of which is to foster learning opportunities on policies and practices that support climate technology transfer; (ii) providing investment finance and support financing pilots with capital grants covering between 5–25% of project costs, and (iii) a technical assistance and capacity building component supporting the development of innovative financing mechanism(s), including methodology development and associated needs assessments, project identification, preparation and implementation assistance. GEF funding is intended to deliver activities that are additional to the baseline activities of the EBRD.

Effectiveness and efficiency

25. The MTR rated the effectiveness and efficiency of the project as satisfactory. As of December 2016, signed FINTECC projects have mobilised USD 3.54 million of GEF funding and USD 46.4 million of EBRD funding for climate technologies. Projects signed under FINTECC to date are expected to yield 248,000 tonnes of lifetime CO2eq emissions reductions. This represents an average abatement cost of over USD 14 per tonne CO2. Adaptation has been more challenging because many potential water investments involve water savings and water is consistently under-priced in FINTECC countries, making investments in water technology a low priority for businesses.

26. The network for policy-makers is under development, and studies were carried out in three pilot countries, Morocco, Kazakhstan and Belarus, with support of IEA and FAO. As a result of this collaboration, the Clean Energy Technology Assessment Methodology (CETAM) was prepared, informing assessments of clean energy technology investment opportunities in the SEMED and ETC regions. The financing mechanism has been developed and is operational, and nineteen (19) projects were signed so far, covering a wide range of mitigation technologies, including three (3) with an adaptation component.

Contribution to scaling

27. The MTR does not address the specifics of potential for scaling investments, other than stating that FINTECC is operational in 16 countries, including the ETC region, the SEMED region, Ukraine, and Kazakhstan, and that such coverage creates opportunities for extended outreach and hence increased potential for replication and scaling up of the project's results. The actual potential for scaling is hard to gauge as there is no information on the projects or the technologies that received grant support, nor are any insights shared on the conditions for scaling and replication of the supported projects.

IADB: Climate Technology Transfer Mechanisms and Networks in Latin America and the Caribbean Project (MTR, 2019)[17]

Description

28. The project seeks to reduce GHG emissions and vulnerability to climate change of LAC countries in specific sectors, namely forestry, transport, renewable energy and energy efficiency for mitigation, and agriculture for adaptation. A sequential approach to implementation was adopted, with component 1 developing institutional capacities and analytical tools to address EST-related issues in national and sectoral policies and plans. It then moves on to strengthening EST transfer through technology networks and centres under Component 2, and to piloting more specific cases under Component 3. Finally, Component 4 seeks the sustainability of the efforts made by promoting public and private investment. The Centre seeks to mobilize USD 50 million in investments in EST, mainly through activities led by the countries and carried out under Component 4. The project is designed to make it more participatory by engaging regional stakeholders to identify priority areas of work within the sectors.

29. The organizations that lead the EST thematic networks and operate as project executing agencies (PEAs) for the centre include Fundacion Bariloche and CATIE, which are also part of the CTC consortium.

Effectiveness and efficiency

30. Overall, the MTR rated the effectiveness and efficiency of the project as Moderately Satisfactory (MS), because it exceeded the targets in some output indicators and had moderate

[17] Mid-term evaluation "Climate Technology Transfer Mechanisms and Networks in Latin America and the Caribbean Project".

shortcomings due to not entirely fulfilling other targets. The PEAs generally met or exceeded the target number of technical assistance projects, programs, strategies and technical studies. The project design reflects financial cost-effectiveness through the creation of partnerships with regional institutions that are leaders in specific themes covered by the project and through the mobilization of private and public investment, among other measures that promote synergies among the different initiatives carried out in the region.

31. The Centre's capacity building activities have focused on two main areas: (i) Roles of National Designated Entities (NDEs); (ii) Methodologies and best practices to mainstream EST in climate change planning. The number of thematic networks in LAC that have incorporated the promotion of EST as part of their mission/work plans are on target. The number of feasible mechanisms for EST transfer showcased by the PEAs has exceeded the target.

32. In terms of impact, measured by the indicator of 'investment enabled by project activities' (through e.g. feasibility assessments, preparation of funding proposals, market research studies), no concrete investment had occurred at the time of the MTR. Activities whose outputs and outcomes will support policy-making have started.

Contribution to scaling

33. The issue of scaling investment is not explicitly addressed in the MTR. Instruments of scaling are: analytical tools; institutional capacity development; creation of synergies through networks; recommendations for policy frameworks, climate innovation systems, climate technology transfer mechanisms; and finally, pre-feasibility studies and project proposals. The centre is effectively acting as a "project accelerator", simultaneously strengthening and leveraging EST and climate networks, and engaging policy makers. The realization of investment and therefore scaling is contingent on access to climate finance, and on the adoption of incentives and supportive policy frameworks.

African Development Bank: Pilot Africa Climate Technology Finance Centre and Network (ACTFCN) – (MTR, 2016)[18]

Description

34. The African Climate Technology Centre (ACTC) supports sub-Saharan African countries in scaling-up the deployment of low-carbon and climate-resilient technologies for climate change mitigation and adaptation. Its objective is achieved through the following components (i) Enhancing networking and knowledge dissemination with respect to climate technology transfer and financing; (ii) Enabling the scaling-up of technology transfer through policy, institutional and organizational reforms of the country and regional enabling environments through technical assistance; and (iii) Integrating climate change technologies into investment programs and projects. The ACTC was established in July 2014 and is managed by the SE4All Africa Hub team in the Energy, Environment and Climate Change Department of AfDB.

35. The ACTC provides technical assistance in response to national institutions' requests and promotes knowledge creation and exchange. In addition, for adaptation, TA services can be provided to AfDB water projects to integrate adaptation technologies. There is no direct transfer of funds (grants) or procurement other than consulting services.

36. The Centre is focused on the water sector for adaptation and on the energy sector for mitigation. For the energy part, the ACTC supports the Sustainable Energy for All (SE4All) Initiative. Furthermore, the project has a strong collaboration with the Sustainable Energy Fund for Africa (SEFA), hosted by the bank, which supports Africa's sustainable energy agenda. ACTFCN is in the position to support first mile actions required to prepare projects for large TA packages provided by SEFA.

37. Knowledge products are produced through calls for proposals targeting research institutes, universities, national climate centres and other relevant academic institutions. The knowledge products are focused on off-grid renewable energy, clean cooking solutions and adaptation technologies in water usages.

[18] African Climate Technology and Finance Centre and Network Project Mid-term Review. https://www.african-ctc.net/fileadmin/uploads/actc/Documents/Final__ACTFCN_Mid-term_Review_Report_20161011.pdf.

Effectiveness and efficiency

38. With regards to the project design, the conclusions regarding its effectiveness vary; with regard to the project's implementation approach it was found to be very effective. The establishment of a climate technology network hosted and managed by the ACTFCN was no longer regarded as reasonable in view of the various existing and well-functioning climate change networks which had emerged in the time between project conceptualization and implementation.

39. Under component 2, support advice provided to countries on national policies and programs, the project scores low on the indicator of national/regional clean energy policies and strategies adopted, with a low probability of achieving the target. Activities of direct support to policy/regulatory strategies have advanced slowly, compared to other activities.

40. Component 3 has mainly supported the mainstreaming of low carbon and clean technologies through SE4All Action Agendas (AA) and Investment Prospectuses (IP). Also supported is project facilitation (last mile support) to reach a final investment decision and approval of viable projects. This can involve advice and support on resolution of remaining outstanding issues, addressing project risks and development of a risk mitigation strategy, finalization of the project documentation required for the project to be ready for financing, and the mobilization of financing.

41. For adaptation it was originally foreseen that the water department would proactively identify projects, as all adaptation activities are to be directly linked to the bank's water sector activities. However, this effort did not take off until an expert was hired to engage with the water department. At the time of the MTR there were 6 projects in the pipeline.

42. So far, no investment projects have been directly supported by the Centre, although efforts have been made into assessing the potential of setting up dedicated financing options for EE & RE projects. The probability that the target for this indicator will be achieved is moderate.

43. The MTR found that implementation of the ACTFCN is requiring a wider variety of roles and more resources than originally foreseen by the project. Some institutions are having difficulties in formulating requests and have required some support from the ACTFCN team in conceptualizing requests. Moreover, a more active acquisition of new projects may be necessary, as well as engagement in organizing capacity building and/or outreach events, visiting countries receiving TA for a closer follow-up, monitoring, co-shaping and quality control of activities on the ground.

Contribution to scaling

44. The issue of scaling is not explicitly addressed in the MTR. Scaling will require a more active support structure and network for generating requests, and that can also continue to support activities and long-term engagement with policy-makers and government agencies, as well as facilitate access to finance. As indicated in the MTR, it will be key to ensure financing for the implementation of the Action Agenda & Investment Prospectuses in the short/medium term. A study has been conducted to assess the potential for setting up a fund to provide credit lines for small and midsize investments in energy efficiency and the renewable energy sector.

ADB: Pilot Asia-Pacific Climate Technology Network and Finance Centre (CTNFC) (MTR, 2015)[19]

Description

45. The CTNFC was endorsed by the GEF CEO in May 2012, is being jointly implemented by UN Environment and ADB, and began implementation in October 2012. The project's objective is to pilot a regional approach to facilitating deployment of climate technologies (mitigation and adaptation) that combines capacity development, enhancement of enabling environment for market transformation, financial investments and investment facilitation. CTNFC consists of six components. Three components were under management of ADB: (4) Integrating climate technology financing needs into national development strategies, plans and investment priorities; (5) Catalysing investments in environmentally sound technology (EST) deployment; and (6) establishing a pilot "marketplace" of owners and buyers of low-carbon technologies to facilitate their transfer. The CTNFC only offered consulting services and funded workshops, meetings and trainings. Three components were implemented by UNEP: a regional network facilitation;

[19] ADB Pilot Asia Pacific Climate Technology Finance Centre (CTFC) Mid-term Review Report (Final). https://www.adb.org/sites/default/files/project-documents/45134/45134-001-tacr-en.pdf.

strengthening capacities of national and regional climate technology centres; support for EST transfer policy formulation and related capacity development.

46. The MTR only covered the ADB components. In addition, a Knowledge TA started as ADB's own initiative earlier than the CTNFC and was integrated into the CTNFC. The Knowledge TA produced the organization of four regional dialogues to facilitate knowledge sharing among national climate change institutions in ADB's DMCs and four knowledge products.

Effectiveness and efficiency

47. Under Component 4, Climate technology was mainstreamed in national development plans through the CPS (Country Partnership Strategy) and COBP (Country Operations Business Plan) process of its member countries. Agreements were reached with DMCs, through the Regional Departments, on receiving technical assistance with integrating climate technologies into national and/or sub- national investment plans, including pre-feasibility studies. Seven (7) countries (PNG, PRC, Bhutan, Viet Nam, Pakistan, Mongolia and Bangladesh) received assistance. For Bangladesh the assistance resulted in the inclusion of a number of projects with climate technology focus investments. In the PRC, assistance was provided on the design of the Climate Technology Promotion Mechanism (CTPM) for Hunan. However, without conducting an ex-post evaluation, it is not possible to assess whether the assistance provided and inclusion in the COBP led to concrete investment projects.

48. Component 5 has a public sector and private window. The public-sector investment window works with the Regional Departments with the intention of assessing the projects within the ADB investment pipeline that would benefit from additional technology input, including technology assessment, pre-feasibility assessment, best practices, and comparison of technology options. Assistance was provided to 20 investment projects. The fact that the subproject was not designed to originate its own projects outside the investment pipeline of ADB placed limitations on the outcomes that could be achieved. Midstream adjusting projects is hard to impossible because loans written are locked in and can't suddenly change, and it is normally tightly defined as to what is to be achieved, and budgets can't be changed. Making substantial technology changes during the project cycle is incompatible with ADB processes. Given the long lead time usually required for developing ADB public sector investment projects, it is not yet clear how much of the technology inputs will be translated into the final project designs particularly since decisions on the design, choices of technologies, and prioritization of investment projects to be supported are subject to a number of factors both within ADB as well as the respective country governments.

49. The private sector investment window was initially intended to catalyse climate technology investments via VC funds. During the implementation of the subproject, it was realized that there was a narrow and limited market for VCs that focus on cleantech in developing Asia, especially early stage VCs. Hence, it was decided to add PE and other investment ecosystem actors as target clients. The PE fund supported is ACP, Asia Climate Partners established by the ADB. Consequently, a shift in focus to four core areas was embraced: (i) Supporting accelerator and incubator programs for high-potential cleantech entrepreneurs; (ii) Supporting cleantech-focused VC and PE funds and investors; (iii) Enabling knowledge sharing on best practices and market trends; and (iv) Creating a regional cleantech network. The project has assisted clean technology accelerators in mentoring clean technology start-ups in PRC, the Philippines, and India. The project also supported various events promoting knowledge sharing and collaboration in the region and facilitating the creation of clean technology network of investors, providers, start-ups, and other stakeholders.

50. The design of Component 6 was guided by the recommendation of a feasibility study conducted by McKinsey in 2010. A key indicator of the effectiveness of the assisted broker model for transfer of LCTs was the demonstration of its ability to operate as a commercial platform for brokering technology transfer from owners of technologies in or outside Asia Pacific to technology buyers in developing Asia. The "market place" was operated by IPEx Cleantech Asia, a consortium of DNV-GL in Singapore and ReEx Capital Asia and was based in Singapore. It was launched in December 2014. IPEx closed in December 2017, after having brokered one technology transfer deal to a project developer in India, involving a water technology for industrial effluents owned by a Singaporean firm, which paid for the services provided. While the market place generated a strong interest from technology owners both outside and in the region, who were seeking to penetrate the market in developing Asia, the profile and interest of potential buyers, and their willingness and ability to pay for new technologies and for brokerage services was not researched prior to project

development and appraisal. Moreover, the study purported that this kind of platform can only be financially viable and sustainable after five years of operation. Yet the MPO was expected to be self-sustaining after 18 months of operation.

51. The MTR rated project progress as moderately satisfactory to satisfactory.

Contribution to scaling

52. The MTR did not address contribution to scaling.

B. National pilot projects of the PSP under the fourth replenishment of the GEF

53. Ten of the eleven projects have reached the mid-term evaluation stage. For more than half the projects, effectiveness and efficiency were not or not consistently evaluated in the mid-term review and are therefore unevenly assessed in this evaluation. Five projects (Sri Lanka Bamboo, Thailand Cassava ethanol, Cambodia biomass energy, Senegal Typha, Mexico Wind) were insufficiently advanced to make a meaningful assessment of their effectiveness at the time of the MTR. For four of the projects updated implementation information was received and is reflected in this evaluation. Nonetheless, a narrative assessment of effectiveness is provided for all projects based on project achievements. A few exceptions notwithstanding, the effectiveness and efficiency of many pilot projects was moderately unsatisfactory at the MTR stage. The main factors, other than those beyond the control of the project that explain the reason for the low effectiveness and efficiency are outlined in the experience gained and lessons learnt section.

54. The pilot projects can be categorized as technology transfer through demonstration projects. The GEF grant was used for technical assistance, studies, institution building, capacity development, and in a number of cases, for reducing the cost of technology adoption and development to users and firms. Only in the case of the SolarChill project, was the full cost of demonstration paid by grants.

55. A general finding is that project objectives tended to be overambitious, whether in their goal to have supportive policy frameworks adopted, supply chains established, in their technology transfer and technology development goals, and in their ability to scale investments. In the best cases, they successfully demonstrated and piloted climate technologies in a new context, and laid a foundation for further investment and scaling. Only the Green Freight project, for which a terminal evaluation was available, fully achieved its objectives. In terms of efficiency, the majority of projects scored poorly on timely achievements of objectives due to delays in start of implementation, and subsequent difficulties due a number of factors. Effectiveness was much affected by engagement with government during project development, government leadership and support during implementation, and by project management.

56. The effectiveness and efficiency, in particular in terms of their achievements, and any contribution to scaling of each of the reviewed pilot projects are summarized in Annex III.

IV. Experiences gained and lessons learned in implementing the centres and the pilot projects as relevant to the Technology Mechanism

57. The PSP projects offer a rich source of experiences gained and lessons learnt in designing and implementing climate technology projects. Equally, the implementation of the regional pilot centers has generated experience with different modalities for originating climate technology projects, different TA instruments of support, technology transfer mechanisms, and regional centres as climate innovation system builders through network development and strengthening, creating synergies and links, and connecting projects and technologies with climate finance and investors.

A. Lessons learned from the pilot regional centres

58. Five lessons relevant to the Technology Mechanism were synthesized from the MTRs of the pilot Centres.

Project origination

59. Understanding project origination modalities and their influence on potential and pathways for scaling up investment is an important aspect of enhancing the effectiveness of the Technology Mechanism. For example, the IADB origination modality of regional institutions which are consortium members of CTCN has implications for the Technology Mechanism. Yet investment pipeline origination, as is the case for the EBRD Centre, has not precluded CTCN from providing technical assistance.

60. Four project origination modalities can be distinguished: origination in the investment pipeline of Regional Development Bank without capital grant support (ADB); origination in the investment pipeline with capital grant support to reduce cost of technology adoption (EBRD); origination from public sector and private sector entities (AfDB); origination from pre-selected regional and national institutes with thematic expertise that are executing partners in the project (IADB). More information and insights are needed on the actual impact on climate technology outcomes of the 4 modalities.

61. Clearly, origination in investment pipelines without capital grant support appears to have the least likely impact as indicated by the ADB experience because loans are already written in and projects too tightly defined to allow meaningful change. Indeed, in a follow-up TA approved in October 2018 (Integrated High Impact Innovation in Sustainable Energy Technology ADB TA knowledge and support technical assistance (TA) cluster)[20] it is stated that the MTR of the regional TA cluster for Establishing a Pilot Centre to Facilitate Climate Change Technology Investments in Asia and the Pacific identified the need to (i) determine technology options through country-specific analysis more strategically; (ii) create a more direct link with ADB operations and the lending pipelines; and (iii) bring projects into early assistance discussions with ADB (as either stand-alone projects or components of larger projects) to ensure DMC ownership and commitment, country relevance, and increase the likelihood of upscaling. Also referred to is the demonstrated "need for increased pilot projects to demonstrate the ability to standardize solutions and support, and scale-up opportunities for promising technologies".

62. It is not possible to evaluate the FINTECC approach to origination as there is no information on the entry point of the assistance in the project cycle and how technology options were determined, the type of technologies supported, and on the conditions and likelihood for scaling.

63. The ACTFCN adopted two different approaches: origination in the investment pipeline for adaptation, and origination from public and private sector entities for mitigation. According the MTR, public sector entities struggled with formulating requests and the Centre had to assume a broader role and provide more time resources than anticipated. As articulated in the MTR, experience shows a need for a more proactive origination and follow-up, e.g. a more active acquisition of new projects and the need for on the ground engagement and co-shaping and quality control of activities on the ground. This is an important insight: the effort that is required to originate projects that meet requirements, and therefore the need for engagement and capacity development.

TA modalities

64. A better understanding and differentiation of the kinds of TA modalities as early stage project acceleration instruments as a basis for scaling investment in climate technologies is essential to enhance the effectiveness of the Technology Mechanism, in particular in view of the role of the CTCN as technical service provider. Yet there have been very few concrete opportunities for the CTCN to provide TA services in the context of the pilot regional Centres.

65. The ADB Centre MTR indicates that pre-feasibility studies proved to be very valuable in the early stages of identifying potential projects for including in Country Business Operation Plans (CBOP). Other forms of TAs were also provided, such as best practice information, technology comparisons, and country specific data. The IADB also deploys a range of TA modalities, including technology road maps and analytical tools.

66. Much less information was provided on policy support related TA. The work on policy support at IADB Centre has just started and the results of the relevant UNEP component of the ADB Centre have not been reviewed yet.

[20] https://www.adb.org/sites/default/files/project-documents/52041/52041-001-tar-en.pdf.

Financing

67. A better understanding of the financing needs of climate technology projects generated by the pilot regional Centres and different modalities for facilitating access is essential to achieve the scaling of investment as originally envisaged by the PSP.

68. With the exception of FINTECC, which offered up to 25% capital grant support to investment projects, none of the technology and finance centres offered financial instruments, but at the most facilitated access to finance, though it is not possible to gauge from the MTRs to what extent this will be successful. No investments had yet been made based on projects generated by the AfDB and IADB centres at the time of the MTR. As both the MTRs of the IADB and AfDB state, it is key to ensure financing for the implementation of the AA and IP in the short to medium term, and for the projects generated by the EPAs of the IADB respectively.

69. Without access to finance, project generation will lose momentum, and their added value through their ability to function as project accelerators risks being cast in doubt. In the case of the AfDB for example, a study has been conducted to assess the potential for setting up a fund to provide credit lines for small and midsize investments in energy efficiency and the renewable energy sector. Alternatively, the RDBs could absorb some of the projects in their investment pipeline, and facilitate access to climate funds such as CIF, GCF, GEF, SCCF and LDCF and the Adaptation Fund. Both the IADB and ADB MTR raise the need to create a more direct link with Bank operations and the lending pipelines.

Long-term engagement, ownership and capacity development

70. The need for and benefits of long-term engagement with national focal points including NDEs, institutions and stakeholders overall and the importance of capacity development support raised by three of the Centres suggests the need for continuity of engagement and a role for the CTCN through its support of NDEs. In line with the new technology framework, there is a need for enhanced technical support delivered in a country-driven manner, including for enabling environments and capacity building, and engagement and collaboration with relevant stakeholders.

71. The AfDB MTR raises the need for long-term engagement and support to enhance the chances of successful implementation of strategies and policies rather than by financing isolated activities. It is stated that through a longer-term engagement, the Centre will be able to build strong relationships with local institutions, identify capacity development needs and other support required and be able to provide tailored TA.

72. The lesson from the UNEP implemented components of the Asia-Pacific pilot centre is that it is a challenge to assess how long it will take for TAs to be translated to policies, larger programmes or demonstration projects, or for investment to happen and that maintaining strong ties with focal points and stakeholders is crucial for exploring options for scaling up the TAs through collaboration with ADB, CTCN, and the GCF. Their current focus is on providing TA to partner countries to support them in designing and developing programmes to facilitate technology use for NDC implementation. The coordination among the various focal points on climate change and interactions with stakeholders is still being built up.

73. The IADB Centre stressed engaging and generating ownership on the part of national or local governments as critical to making the long-term objectives of a project, including - private sector projects, legitimate and sustainable.

Need for realistic time scales for technology transfer mechanisms

74. The experience with operationalizing the Centres and with the ADB-led Market Place for LCTs demonstrates the need for realistic time frames to test, develop and finetune operating procedures and modalities of technology development and transfer acceleration Centres, and to establish a track record. All Centres, originally conceived as three-year projects, took more time to be designed, established, become operational and achieve expected outcomes.

B. Lessons learned from the pilot projects

75. The lessons learnt from the pilot projects are more centred on the importance of engagement with and support from governments, and of enabling environments in the successful design and implementation of demonstration projects, than on support modalities by project agencies. The link

between the two elements is that the implementation of the pilot projects shows the need for pre-feasibility and other techno-, market and socio-economic studies to inform project design, which is what the Centres and the CTCN can provide. The other shared lesson is that of access to finance, both for demonstration and for scaling.

Strong government leadership is key to successful implementation

76. "Strong government leadership is key to successful implementation", and "should be a prerequisite for demonstration projects", according to the evaluation of the Green Freight demonstration project. "The local government in Guandong 'spent much time coordinating among line departments and resolving any issues encountered during preparation and implementation". This is also echoed in the HCFC phase out and HFC-free technology promotion project MTR, where the PMU worked closely with the government on an implementation strategy. Government leadership is also linked to clear government ownership of a project. Projects where government leadership was lacking were much less effective. Governments play not only a key role in removing barriers to and incentivizing the adoption of new technologies but government leadership is also key in helping to resolve coordination and implementation problems encountered during first of their kind initiatives.

The importance of engagement and dialogue with government

77. The imperative of key stakeholder engagement starts from the project development stage, and the importance of dialogue with government even in private investment projects, is expressed or apparent in most of the projects. Projects that actively engaged in dialogue with government and relevant public-sector agencies from project development to implementation stages were more successful. The cassava ethanol South-South technology transfer project MTR argues persuasively that the Thailand ethanol experience shows that dialogue with government is as important as private sector engagement, and that weak engagement with the governments of Myanmar and Laos in project development affected the lack of results in those countries.

The importance of enabling environments

78. For all the PSP demonstration projects, enabling environments, i.e. supportive policy and regulatory frameworks are key to achieving private sector investment and therefore scaling. In Chile it was the introduction of a net billing scheme that allowed the scaling up of rooftop solar PV, though its full potential is still held back by lack of access to financing. In the Russian Federation HCFC phase out and HFC-free and energy efficient refrigeration project, progress of the energy efficiency component is hampered by the lack of legal and financial imperatives to change. The lack of a policy instrument to enable excess power to be sold to the grid was one of the factors affecting the success of the Cambodia agricultural residue biomass project. In Thailand government policy and pricing transparency across all value chains were key determinants to mobilize private sector involvement in ethanol production. In the Mexico Wind project, the strategy for the scale up of the MEM (wind turbine) will be based on government's plans for the development of renewable energies in the country.

Need for flexibility in project design

79. The need for flexibility in project design is raised in the GEF report to COP 24 in the section on PSP learning. Project activities should not be rigidly defined at appraisal, to allow the flexibility to adopt a phased approach, add new activities, and sharpen the design as new situations emerged. A number of projects underwent a re-design in response to emerging situations, new policy instruments and market developments.

Access to finance

80. In half of the reviewed pilot projects, capital grant funding was offered to private investors, farmers and other technology actors to cover part or the full cost of demonstration, or in the case of Chile, lower the loan cost for rooftop solar PV. The capital grant was crucial in getting firms and farmers to invest in new technologies, and in developing the wind turbine in Mexico. Further scaling will be dependent on the availability of suitable financing instruments, including climate finance and commercial financing.

The importance of a strong outreach component

81. According to the Green Freight project, the design of a demonstration project should include a strong outreach component. The innovative nature of most of the technologies demonstrated means there is low awareness among potential technology users, government agencies, and therefore the need to have an outreach component targeted at potential users and more broadly. Reaching out to farmers in Jordan and industry in the Russian Federation for example was essential to raise awareness and generate broader interest, and this will continue to be important for further scaling.

The importance of pre-feasibility studies and market studies

82. A number of projects were hampered by a lack of data, information and understanding of potential demand and conditions for technology adoption that could have been generated by techno-economic feasibility and market studies, including on potential target users profiles and conditions for investment. This resulted in implementation delays and projects not achieving objectives and targets. Such studies can be critical for making strategic choices and successful project implementation. The CTCN and the pilot regional centres have a role in providing TA for such studies that can be used to inform project development.

The need for intermediate metrics

83. While the goal of the projects is the reduction of CO2 emissions or increased resilience for adaptation, their value in and contribution towards building a climate innovation system for specific technologies is not being measured. There is a need to capture and measure value created as a result of knowledge creation and spillovers, and of de-risking future investment.

Need for suitable technology transfer models and mechanisms, and good practices

84. Both the pilot Centres' and pilot project implementation experience indicate the need for better understanding of suitable technology transfer models and mechanisms, and good practices to inform project design and implementation. Technology transfer was supported in a variety of ways through the pilot projects, with projects being relatively vague about support beyond pilot demonstration and training. There is even less information on the technology transfer mechanism being considered by the Centres, with the exception of the Assisted Broker Model of the Asia Pacific Centre, which failed to establish a replicable business model.

Unrealistic project objectives

85. A general finding is that project objectives tended to be overambitious, whether in their goal to have supportive policy frameworks adopted, supply chains established, in their technology transfer and technology development goals, and in their ability to scale investments. In the best cases, they successfully demonstrated and piloted climate technologies in a new context, and laid a foundation for further investment and scaling under strong government leadership including stakeholder engagement and dialogue.

V. The operations of the Poznan Strategic Programme

86. This chapter looks at the operations of he PSP at programme level. In analyses the operations of the PSP in terms of: scaling up and replicating projects; PSP relevance in addressing global and regional issues; and the effectiveness of the PSP as a model of change.

A. Scaling and replication of projects

87. The PSP projects are demonstration projects that foster innovation, and support the testing and first time deployment and transfer of new technologies. On their own, the pilot projects are unlikely to lead to scaling. It is only where demonstration projects are succeeded by projects with a public or commercial financing component, and other scaling support that scaling is a realistic outcome. A single demonstration project should build a foundation and is a step towards de-risking technology adoption but will not lead automatically to scaling without follow-up projects and access to climate finance. This is an important finding in the context of enhancing the effectiveness of the Technology Mechanism as it reveals the contribution of the pilot projects in the process towards scaling, as well as the follow up required to ensure scaling successful pilots.

88. In the best case, the pilot projects laid the foundation for scaling and replication. This is the case for the Green Freight demonstration project and the Jordan irrigation project. The Green Freight project has been responsible for initiating a number of other new initiatives in the sector, including a similar green freight initiative in Brazil and the "China Green Freight Initiative" led by MoT, CAA and China Road Transport Association.

89. Regarding the scaling of the Jordan project, during the preparatory time for the start-up, IFAD had embarked on the design of a new project in Jordan, namely REGEP (Rural Economic Growth and Employment Project – US$ 15.18 million). REGEP will act as a scaling-up platform where all the SCCF project tested technologies that are proved successful and accepted by farmers will be immediately scaled-up.

90. The MTR of the cassava ethanol concludes that implementing South-South technology transfer projects entail some risk due to complexity. There is a need for success stories or examples that can be replicated.

91. According to the CTCN, scalability and replicability will be key over the next four years. The CTCN has indicated it will, through development of regional TA requests, multiply the impact of a single intervention across countries facing similar challenges.

92. According to the progress reported by the global UNIDO project "Promoting Accelerated Transfer and Scaled-up Deployment of CCM Technologies through the CTCN" in the GEF report to COP 24, there is a significant demand from developing countries for the types of services that the CTCN delivers. Indeed, increasing numbers of requests for technical assistance are reaching the CTCN:

(a) There is a demonstrated appetite for CTCN-like services as a complement to other mechanisms and initiatives. In particular, the CTCN can contribute to an early-stage support;

(b) The CTCN has a wide range of ready-to-use resources and network of international expertise and technologies;

(c) There are multiple opportunities for scale-up and replication, and the CTCN, due to its demand-driven nature, is well positioned to gauge the needs and priorities.

B. Addressing global and regional issues

93. With regard to the PSP's relevance in addressing global and regional issues, it should be emphasized that the COP decision to establish the PSP and GEF efforts to create it have significantly raised the profile of the important role that climate technology development and transfer plays in supporting countries in meeting the objectives of the Convention.

94. In the 2015 evaluation, it is reflected that some stakeholders also stressed the importance of GEF PSP collaboration in creating a global climate technology institutional architecture that is enhancing support and bringing greater attention to climate technology issues.

95. The thematic emphases of the Centres generally reflect regional priorities. A major focus of the ADB Centre is energy access, and the implementation of the SEforALL initiative. In LAC, agriculture is a major focus. However, one imbalance is the lack of adaptation projects among the pilot projects. Although all the Centres have an adaptation component, there has been less emphasis and more difficulties with addressing adaptation.

96. The PSP climate technology transfer and finance centres are demonstrating the benefits of a regional approach through enhanced learning and opportunities for South-South and North-South technology transfer while delivering country-driven priorities. The EBRD MTR pointed out the acceleration to market transformation that could result from networking activities that support both South-South and North-South knowledge transfer. For example, the developments in introduction of energy performance certificates for buildings in Moldova and Kyrgyzstan followed similar paths, and faced similar challenges, and these are again coming to the fore in Ukraine. The networking on technology transfer proposed, when focused on concrete opportunities promises to accelerate market transformation.

97. The IADB Centre promotes and supports regional collaborative efforts, specifically through the creation of partnerships with regional institutions that are leaders in the themes covered by the project. Strong emphasis has been placed on linking and contributing to existing regional networking

initiatives, with a view to also ensuring the continuation of the networks' activities beyond project closure. The MTR also noted the lack of links between the technology transfer and climate change communities in the region, something that the Centre is bridging through its network and project activities.

98. In the ADB Centre the VC and incubators component also supports regional and global network development, and has similarly connected the cleantech innovation and climate change change communities.

C. Effect a model of change

99. The evaluation of the PSP pilot projects demonstrates, with few exceptions, the need for a more strategic and consistent approach informed by preparatory, foundational and case study work that regional climate and technology finance centres and the CTCN are well positioned to deliver.

100. As outlined in the section on experience gained and lessons learnt, the climate technology transfer and finance centres and the CTCN are in effect operating as climate technology project accelerators and more broadly as climate innovation system builders, connecting technology, climate, finance and policy actors, creating synergies, supporting capacity development, and generating learning and knowledge.

101. It is essential that they continue in some form after GEF funding comes to an end, in particular in view of the new technology framework which strongly emphasizes innovation, collaborative efforts, enhanced technical assistance, and on enhancing stakeholder engagement at the national, regional and global levels.

102. According to the GEF report to COP 24, there is significant demand for the type of services that the CTCN delivers and that it can be a complement to other mechanisms, and in particular contribute to an early-stage support.

VI. Overlap, complementarity and synergies between the PSP centres and pilot projects and those of the Technology Mechanism

103. In response to a request from the COP, the GEF elaborated and submitted a plan for the long-term implementation of the PSP to COP 16; the GEF provided funding for the regional centre projects as part of GEF-5. On the Technology Mechanism, COP 16 established the CTCN and decided that the Climate Technology Centre would facilitate a network of national, regional, sectoral and international technology networks, organizations and initiatives with a view to engaging the participants of the Network effectively in agreed functions. While there are thus no overlaps and complementarities in the COP mandates of the centres and the CTCN, there are overlaps, complementarities and possible synergies in the activities of the centres and those of the CTCN. This chapter describes overlaps, complementarities and synergies between the activities of the PSP centres and pilot projects and those of the Technology Mechanism.

GEF support for CTCN

104. The COP has repeatedly requested the GEF to provide support to the CTCN. Under the PSP, the GEF has supported from its 5th Replenishment Period a specific technical assistance program of the CTCN with 1,8 million dollars: "Promoting accelerated transfer and scaled-up deployment of CCM technologies through the CTCN". With this funding CTCN has been able to take a number of steps in addressing technology transfer.

105. In one region, Asia Pacific, UN Environment, the host of the CTCN, has implemented the capacity building component of the regional climate technology transfer and finance centre. This has led to accelerated demand of CTCN services as soon as the CTCN started its operations.

106. Efforts have been made by the GEF to coordinate between the CTCN and the regional banks on collaboration with the regional centres of the PSP. Generally, the coordination has been ad-hoc in nature and been limited to information sharing. No specific efforts aiming at joint technical assistance or capacity building programs were made. Furthermore, it has remained unclear whether PSP TA services have been reachable to the National Designated Entities of the Convention.

Collaboration and coordination between the pilot regional Centres and the CTCN

107. In some cases, CTCN has approached ACTFCN to comment on incoming requests for TA. Both centres started activities at a similar point in time and initially the scope for collaboration was limited, however, now with both centres in full operation a closer coordination/collaboration is being established. For instance, pipelines have been shared, and ACTFCN would forward requests to CTCN for topics/areas not covered by itself. Providing joint support to some countries is also a possibility being assessed.

108. According to the ADB centre MTR, the efforts of the CTFC (through component 4) should have been able to piggyback on the activities supported by UNEP in the project. However, it found that the coordination in the management between the part of UNEP and that of ADB needed strengthening. It recommended that a strengthening of partnerships and coordination on Climate Technology Promotion and Implementation, including that information sharing, coordination and communication between implementing partners, namely ADB and UNEP, should be enhanced to address implementation gaps as well as leverage each other's strengths in dealing with governments for greater support on project implementation.

109. The FINTECC MTR states that good collaboration has been established with the CTCN network (building a foundation for Network 3). The EBRD attended CTCN's Regional Network meeting, the Regional NDE Forum in Armenia on 1 October 2015. The EBRD is reviewing all requests received by CTCN from EBRD countries of operation and is providing inputs wherever possible.

110. In the IADB MTR it is indicated that the association with FB and CATIE contributes to the project objective of supporting the operation of the CTCN and facilitates the coordination of efforts and activities between the CTCN and the Project.

111. There has been some practical and concrete cases of collaboration with regional banks, such as providing technical assistance for preparing a financial proposal for EBRD for fuel-switching in Bosnia-Herzegovina, organizing capacity building workshops together with AfDB, and CTCN Consortium Partners supporting project preparations for IADB. However, these are most probably separate cases and not necessary linked together with PSP programming.

112. The GEF also reported in detail in its report to COP on the organization of virtual meetings between the Centres and the CTCN, and on collaboration and communication established between the CTCN and the Centres.

113. Yet beyond attending meetings and exchanges on project proposals, and a few cases of CTCN preparing technical assistance for a Bank project, synergies were not more systematically explored. To ensure greater coherence, synergy and complementarity, a regional centre project should be working with the CTC and its network. This could have been the case for Asia-Pacific if the Centre project had not started before the CTCN became operational.

VII. The responsiveness of the GEF to the TEC's recommendations on the PSP to enhance the effectiveness of the Technology Mechanism

114. In its final report on the evaluation of the PSP[21] undertaken in 2015, the TEC provided a number of recommendations on the PSP to enhance the effectiveness of the Technology Mechanism. This section assesses the responsiveness of the GEF and other actors to these recommendations.

(a) ***Encourages the GEF to further catalyse the scaling-up of good practices under the PSP and the sharing of experiences and lessons learned among PSP elements and with relevant stakeholders***

115. The GEF has continued to approve projects with technology transfer objectives. In the reporting period leading to COP 24, for CCM, 27 projects with technology transfer objectives were approved with $108 million in GEF funding and $402.9 million in co-financing. For CCA, eight projects to promote technologies for adaptation were approved with $48 million from the LDCF and $1.1 million from the SCCF, and $177.9 million of co-financing.

[21] FCCC/SBI/2015/16.

116. The PSP projects are still under implementation, and have produced mixed outcomes so far, and it is premature to start scaling specific practices before further assessment of their results and their potential for scaling. In the follow-up to the Centre that is nearing project closure, the ADB-UNEP Centre, a different project origination approach is being adopted, namely the development of innovative low carbon technology projects in close collaboration with the operational departments rather than aiming to assist projects that have already entered the investment pipeline. There is no assessment possible or sufficient information yet on the replicability of some of the technology transfer mechanisms and support models. Yet as the PSP experience has proven, there is an urgent need to learn from experiences and better understand the conditions, modalities and processes for successfully demonstrating, transferring and scaling new technologies.

117. One centre model that is currently proven is that of the CTCN, which has established a track record of providing early stage support to potential projects, and for which there is much demand from countries.

118. In its report to COP 24, the GEF highlighted that a constructive dialogue has been established with the respective GEF agencies. The GEF also attended a number of meetings to raise awareness of the program. In addition, the GEF organized a side event at SB 46 to share experiences and lessons learned from the PSP.

(b) ***Invites the GEF to share the midterm evaluations of the PSP climate technology transfer and finance centres and the GEF-4 pilot projects with the TEC as soon as available, to enhance the sharing of PSP experiences***

119. As of February 2019, 14 of the 16 projects supported under the PSP had reached the mid-term evaluation stage. All completed MTRs were made available by the GEF for this updated evaluation of the PSP.

(c) ***Encourages the PSP climate technology transfer and finance centres and the CTCN to strengthen their institutional linkages with a view to strengthen coordination, enhance information-sharing and create synergies that accelerate regional climate technology development and transfer***

120. As outlined in detail in the section on overlap and complementarity between the Technology Mechanism and the PSP, the GEF has convened a number of dialogues among the regional Centres and UNEP and CTCN in the margins of GEF Council and other meetings to share information. Other than convening meetings, no other institutional linkages were supported by the GEF.

(d) ***Countries can enhance coherence and effectiveness of national climate technology efforts by strengthening links between the different national entities. The TEC encouraged countries to explore how they may strengthen links between their NDE, GEF focal point, regional centre focal point, GCF national designated authority or focal point, and other UNFCCC national focal points***

121. The Climate Technology Centre requested from NDEs information regarding their collaboration with the GEF OFPs on matters relating to the development and transfer for climate technologies. In total, 69 NDEs responded to the survey. Of these respondents, 64 percent noted that they do have information regarding the GEF portfolio in their respective countries. Forty-nine percent of NDEs indicated that they meet regularly with the GEF OFPs to support coordination at the national level, and of these, half meet every three months or less. Sixty percent of respondents stated that, as NDEs, they did not participate in the GEF portfolio formulation exercise in their countries and thus did not effectively contribute to defining priority sectors for GEF funding. They suggested that NDEs had much to contribute to climate technology elements in the portfolio formulation exercises. Finally, the survey responses highlighted that four sub-regional meetings organized by the CTCN provided a good opportunity for NDEs, GEF OFPs, and NDAs of the GCF to meet and discuss matters of common interest and share their experiences.

122. The survey reveals there is a need to strengthen country coordination mechanisms, in particular the participation of NDEs in GEF portfolio formulation exercises.

(e) ***Invites the GEF to structure its report on the PSP under the areas of (1) regional and global climate technology activities, (2) national climate technology activities, and (3) TNAs, with a view to enhancing the clarity of GEF reporting, strengthening coherence and building synergies between the activities of the PSP and the Technology Mechanism***

123. The GEF has responded to this recommendation, as reflected by the structure of the GEF reports to the COP. The chapter on technology transfer in the GEF reports to the COP has been structured around these elements.

(f) ***Recommends that the GEF report annually to the COP through the SBI on the progress made in carrying out its activities under the PSP, including its long- term implementation, instead of twice per year as stipulated in document FCCC/SBI/2011/7, paragraph 137***

124. The GEF has responded to this recommendation by reporting annually to the COP on the progress made in carrying out its activities under the PSP, including its long- term implementation. This information is contained in the annual reports of the GEF to the COP.

VIII. Key messages and recommendations on the PSP to enhance the effectiveness of the Technology Mechanism.

125. The TEC drew on the evaluation undertaken as described in this report to provide the following key messages and recommendations regarding the PSP with a view to enhancing the effectiveness of the Technology Mechanism.

A. Key messages

126. With the exception of messages related specifically to the modalities of the pilot centres, messages apply to both the pilot centres and the pilot projects. The TEC has the following key messages:

(a) The PSP has significantly raised the profile of the important role that climate technology development and transfer plays in supporting countries achieving climate mitigation and adaptation goals, including in Multilateral Development Banks;

(b) The implementation of the pilot regional climate and technology finance centres has generated experience with and better understanding of: different modalities for originating climate technology projects, different TA instruments of support, technology transfer mechanisms, financing needs, importance of long-term engagement, ownership and capacity building, and the need for realistic time scales for technology transfer mechanisms to become operational and self-sustaining;

(c) The regional pilot centres and the CTCN are in effect operating as climate technology project accelerators and more broadly as climate innovation system builders, connecting technology, climate, finance and policy actors, creating synergies, supporting capacity development, and generating learning and knowledge;

(d) Project origination both within the pipelines of the Regional Development Banks and externally from public or private entities is resource intensive and requires strategic and expert engagement, as well as capacity development and support during project development for externally originated project proposals;

(e) A better understanding is needed of the implications and limitations of different project origination modalities and their effect on accelerating the adoption of new climate technologies and scaling investment, and on addressing regional and country priorities and country drivenness;

(f) Facilitating access to finance is key to scaling investment in climate technologies. The realization of investment and therefore scaling is contingent on access to climate finance, including blended finance. It is too early to establish the success of the Centres in mobilizing finance for the projects they originated. There is a need for learning and generating lessons. One possible approach suggested by the ADB MTR is to integrate climate technology financing needs into the regional multilateral banks' country partnership strategy and country operations business plans of its member countries;

(g) The implementation of the regional Centres and of the CTCN has also drawn attention to the need for long-term engagement with policy-makers and government agencies, including NDEs, in particular on policy issues, to ensure scaling, and the need for capacity development at the national level;

(h) The timescales for testing, operationalizing and where applicable, self-sustaining of new technology transfer mechanisms need to be realistic. It takes time to establish a track record, develop business or cooperative models and finetune operating procedures;

(i) The PSP pilot projects offer a rich source of experiences gained and lessons learnt in designing and implementing climate technology projects, such as the need for strong government leadership, importance of engagement and dialogue with government, importance of enabling environments, importance of outreach, need for flexibility in project design, access to finance, importance of pre-feasibility and market studies, and the need for intermediate metrics;

(j) Enabling environments are a key factor for scaling investment in climate technologies. In line with the new Technology Framework, enhanced technical support for creating enabling environments should be provided. Although some of the Centres are providing policy related TA, there is insufficient information to provide any insights or recommendations;

(k) The experience gained in the pilot projects and in the regional Centres show that technical assistance instruments including as pre-feasibility studies, technology assessments and road maps are essential as early stage support to scaling investment. Some analytical tools were also used to support decision making on technologies. An analysis is needed of different instruments and how and what stage they can be utilized to support countries and projects;

(l) Both the pilot Centres' and pilot projects implementation experience indicate the need for better understanding of suitable technology transfer models and mechanisms, and good practices to inform project design and implementation. This extends to the need for realistic timescales for their implementation;

(m) There is a need for intermediate metrics that capture and measure value created as a result of knowledge creation and spillovers and de-risking future investment, as well as through building a climate innovation system;

(n) Adaptation was under addressed in the PSP and has proven to be more challenging for the pilot regional Centres.

B. Recommendations

127. With a view to enhancing the effectiveness of the Technology Mechanism, the TEC has the following recommendations:

(a) The TEC encourages the GEF, CTCN and the regional Centres to consider the experiences gained and lessons learned from this evaluation. The TEC also encourages further learning and sharing of experiences, between the Centres and the CTCN and with Parties and NDEs;

(b) The TEC encourages the GEF to consider options for a continued role of the regional Centres and the CTCN in scaling up the level of investment in climate technologies;

(c) The TEC encourages the GEF to explore how to continue to support the CTCN in providing enhanced technical assistance;

(d) The TEC encourages the GEF, in consultation with the CTCN and the regional Centres, to consider options for enhancing cooperation with the CTCN in the activities undertaken by the regional Centres;

(e) The TEC recommends to organize a dialogue with the GEF, regional Centres and the CTCN to identify lessons learnt and options for continuing the work of the Centres;

(f) The TEC noted that there is a need to enhance understanding and further analyse some of the elements highlighted in the key messages, which could be considered by the TEC when developing its future workplans.

Annex I

Further information on support for climate technology centres and a climate technology network of the Poznan strategic programme

Table 1
Support of the Global Environment Facility for climate technology centres and a climate technology network

Project title	*Region*	*Agency*	*GEF financing (USD millions)*		*Co-financing (USD millions)*	*Status*
			GEFTF	*SCCF*		
Promoting accelerated transfer and scaled-up deployment of mitigation technologies through the Climate Technology Centre and Network	Global	UNIDO	1.8	0	7.2	Under implementation
Pilot Asia-Pacific Climate Technology Network and Finance Centre	Asia-Pacific	ADB/ UNEP	10.0	2.0	74.7	Under implementation
Pilot African Climate Technology Finance Centre and Network	Africa	AfDB	10.0	5.8	89.0	Under implementation
Regional Climate Technology Transfer Centre	Europe and Central Asia	EBRD	10.0	2.0	77.0	Under implementation
Climate Technology Transfer Mechanisms and Networks in Latin America and the Caribbean	Latin America and the Caribbean	IDB	10.0	2.0	63.4	Under implementation

Source: FCCC/CP/2018/6.

Abbreviations: ADB = Asian Development Bank, AfDB = African Development Bank, EBRD = European Bank for Reconstruction and Development, GEF = Global Environment Facility, GEFTF = Global Environment Facility Trust Fund, IDB = Inter-American Development Bank, SCCF = Special Climate Change Fund, UNIDO = United Nations Industrial Development Organization.

Annex II

Further information on the pilot projects of the Poznan strategic programme from the fourth replenishment period of the Trust Fund of the Global Environment Facility

Table 2
Information on the pilot projects of the Poznan strategic programme from the fourth replenishment period of the Trust Fund of the Global Environment Facility

Project	*Country*	*Counter-part(s)*	*Technology*	*Approach taken*	*GEF funding at the GEF CEO Endorsement (USD millions)*
Climate change related technology transfer for Cambodia: using agricultural residue biomass for sustainable energy solutions	Cambodia	UNIDO	Agro-waste biomass energy systems	Technical assistance and investment to assist transfer of biomass plants to two pilot firms. Capacity building for national suppliers and relevant government departments.	1.9 GEF grant, 4.6 co-finance
Promotion and development of local solar technologies in Chile	Chile	IDB	Solar: photovoltaic and concentrated solar power	Project will include: (1) the development of standards and monitoring protocols for solar panels and solar systems; (2) training for public and private stakeholders on concentrated solar power and photovoltaic systems, and (3) public awareness campaign to promote solar technology projects for both solar water heating and power generation.	3.0 GEF grant, 31.8 co-finance
Green truck demonstration project	China	World Bank	Energy-efficient trucks	Investment for retrofitting of 150 trucks, purchase of 150 new trucks, driver training, intellectual property right purchase/transfer. Technical assistance for all key partners e.g. on greenhouse gas measurement/verification, policy and institutional frameworks for scale-up.	4.9 GEF grant, 9.8 co-finance
Solar chill: commercialization and transfer	Colombia, Kenya, Swaziland	UNEP	Solar refrigeration (for rural medical application)	Testing of two solar chill technologies, investment in procurement/installation of 100 units in each country	3.0 GEF grant, 8.0 co-finance
Construction of 1000 ton per day municipal solid wastes composting unit in Akouedo Abidjan	Côte d'Ivoire	AfDB	Municipal solid waste composting unit	Investment in construction and operation of a pilot 1,000 tonnes/day industrial composting unit in Abidjan, Côte d'Ivoire	3.0 GEF grant, 36.9 co-finance
Dutyion root hydration system irrigation technology pilot project to face climate change impact	Jordan	IFAD	Innovative irrigation system	Investment in pilot demonstration of irrigation technology, technical assistance to train local farmers and stakeholders	2.4 GEF grant, 5.5 co-finance
Promotion and development of local wind technologies in Mexico	Mexico	IDB	Wind	Technical assistance to increase capacity for local development and implementation of wind power technology, investment to develop and test prototype wind turbine built using high component of national technology and manufacturing.	5.5 GEF grant, 33.7 co-finance
Phase-out of hydrochlorofluorocarbons and promotion of	Russian Federation	UNIDO	Energy efficient refrigeration and	Technical assistance to build institutional capacity for phase out of ozone-depleting substance	20.0 GEF grant, 40.0 co-finance

Project	*Country*	*Counter-part(s)*	*Technology*	*Approach taken*	*GEF funding at the GEF CEO Endorsement (USD millions)*
hydrofluorocarbon-free energy efficient refrigeration and air-conditioning systems in the Russian Federation through technology transfer			air-conditioning systems	technologies, investment to support phase out and destruction, technical assistance and investment to stimulate market growth for non-hydrofluorocarbon options.	
Typha-based thermal insulation material production in Senegal	Senegal	UNDP	Organic building insulation (using invasive plant material)	Technical assistance / investment for basic evaluation and research, transfer of tech and know-how, establishing local production, adapting the material for local application, a demonstration project and dissemination.	2.3 GEF grant, 5.6 co-finance
Bamboo processing for Sri Lanka	Sri Lanka	UNIDO	Bamboo cultivation (as land rehabilitator and sustainable energy source)	Scientific and technical analysis / technical assistance / investment to develop policy framework, laboratory for bamboo tissue reproduction, 10,000 hectares of bamboo plantation, machinery for wood flooring production and biomass pelletization production, along with associated capacity/know-how for sustainable operation	2.7 GEF grant, 21.3 co-finance
Overcoming policy, market and technological barriers to support technological innovation and south-south technology transfer: the pilot case of ethanol production from cassava	Thailand	UNIDO	Bioethanol production	The project aims at removing barriers and promoting technology transfer in the production of ethanol and at enhancing South–South cooperation. Also aims to increase fermentation efficiency in ethanol production, to promote private sector engagement, and to transfer the associated technologies to other countries in South-Eastern Asia. Includes technology demonstrations to enhance and motivate full-scale technology investments (e.g., it offers to establish a demonstration plant in collaboration with an interested partner). In order to remove policy and financial barriers, the project also provides training to policymakers, banks, and entrepreneurs.	3.0 GEF grant, 31.6 co-finance

Source: FCCC/SBI/2015/INF.4, appendices 2 and 3, and information provided by the GEF secretariat.

Abbreviations: AfDB = African Development Bank, GEF = Global Environment Facility, IDB = Inter-American Development Bank, IFAD = International Fund for Agricultural Development, UNDP = United Nations Development Programme, UNEP = United Nations Environment Facility, UNIDO = United Nations Industrial Development Organization.

Table 3
Information on the cancelled pilot projects of the Poznan strategic programme from the fourth replenishment period of the Trust Fund of the Global Environment Facility

Title	*Country*	*Agency*	*GEF Poznan Programme Funding (USD millions)*	*Total GEF Funding (USD millions)*	*Co-financing (USD millions)*	*Status of Project*
Renewable CO_2 capture and storage from sugar fermentation industry in Sao Paulo State	Brazil	UNDP	3.0	3.0	7.7	The project was cancelled in February 2012 upon request from the Agency. The project preparation identified investment costs far higher than initially expected, exceeding the available financing.
Introduction of renewable wave energy technologies for the generation of electric power in small coastal communities	Jamaica	UNDP	0.8	0.8	1.4	The project was cancelled in October 2011 upon request from the Agency.
Realizing hydrogen energy installations on small island through technology cooperation	Turkey, Cook Islands	UNIDO	3.0	3.0	3.5	The project was cancelled in March 2012 upon request from the agency following changes in the concerned governments' priorities.

Source: FCCC/SBI/2015/INF.4, appendix 3.
Abbreviations: GEF = Global Environment Facility, UNDP = United Nations Development Programme, UNIDO = United Nations Industrial Development Organization.

Annex III

Effectiveness and efficiency of the PSP pilot projects at the mid-term review stage

IADB: Promotion and Development of Local Wind Technologies in Mexico (MTR, 2015)[1]

Description

1. The project objectives are (i) to consolidate the human capacities for the design of state of the art wind turbines for distributed generation (DG); (ii) to structure a value chain for the production of goods and services at the national level in the wind energy sector (iii) to consolidate the technical capabilities for the manufacturing, assembling, operation, testing and certification of wind turbines for DG with a high component of national technology; and (iv) to support the development of a 1.2 Megawatt Class 1A wind turbine for DG and provide capacity building to promote wind power application through DG by Small Power Producers (SPPs).

2. The so called '*Máquina Eólica Mexicana'* (MEM) is designed for distributed generation applications and will be constructed, commissioned and operated in the public Regional Wind Technology Centre (IIE- CERTE), with the support of GEF. The main benefit from the project is the know-how that will be developed and owned by the consortium of companies and organizations that execute it. The project will develop a working and certified wind turbine prototype. MEM is a technological innovation project with complex specifications that is untypical of Bank projects.

3. Due to limited implementation progress, with barely 2,4% in disbursements at the time of the MTR, the effectiveness of the project was rated low. Although the wind turbine project is executed by a technically competent entity, the IIE (the Electrical Research Institute), renamed after the project started), the project has been marred by procurement and contracting regulation difficulties, and by a lack of coordination with SENER and CONACYT to access the Energy Sustainability Fund, as well as by a management disconnect between the GEF project and the MEM project. The MEM project is the component that is to manufacture the wind turbine.

4. However, since the MTR was carried out the main sections of the wind turbine have been designed and manufactured including: (i) most of the components inside the Nacelle; (ii) the tower; (iii) the design of the basement. Most of these sections are ready for assembly. The tower, which was designed and manufactured by Trinity Co has already been transported to the site where the wind turbine will be erected. The final designs of the blades will be completed in April 2019, and the process for the manufacturing of five blades will be initiated within the first semester 2019. The blades will be manufactured at Regional Wind Technology Centre (RWTC) located in La Ventosa, Oaxaca-Mexico. Works are already in progress for the construction of the industrial plant.

5. INEEL (National Institute for Electricity and Clean Energy), formerly named IIE, has as main priority to complete the design and manufacturing of the MEM, using grant resources and counterpart financing. Due to recent changes at the Government of Mexico, the counterpart budget needs to be presented for authorities' approval. The strategy for the scale up of the MEM once certified will be based on government's plans for the development of renewable energies in the country. Both, the counterpart resources and the new strategy will be confirmed by INEEL within the first semester of 2019.

UNEP: SolarChill Development, Testing, and Technology Transfer Outreach – (MTR, 2018)[2]

Description

4. The objectives are to: (i) Procure, install, and field test a total of 198 SolarChill-A vaccine cooler units (in three countries (66 in each); (ii) Laboratory test prototypes, procure, and field test a total of 45 SolarChill-B units for food preservation for domestic and small commercial applications (15 in each country); (iii) Information dissemination (e.g. marketing campaign, increased awareness etc.) and technology transfer. The intention of the SolarChill Project is to stimulate the global market uptake of the SolarChill direct drive technology, especially in off-grid areas, in both health

[1] Evaluación de Medio Termino. Proyecto de Promoción y Desarollo de Tecnologías Eólica Locales en México: http://idbdocs.iadb.org/wsdocs/getdocument.aspx?docnum=EZSHARE-357744178-7.

[2] Web link not available.

and food security applications. The project also intends to provide transparent field test data, which can be used for outreach activities and technology transfer.

Effectiveness and efficiency

5. At the time of the MTR, field tests of SC-A units were on-going in the three countries. The SC-B project component was delayed, with testing of units expected in 2018-2019. The technology transfer effort is exclusively focused on the work led by HEAT with The Fridge Factory (Palfridge) in eSwatini. The prototypes are going to be built at Palfridge and will be ready for testing, by end of 2018. Production of the 100 units as agreed between GIZ and Palfridge is expected to start in 2019. Kenya does not have a fridge manufacturer and in Colombia local manufacturers are not interested due to the low annual volume foreseen.

6. SolarChill Direct Drive is a niche technology with a very low annual production volume and a limited number of suppliers, but with a high level of technical requirement (especially for SC-A) in order to pass the quality, reliability and temperature performance requirement. The result is a high initial purchase price, ranging for SC-A from USD2,585 up to USD5,762. This price barrier is even more impactful with the SC-B units as it targets remote communities with limited purchasing power, yet no financial plan is in place to help end-users with the initial high prices. Manufacturing and purchase costs are expected to reduce with economy of scale as more units are produced. Currently lifetime costs of SolarChill refrigerators normally break even with those of kerosene units after 5-10 years, depending on varying prices for equipment and fuel.

7. The current project plan seems to be limited to field test and their results. There is no commercial and financial strategy articulated for what comes after the field test, i.e. as to whom will take over the market penetration and commercialization work. It is not clear how the units' initial price will be reduced to allow mass adoption, production and commercialization. The MTR did not assess effectiveness or efficiency.

UNIDO: Overcoming Policy, Market and Technological Barriers to Support Technical Innovation and South-South Technology Transfer: The Pilot Case of Ethanol Production from Cassava". Thailand, Vietnam, Lao PDR and Myanmar – (MTR, 2015)[3]

Description

8. Main objective of the project is to prepare Thailand to serve as the regional hub for South-South technology transfer of ethanol production from cassava. The project was delayed because NSTDA, the government agency with whom UNIDO developed the concept, was unable to execute the project and another executing partner had to be found. KMUTT (King Mongkut University of Technology Thonburi) replaced NSTDA to take up the role of executing partner at the end of 2013. Although the technology transfer involved three countries, i.e. Lao PDR, Myanmar and Vietnam, there were no institutional partners' involvement from the first two countries in the project development phase. The major share of co-financing from a private company in Myanmar did not materialize as the company decided not to go ahead with the ethanol production plant due to lack of policy support from the Myanmar government.

9. Key barriers to investment in ethanol production are the lack of policy and price incentives for the promotion of bio-ethanol, low technical efficiency in processing ethanol, and lack of advanced technological know-how by the private sector. During the project formulation stage, it was recognized that the new bioethanol production technology package developed by NSTDA in Thailand could be transferred to the neighbouring countries as it consists of know-how to increase the yield of cassava and fermentation technology to increase the ethanol plant-level efficiency. It should be noted that fermentation technology has to date not been tested at full scale.

10. The main project components are (1) Institutional capacity strengthening for VHG-SSF (advanced fermentation) technology dissemination, with KMUTT as hub for supporting South-South technology transfer; (2) South-South technology transfer: capacity building and policy dialogue with participants from Vietnam, Lao PDR and Myanmar, including Improved pricing practices and policy environment; (3) Demonstration, commercialization of the technology and private sector development.

[3] Independent Mid-term review: https://www.unido.org/sites/default/files/2015-10/GFTHA100264_MTR-2015_Rep-F_0.pdf.

Effectiveness and efficiency

11. At the time of the MTR approximately a year after the project activities got started, the project had achieved none of the expected outputs. However, at the terminal evaluation stage, project outcomes were partially achieved. Component 1 outcomes were mostly achieved, including the technology transfer package and KMUTT recognized as a regional hub for fermentation technology and technology transfer. The outcome under component 2 of "conducive environment to promote bio-ethanol technology and strengthened policies to promote ethanol for the replacement of conventional fuels" was not achieved. Under component 3, a demonstration plant was established in Thailand with an ethanol production capacity of 200 l/day. The Thai manufacturer of ethanol from cassava, Sapthip Co. Ltd., agreed to integrate the pilot plant of the new technology into their production line, with an ethanol production capacity of 200 l/d. A demonstration plant was established with KMUTT's technical assistance and expert advice at FIRI in Vietnam with an ethanol production capacity of 50 l/d capacity.

UNIDO: Bamboo Processing for Sri Lanka – (MTR, 2016)[4]

Description

12. "The project's objectives are to develop a bamboo supply chain and product industry in Sri Lanka, leading to reduced GHG emissions and a sustainable industry base." Components range from developing a policy framework for growing, harvesting, transporting and processing bamboo, bamboo tissue production, support plantation establishment and operation, to support for bamboo processing.

Effectiveness and efficiency

13. At the time of the MTR in 2016, a range of preparatory activities had taken place, in the form of consultant reports, analyses and studies, but these had not been acted upon, and most outputs and outcomes had not been delivered. The project was affected by political upheaval, and the challenges of developing a supply chain from scratch. Furthermore, a lack of coordination, including between government entities, unclear project ownership, and project management issues further affected project implementation.

14. However, by 2018, some progress was made, though none of the anticipated co-financing had materialized. Relevant government departments had become more engaged in the project, and the project steering committee had resumed its function and meetings. Recommendations on a national strategy were formulated, as well as on introducing bamboo to REDD+. Although 700 ha are planned for bamboo planting, land availability is still hampering project progress. Three models of plantation setup were either realized or prepared. Some private investments in bamboo processing technology were made, and a 10 MW dendro-power plant is being set up in Vavuniya, using high-yielding bamboo chips as biomass, though this was achieved independently of the project.

15. It was decided in 2018 to discontinue the revolving loan-based fund for financing bamboo processing proposals as most of the proposals received would most likely not succeed commercially without support. Instead the project will implement directly grant based support to communities and small and medium enterprises along the bamboo value chain, as originally envisioned in the project document.

UNIDO: Climate change related technology transfer for Cambodia: Using agricultural residue biomass for sustainable energy solutions – (MTR, 2015)[5]

Description

16. The objective of the project is sustained transfer of cost effective, efficient and biomass energy technology systems derived from agricultural waste (to replace fossil fuels for powered generators and boilers) for power generation and thermal energy applications. The 5 envisaged outcomes are (1) Transfer of clean and energy efficient low carbon technologies; (2) Supply of national service providers in technology evaluation and technology transfer; (3) Stronger

[4] Mid-Term Evaluation Review. https://open.unido.org/api/documents/5859540/download/Mid%20Term%20Evaluation%20Report%20-%20Final%20Sri%20Lanka%20100043%20GEF4114.pdf.

[5] Independent mid-term review. https://www.unido.org/sites/default/files/2015-10/GFCMB12002-100223_MTR_Report-F_151022_0.pdf.

institutional framework in place to ensure long-term support for renewable energy biomass promotion; (4) Increased adoption of biomass energy generation technologies by Cambodian businesses and private investors, creating a market for biomass technologies; (5) Establishment of policy, legal and regulatory frameworks that sustainably promote and support renewable energy generation.

Effectiveness and efficiency

17. The project suffered a setback in mid-2014 when three co-financing enterprises withdrew their commitments to invest in pilot biomass energy systems. During project implementation, it was found that biomass-based technologies in captive power/co-generation projects were not techno-economically feasible for the originally targeted rubber and rice sectors. Lack of understanding and of disclosure of the energy load profiles of many of these enterprises led to an overoptimistic projection of the feasibility of biomass energy systems. This is because energy demands are for less than 10 hours a day, and because of the seasonal availability of feedstock. Nor is there a mechanism to sell excess power to the grid. Only a 24-hour biomass energy operation would be techno-economically viable as, but then availability and/or cost of biomass is an issue.

18. At the time of the MTR, there were ongoing efforts to identify SMEs with more favourable conditions for biomass co-generation; this would include SMEs that have expansion plans and who are using diesel oil for steam generation. The conditions for a techno-economically feasible pilot project, however, consist of a plant that has a 24- hour energy demand for thermal and electrical energy. Such a pilot project would be able to successfully demonstrate lower production costs for industrial enterprises.

19. Since the MTR, the project has conducted screening of industrial enterprises that will have 24-hour thermal and electricity demand where co-generation with biomass would be techno-economically feasible. The focus had been mostly on the food processing sector. Several feasibility studies have been conducted and presented to the companies. UNIDO has signed contract with AMRU RICE (Cambodia) Co., Ltd to implement a biomass gasifier CHP plant of approx. 40 kWe and 60 kWth. Other technologies that use biomass for heat or cooling energy have been investigated, e.g. absorption chillers for beer processing/ cooling. There is potential in several factories and their implementation is both economically and technically viable. However, several companies did not go forward with the implementation of the suggested technologies due to several varying reasons including high upfront investment costs, and lack of access to appropriate finance.

UNDP: Typha-based Thermal Insulation Material Production in Senegal (Transfert de Technologie: Production de Matériaux d'Isolation thermique à base de Typha au Sénégal) – (MTR, 2016)[6]

Description

20. The project goal is to facilitate the development in Senegal of a local production of thermal insulation material based on Typha. It targets the improvement of energy efficiency in both rural and urban building techniques. A research-development component will create the conditions for a transfer of thermal insulation material production technologies: products will be tailored to the local building context, materials and constraints; pilot projects will demonstrate the usability of these products; awareness will be raised among relevant national stakeholders in the construction and training courses will be set for the nation-wide dissemination of the product; and measures for diffusion of the technology and use of the products, such as regulatory and incentive frameworks, will be analyzed.

21. The project is expected contribute to improve the thermal comfort in housing in a Sahelian country, to reduce electricity consumption for air-conditioning and related CO2 emissions, and generate decentralized employment opportunities.

Effectiveness and efficiency

22. None of the objectives were achieved at the time of the MTR in September 2016. The project ended in 2017. Tests carried out by project partners showed that Portland cement, widely used in Senegal, did not respond well to the typha addition, and could not be used. Therefore, it was decided to pursue the earth-typha mix materials only.

[6] Evaluation mi-parcours du project Transfer de Technologie: Production de Matériaux d'Isolation Thermique á Base de Typha au Sénegal: https://erc.undp.org/evaluation/evaluations/detail/7334.

23. Samples of panels and bricks made of earth-typha material were prepared but still had to be tested in different Sahelian conditions at the time of the MTR. An eco-pavilion in compressed typha panels was built by the project in Diam Niadio but it does not correspond to the reality of houses found in urban and rural areas in Senegal. Training modules were developed and technical training activities were conducted. Some studies were also produced. With regard to the establishment of small scale typha-based building materials production facilities, the project was looking for funding of this activity at the time of the MTR.

24. However, the research carried out by the GEF project, and the first pilot demonstrations of the typha-earth building materials made it possible to establish the insulating properties of the plant as a building material, and to demonstrate the real interest of its use in energy-efficient buildings. A follow up project funded by the French GEF, FFEM, started in 2017.

IFAD: Irrigation Technology Pilot Project to Face Climate Change Impact in Jordan – (MTR, 2017)[7]

Description

25. The project's aim is to promote innovative and technically reliable irrigation technologies to reduce the vulnerability to climate change of the agricultural system in Jordan and particularly from its impacts on water resources by testing innovative, environmental friendly and water-use efficient technologies.

26. The project has a simple design of two components: (1) Identification, implementation and expansion of irrigation technologies in Jordan; (2) Training, capacity building and awareness raising. The main target group consists of rural farmers. Two technologies out of eight originally identified; namely buried diffuser and reuse of grey-water, were excluded. The 6 technologies implemented are: (i) Fertigation, (ii) Solar Energy Water Pump, (iii) Aquaponics, (iv) Hydroponics, (v) Water Desalination and (vi) Computerized Irrigation Technology. While the technologies are technically appropriate, the poorest farmers cannot afford to invest in and maintain heavy technology (i.e. desalination technology cost more than USD 70,000). A call of interest selected farmers according to the criteria of willingness to contribute 25% of the investment.

Effectiveness and efficiency

27. The project faced significant delays in starting up due to complex selection of technologies, mobilization of farmers; unavailable confirmation of target beneficiaries' contribution, and to extensive consultation with beneficiaries on the proper irrigation technologies. Fertigation technology is the most affordable of the 6 technologies and is therefore reaching more farmers. The solar energy water pump is the second most affordable technology implemented by the project and is in high demand by farmers. Due to the cost-sharing the project could not reach the most vulnerable farmers, but the cost-sharing was put in place both to promote ownership and to reach out to a larger target group.

28. At the time of the MTR about 34 farmers had benefited from the project. During the second stage, 72 farmers are expected to benefit from the project. The 300 ha target indicator should be reached at the end of the project: (34 in the first phase + 72 farmers in the second phase) x 3ha average area = 318 ha. The overall rating of Component 1 is rated as *moderately satisfactory (4)*. The overall rating of Component 2 is rated as *moderately unsatisfactory (3)*.

Phase out of HCFCs and Promotion of HFC-free Energy Efficient Refrigeration and Air Conditioning Systems through Technology Transfer in the Russian Federation – UNIDO – (MTR, 2013)[8]

Description

29. The project aims primarily at the direct phase out of 600 tons of ozone depleting potential of HCFCs (for the most part HCFC-21, HCFC-22, HCFC-141b, and HCFC-142b) in sectors engaged in production of foam and refrigeration equipment to achieve the 2015 target values envisaged by the Montreal Protocol. The GHG emissions reduction resulting from the phase out of HCFCs will be approximately 15.6 MMT CO2. The secondary objective of the project is to introduce more

[7] https://www.ifad.org/en/web/knowledge/publication/asset/39570390. Web link to MTR not available.

[8] UNIDO Project Mid-term Review Report: https://www.unido.org/sites/default/files/2014-05/RUS_GFRUS11001_MTR_Dewpoint_0.pdf.

energy efficient designs through technology transfer, during the conversion of refrigeration and air conditioning manufacturing facilities.

30. Project components are: (1) institutional capacity building; (2) HFC and HCFC life cycle performance analysis; (3) Phase out of HCFC consumption in the key consuming sectors of Foam and Refrigeration; (4) Development of ODS destruction facility and supporting recovery network; (5) Stimulating market growth for energy efficient refrigeration and air conditioning equipment; **(**6) Technology transfer; (7) Feasibility study to determine the best and most integrated strategy for dealing with HCFC production closure.

Effectiveness and efficiency

31. The programme started effectively, with both public and private stakeholders actively engaged in both the technical and institutional activities and objectives of the programme. Legislation is in place at the federal level and government and project stakeholders were working to develop the detailed regulations which will form the mechanism for enforcement of the appropriate federal laws.

32. The progress in implementing a legal framework for the control of HCFCs significantly accelerated the prioritization of HCFC phase out across the foam and refrigeration sectors and some foreign owned enterprises had already converted to non-ODS technology voluntarily ahead of the legal obligations. As of January 2015, 490 tons of ODP were phased out.

33. The implementation strategy is to bypass the adoption of HFCs, by encouraging and facilitating the adoption of Low GWP solutions. Great emphasis is being placed on natural refrigerants such as ammonia and hydrocarbons, used in appropriate applications, supplemented by the use of HFOs which currently in the development phase. This strategy appears to be supported by the chemical manufacturing sector, which does not currently produce most popular HFC Refrigerants or Foam blowing agents and is keen to avoid a widespread adoption of technology dependent on foreign imports.

34. Some progress has been made in stimulating the adoption of more energy efficient refrigeration technology, for example there is a high level of engagement from refrigeration technicians and designers and a technical training centre has been established in Moscow with support of the leading industry players to train technician and promote energy efficient refrigeration technology. However, the nature of the market has made it more difficult to get stakeholders to prioritize energy efficiency without the any legal or financial imperative to change. Overall progress rating was highly satisfactory. Effectiveness and efficiency were not rated.

"Promotion and Development of Local Solar Technologies in Chile" – IADB – (MTR, 2017)[9]

Description

35. The general objective of this project is to support the Government of Chile (GoC) and the Ministry of Energy (MINENERGIA) to develop a solar industry, for solar water heating (SWH) and power generation in Chile (Photovoltaic (PV) panels and Concentrated Solar Power (CSP). The specific objectives are to: (i) promote technology transfer, institutional strengthening and capacity building in solar technologies; (ii) develop pilot projects using solar technologies (SWH and power generation) and (iii) support the design of incentives, financial mechanisms and a public awareness campaign to promote solar projects with SWH and power generation technologies.

Effectiveness and efficiency

36. The project started implementation in 2014 when rooftop solar systems began to flourish in Chile as a result of a net-billing scheme coming into power, easing the connection of small and medium (<0.1MWe) PV systems to the distribution network.[10] High growth rates occurred in 2016, with 5 MWe and 714 systems installed by the end of the year. GEF funding was used for three public solar rooftop demonstration projects totalling 150kW in 2017, the contribution of which to the overall programme is not clearly articulated in the MTR. The project's more important contribution

[9] Mid-term Evaluation of the Technical Cooperation ATN/FM-X-CH , Project No CH-X1007 "Promotion and Development of Local Solar Technologies in Chile": http://idbdocs.iadb.org/wsdocs/getdocument.aspx?docnum=EZSHARE-18023953-5.

[10] Haas et al, 2018. Sunset or sunrise? Understanding the barriers and options for the massive deployment of solar technologies in Chile. *Energy Policy (112) 399-414.*

was to building capacity for the design and development of the public tenders associated with the installation of solar pv projects in the public solar rooftops program, which resulted in cost reduction.

37. As a result of the fast-changing market, a large part of the budget for pilot solar rooftop projects was re-allocated to designing a credit line for SMEs to obtain PV systems at preferential rates and tenures (grant subsidies to reduce credits/interest rates). A re-assessment of the market also led to support for SWH being dropped from the project.

38. At the time of the MTR, the CSP component, i.e. the construction of a CSP plant in the Atacame desert, was delayed mainly due to challenges associated with the corporate crisis of Abengoa, the EPC contractor that was publicly awarded the construction, operation and maintenance of the plant. The project produced the ATACAMATEC Study, providing the means to design, prepare and successfully tender the first CSP Plan in Chile. The government asked the project to attend to the specific demands related to the monitoring of the CSP plant being implemented by ABENGOA, along with expert advice and exchange of experiences.

World Bank: Green Freight Demonstration project (PRC) - (Terminal evaluation, 2016)[11]

Description

39. The Project Development Objectives (PDO) are to: (a) demonstrate the global and local environmental benefits of the application of energy efficiency vehicle technologies and operating techniques, and (b) support improving energy efficiency and reducing greenhouse gas emissions in the road freight transport sector in Guangdong.

40. The project consists of three components: (1): Green Truck Technology Demonstration, which Facilitated communication and cooperation among energy efficient vehicle technology suppliers, freight - carriers, freight shippers, and other key stakeholders, and enabling project participants access to government and commercial financing, including the provision of financing of Green Freight - Technology Rebates and Performance- Based Payments. Six energy efficiency technologies verified by the US EPA SmartWay Program (low resistance tire, roof fairing, side skirt, gap fairing, tire pressure monitor, and energy efficient driving system) were demonstrated; (2) Green Freight Logistics Demonstration which established two logistics brokerage platform pilots, which assisted in demonstration through the provision of financing of Green Freight Technology Rebates and Performance-Based Payments. The grant was used to subsidize half of the truck driver's payment (US$16 per trip) in order to attract more users; (3) Capacity building and outreach programs. The PMO organized a series of training programs, workshops and symposiums to advertise and promote green freight concepts. By closing, over 3,200 truck drivers had received training. Training for government officials and project management officials had totalled over 200 person-times.

Effectiveness and efficiency

41. The effectiveness and efficiency of the project were both rated as substantial. The short-term net benefits from fuel savings were about US$61.2 million, almost three times the total project cost. The project reduced CO_2 emissions by 161,430 tons at a GEF grant cost of US$23 per ton, which was much higher than the US$3.5 per ton estimated at appraisal due to the fact that the technologies verified by the US EPA SmartWay were unable to produce the same benefits in Guangdong. In addition, the grant leveraged US$8.02 million of private sector investment (eight times the estimated amount at appraisal), the major portion of which came from the two logistics companies that implemented the logistics platform pilots and the trucking company that implemented the drop-and-hook pilot. This is mostly due to the increased awareness of the benefits of energy efficiency technologies and operating techniques, as well as Guangdong's efforts in mainstreaming energy efficient practices in the freight and logistics sector.

[11] Implementation and completion results report (TF-99076) on a grant from the Global Environment Facility Trust Fund in the amount of USD 4,2 million to the People's Republic of China for a Guandong Green Freight Demonstration Project http://documents.worldbank.org/curated/en/105411467614051818/pdf/ICR2510-P119654-Box396252B-PUBLIC-disclosed-6-29-16.pdf.