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气候变化框架公约

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附属履行机构
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技术的开发和转让：
关于技术转让的波兹南战略方案

关于技术转让的波兹南战略方案的最新评估报告

执行秘书的说明*

概要

履行机构责成技执委更新其关于评估波兹南战略方案的报告，以期增强技术机制的效力。本报告载有这个评估的结果，包括关键信息和建议。

* 出于提交人无法控制的情况，本文件订于在标准发布日期之后发布。

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缩略语

ACTFCN	非洲气候技术融资中心和网络(非洲气候融资网络)
ADB	亚洲开发银行(亚行)
AfDB	非洲开发银行(非行)
COP	《公约》缔约方会议
CO_2	二氧化碳
CSP	聚光型太阳能
CTCN	气候技术中心和网络
CTNFC	亚太气候技术网络和融资中心(亚太气候融资中心)
EBRD	欧洲复兴开发银行(欧行)
EST	无害环境技术
FINTECC	气候变化融资和技术转让中心(气候融资技转中心)
GCF	绿色气候基金
GEF	全球环境基金(环境基金)
GEF-4/5/6	全球环境基金(环境基金)第四次/第五次/第六次充资
HCFC	氢氯氟烃
HFC	氢氟烃
IADB	美洲开发银行(美行)
IFAD	国际农业发展基金(农发基金)
LDCF	最不发达国家基金
MTR	中期审查
NDE	国家指定实体
PPP	公私伙伴关系
PSP	关于技术转让的波兹南战略方案(波兹南战略方案)
REDD-plus	REDD+ (减少毁林所致排放量；减少森林退化所致排放量；保护森林碳储量；森林的可持续管理；以及增加森林碳储量(第1/CP.16 号决定，第 70 段))
SBI	附属履行机构(履行机构)
SCCF	气候变化特别基金
SEforALL	人人享有可持续能源
SMEs	中小企业
TA	技术援助
TEC	技术执行委员会(技执委)
TNA	技术需求评估
UNEP	联合国环境规划署(环境署)
UNIDO	联合国工业发展组织(工发组织)

一. 导言

A. 任务

1. 履行机构第四十三届会议请技执委更新其关于评估波兹南战略方案的报告[1]，通过履行机构最晚提交《公约》缔约方会议第二十三届会议审议。履行机构请技执委汲取通过波兹南战略方案试点区域气候技术转让和融资中心获得的经验教训，以及通过环境基金第四次充资下的试点项目获得的经验教训。[2]

2. 履行机构第四十七届会议注意到技执委正在进行的关于更新报告的工作，并请技执委提交更新的评估报告，作为提交《公约》缔约方会议的年度报告的一部分，供履行机构在第四十九届会议上审议。[3]

3. 履行机构第四十九届会议商定在履行机构第五十届会议上继续审议这个事项，以便技执委继续开展工作，以期在第 18 次会议上完成更新评估报告，供履行机构第五十届会议审议。[4]

B. 范围

4. 本报告按照相关职权范围[5]编写，提供技执委以增强技术机制的效力为目标对波兹南战略方案进行评估的最新情况。本报告的结构以职权范围所列工作范围的不同要素为依据。

5. 最新评估涵盖波兹南战略方案的两个窗口：

(a) 试点区域气候技术转让和融资中心；

(b) 环境基金第四次充资下的试点项目。

6. 用于评价波兹南战略方案的方法也同样符合上述职权范围，后者列出了目标、范围、程序、活动、信息来源、产出和提交评价的最新情况的时限。

7. 先前的评估报告是 2015 年编写的，而当时波兹南战略方案的执行仍在初期阶段，中期审查还没有进行，因此尚难评估波兹南战略方案的效力和效率并确定经验教训。中期审查报告是此次更新评估的主要信息来源。此外，适当情况下还请有关方面提供了项目的最新进展信息。

C. 附属履行机构可采取的行动

8. 请履行机构审议本报告，以期酌情确定进一步行动。

[1] FCCC/SBI/2015/16。

[2] FCCC/SBI/2015/22，第 79 段。

[3] FCCC/SBI/2017/19，第 92 段。

[4] FCCC/SBI/2018/22，第 74 段。

[5] 载于技执委 TEC/2017/14/8 号文件的附件，可查阅 https://bit.ly/2LBn45b。

二. 背景

A. 波兹南战略方案

9. 《公约》缔约方会议第十三届会议请环境基金拟订一项旨在逐步提升技术转让投资水平的战略方案，帮助发展中国家解决对无害环境技术的需要。[6]

10. 2008 年，环境基金理事会批准了一项关于技术的战略方案。[7] 该方案有三个窗口：

(a) 技术需求评估；

(b) 与技术需求评估相联系的试点优先技术项目；

(c) 传播环境基金的经验及经成功证明的无害环境技术。

11. 《公约》缔约方会议第十四届会议将这一方案重新命名为波兹南战略方案，请环境基金除其他外考虑长期执行波兹南战略方案，并向《公约》缔约方会议第十六届会议进行汇报。[8] 环境基金向《公约》缔约方会议第十六届会议提交了一份有关长期执行波兹南战略方案的计划，包含五个要素：[9]

(a) 支持各气候技术中心和一个气候技术网络；

(b) 开展优先技术项目试点工作以促进创新与投资；

(c) 技术转让公私伙伴关系；

(d) 支持技术需求评估；

(e) 环境基金作为一个促进支助机构推动技术转让。

12. 环境基金注意到，以上第 11(b)、(d)和(e)段所指各要素是 2008 年核准的初始方案的直接延续和扩大。[10]

13. 环境基金在其第四次充资下为波兹南战略方案提供了资金，并在第五次充资下向《公约》缔约方会议第十六届会议提交了关于波兹南战略方案长期执行的计划。初始为波兹南战略方案提供的资金总额为 5,000 万美元，其中 3,000 万美元来自环境基金信托基金的国家配额，500 万美元来自环境基金信托基金的预留资金，1,500 万美元来自气候变化特别基金。据环境基金报告，为这些活动进行联合供资的资金额为 2.288 亿美元。[11]

14. 环境基金第五次充资为波兹南战略方案长期执行要素提供的资金，主要来自透明资源分配系统之下的(减缓项目)国家配额，及全球和跨重点领域的(技术需求评估全球项目和公私伙伴关系)预留资金。气候变化特别基金和最不发达国家基

[6] 第 4/CP.13 号决定，第 3 段。

[7] 见环境基金文件 GEF/C.34/5.Rev.1，可查阅 https://www.thegef.org/sites/default/files/council-meeting-documents/C.34.5.Rev_.1_4.pdf。

[8] 第 2/CP.14 号决定，第 1 和第 2 段。

[9] 见 FCCC/SBI/2010/25 号文件，附件。

[10] FCCC/CP/2013/3，附件，第 140 段。

[11] 见 FCCC/SBI/2015/INF.4 号文件，附录 3。

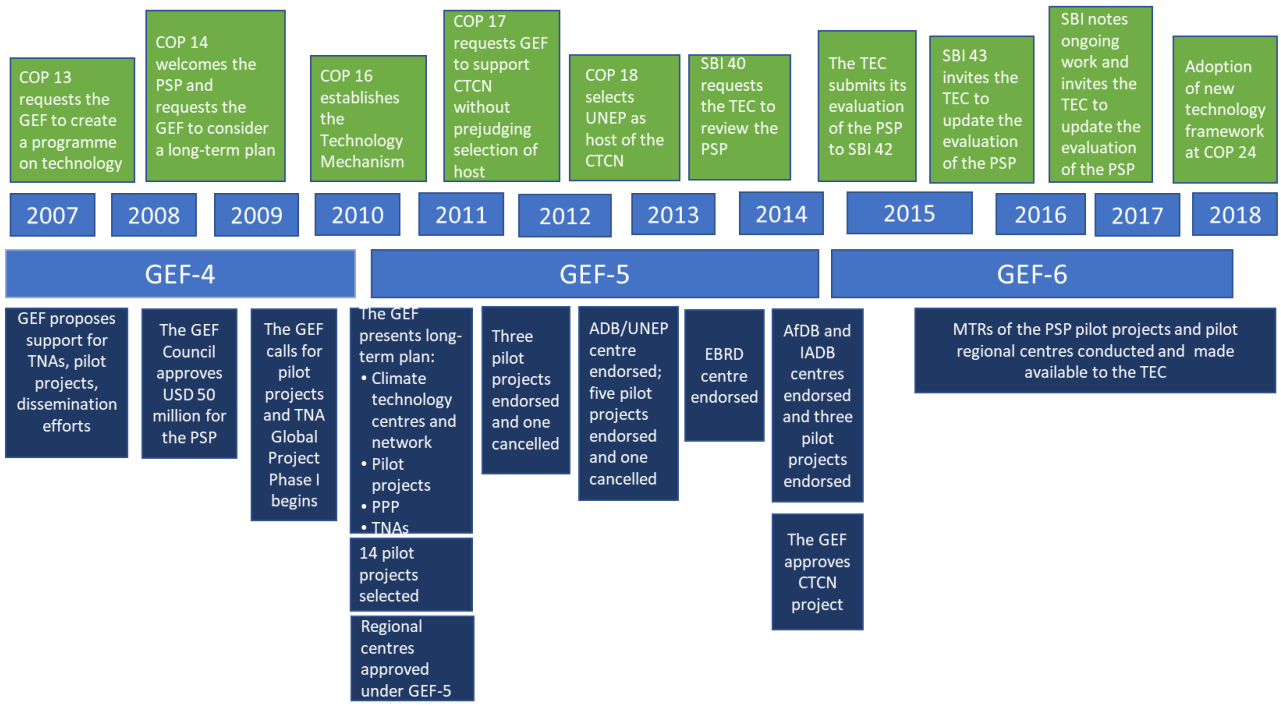
金为试点适应项目提供了资金。环境基金报告说，环境基金第五次充资下所有具有技术相关目标的减缓和适应项目都是波兹南战略方案的一部分。[12] 环境基金第六次充资下继续为技术需求评估提供资金，来自面向最不发达国家和小岛屿发展中国家的一个重点领域预留资金。

15. 环境基金充资期并不为波兹南战略方案预留资金，波兹南战略方案也不是充资期战略的组成部分。相反，技术转让连同波兹南战略方案的各项要素嵌入环境基金的方案战略，通过国家配额或每个充资期的预留资金供资。而环境基金则在提交缔约方会议报告的技术转让项下将这些要素归在一起统一汇报。关于环境基金和波兹南战略方案的进一步背景资料，见附件一和附件二。

B. 技术机制

16. 在制定波兹南战略方案两年后，《公约》缔约方会议第十六届会议设立了技术机制，目的是促进关于技术开发和转让的强化行动。[13] 缔约方会议授权技执委和气候技术中心和网络在缔约方会议指导下，按照各自的职能，为有效落实技术机制提供便利。下图列出波兹南战略方案和技术机制的主要阶段性标志。

波兹南战略方案和技术机制阶段性标志



[12] 见 FCCC/CP/2014/2 号文件，附件，第 136 和 137 段。

[13] 第 1/CP.16 号决定。

三. 波兹南战略方案的效力和效率

17. 本章概述对波兹南战略方案试点区域中心和试点项目单项及总体效力和效率的审查情况，并说明它们如何按照波兹南战略方案的总体目标为技术投资水平的提升做出贡献。

18. 效力是指实现目标的程度，效率是指如何高效率地利用现有资源(人力、物力和资金)达成目标和是否及时实现目标。现阶段评估影响为时过早，但对投资水平的提升的贡献本身就是一个影响指标。在效力项下也简略谈到所面临的挑战。下文第五章归纳和分析波兹南战略方案对项目拓展和复制的贡献。

A. 试点区域气候技术转让和融资中心

19. 4 个试点区域中心的执行模式、范围和主题重点各不相同。美行的中心强调的主要重点是，创建网络以及通过国家和区域执行机构开展工作以实现其目标，这基本上在美行正常业务之外。相反，欧行的中心(气候融资技转中心)则是为鼓励采用低市场渗透率的气候技术提供激励型的赠款，作为对该行供资和技术援助的补充。与此同时，亚行与环境署联合实施的中心(亚太气候融资中心)主要是为业务部门提供技术援助服务，以此将新的气候技术纳入该行正常公共部门业务的主流。该中心还有一个很重要的私营部门投资部分。环境署提供技术援助，用以加强利害关系方网络和英才中心，以及用以制订和执行无害环境技术的转让政策和方案。最后，非行的中心采用一种双重方针：一是将侧重于水项目和政策改革的适应活动纳入其正常活动的主流，二是在减缓活动方面支持“人人享有可持续能源”倡议。

20. 这些中心的实施处于不同阶段，亚行的中心已接近项目收尾阶段。美行的中心业务启动最晚，所处进展阶段排在最后。所有 4 个中心现已经过中期审查，只有亚行中心的环境署部分除外。

21. 总体而言，各中心的效力都被评为满意，但有些部分除外，这些部分的评估认为不大可能实现指标。鉴于各中心尚未撬动任何投资，现阶段评估结果为时过早。

22. 除了支持波兹南战略方案下的各中心之外，环境基金还在第五次充资之下提供 180 万美元，用于支助一个技术援助方案，该方案的目的是，通过气候技术中心和网络，促进加速和扩大部署气候变化减缓技术，[14] 让其能够采取一系列关键步骤处理技术转让需要，包括在一个有 7 至 9 个发展中国家参加的试点项目内提供气候技术方面的技术援助。

1. 欧洲复兴开发银行气候变化融资和技术转让中心[15]

(a) 概述

23. 气候融资技转中心的设计是要通过解决现有市场障碍，启动在初期转型国家的气候技术投资市场，为此要(1) 建立区域技术转让网络，主要目的是促成支持

[14] 此项目尚未经过中期审查，因此本文不再细述。

[15] 见 2017 年气候融资技转中心中期审查报告。

气候技术转让的政策和做法上的知识共享；(2) 提供投资所需的融资和支持融资试点，以资本赠款的形式涵盖项目费用的 5-25%；以及(3) 建立一个技术援助和能力建设部分，支持发展创新融资机制，包括方法的开发和相联系的需求评估、项目确认，以及筹备和实施援助。环境基金提供的资金是要用以在欧行基线活动之外开展额外活动。

(b) 效力和效率

24. 气候融资技转中心的效力和效率被评为满意。截至 2016 年 12 月，已签定的该中心项目为气候技术调动了环境基金的资金 354 万美元，欧行资金 4,640 万美元。到目前为止，在气候融资技转中心之下签订的项目预计可形成项目寿命期 CO_2 减排当量 248,000 吨，相当于平均减排成本略高于 14 美元/吨 CO_2。适应方面有些困难，原因是许多潜在投资都涉及水资源，而该中心项目所涉国家的水定价一向偏低，所以企业把水技术方面的投资视为低优先度的事项。

25. 目前正在筹建政策制订者网络，并在 3 个试点国家(白俄罗斯、哈萨克斯坦、摩洛哥)开展研究，支助来自国际能源机构和联合国粮食及农业组织。由此开发了一项清洁能源技术评估方法，用于评估南部和东部地中海区域和初期转型国家的清洁能源技术投资机会。一个融资机制现已制定并投入运作，到目前为止共签订了 19 个涵盖多种不同的减缓技术的项目，其中 3 个含有适应部分。

(c) 对提升投资的贡献

26. 气候融资技转中心在 16 个国家运作(包括各初期转型国家、南部和东部地中海区域、哈萨克斯坦和乌克兰)，为延伸外联创造机会，从而增进其成果复制和拓展的可能性。提升投资的确切潜力难以估测，因为没有关于赠款支助项目的信息，也没有交流关于受支助项目拓展和复制的见解。

2. 美洲开发银行拉丁美洲和加勒比气候技术转让机制和网络[16]

(a) 概述

27. 这个项目的目标是，从林业、运输、可再生能源和节能部门对于减缓的作用和从农业部门对于适应的作用着手，减少拉丁美洲和加勒比的温室气体排放和降低其气候变化脆弱性。执行工作采取顺序方针：(1) 发展机构能力和开发分析工具，以处理国家和部门政策和计划中与无害环境技术有关的问题；(2) 通过技术网络和中心加强无害环境技术的转让；(3) 试行更多的具体个案；以及(4) 促进公、私投资，以确保可持续性。美行的这个中心调动了无害环境技术投资 5,000 万美元，主要渠道是以上(4)项下开展的国家牵头的活动。这个项目设计为吸收区域利害关系方参与型的项目，各方共同确定部门内的优先领域。

28. 该中心的项目执行机构是无害环境技术主题网络的牵头机构，这些机构包括气候技术中心和网络集团伙伴 Bariloche 基金会和热带农业研究与高等教育中心。

[16] 见 2019 年中期评价“拉丁美洲和加勒比项目中的气候技术转让机制和网络”。

(b) 效力和效率

29. 总体而言，这个项目的效力和效率被评为基本满意，原因是在一些产出指标上超出了预设目标数，但另一些则没有达标。该项目的执行机构一般都达到或超过技术援助项目、方案、战略和技术研究方面的预设目标数。项目设计有较好的成本效益，因为项目与其所涵盖的具体领域内的领先区域机构结成伙伴关系，又能动员公、私两方面的投资，此外还有另一些促进不同区域倡议之间的协同作用的措施。

30. 该中心的能力建设活动注重通过国家指定实体以及方法学和最佳做法发挥作用，将无害环境技术纳入气候变化规划主流。该中心正在实现其区域内主题网络方面的预定目标数，并已将促进无害环境技术纳入其任务或工作计划。该项目执行机构在所展示的无害环境技术转让可行机制方面已经超过了预设目标数。

31. 就影响而言，按照项目活动(例如，通过可行性评估、准备供资建议书和市场调研)所促动的投资衡量，到中期审查之时尚未有具体投资。支持政策制订的活动已经开始。

(c) 对提升投资的贡献

32. 该中心提升投资的办法包括：分析工具、机构能力发展、通过网络创造协同关系、政策框架建议、气候创新系统、气候技术转让机制和先期可行性研究及项目建议书。该中心有效地发挥项目加速器作用，同步加强和优化利用无害环境技术和气候网络并且吸收政策制订者参与。获取投资和提升投资取决于获取气候融资的渠道并采取激励办法和支持性的政策框架。

3. 非洲开发银行非洲气候技术融资中心和网络[17]

(a) 概述

33. 非洲气候技术中心支持撒哈拉以南非洲国家为减缓和适应气候变化拓展部署低碳和有气候抗御力的技术。该中心实现目标的办法是，增进联网和气候技术转让及融资的知识共享；通过技术援助进行国家和区域扶持型环境的政策、机构和组织改革扩大技术转让；以及将气候变化技术纳入投资方案和项目。该中心成立于 2014 年 7 月，由非行环境和气候变化部“人人享有可持续能源”非洲枢纽团队经管。

34. 该中心应答国际机构的技术援助请求并促进知识生成和交流。此外，可在将适应技术纳入非行水资源项目方面提供技术援助。业务不涉及直接转款(赠款)或采购，仅提供咨询服务。

35. 该中心的重点就适应而言是水资源部门，就减缓而言是能源部门。该中心支持“人人享有可持续能源”倡议，并与非行经管的非洲可持续能源基金密切合作，后者支持非洲的可持续能源设想。非洲气候融资网络可以支助必要的早期行动，以筹备非洲可持续能源基金提供的大型技术援助成套办法的项目。

[17] 见该中心 2016 年中期审查报告，可查阅 https://www.african-ctc.net/fileadmin/uploads/actc/Documents/Final__ACTFCN_Mid-term_Review_Report_20161011.pdf。

36. 以离网可再生能源、清洁炊事方法和水资源适应技术为重点的知识产品正在开发中，为此向研究所、大学、国家气候中心和其他相关学术机构征求了建议。

(b) 效力和效率

37. 该项目的执行情况被认为十分有效，而项目设计的效力如何则结论不一。建立一个由非洲气候融资网络承办和经管的气候技术网络，这个设想已不再被认为值得付诸实施，因为已有若干不同的运转良好的气候变化网络，这些网络是在项目构想形成后到实施前的时期内出现的。

38. 就为各国提供的国家政策和方案方面的支助和建议而言，该项目在获得通过的国家/区域清洁能源政策和战略方面的得分较低，实现目标的可能性很低。旨在为政策和法规战略的通过提供支助的活动进展慢于其他活动。

39. 该中心通过“人人享有可持续能源”行动纲领和引资计划主要支助了低碳和清洁技术的主流化。该中心还提供了项目推动(“最后一哩支持”)，以此支持可行的项目落实最后投资决定和批准，内容可包括为解决任何尚存的未决问题提供咨询意见和支持、处理项目风险和制订风险消减战略、为项目准备获取资金对项目文件进行必要的定稿，以及调动供资。

40. 就适应而言，水资源部门的设想是主动确定若干项目，因为所有适应活动都将直接与非行水资源部门活动直接联系。然而，此事在聘用了一名专家与水资源部门一起工作之后才得以落实。

41. 到目前为止，该中心没有直接支助的投资项目，但已努力设法评估为节能和可再生能源项目确定专项融资办法的潜在可能性。有一定的可能在这个指标上实现预设目标。

42. 非洲气候融资网络的执行据认为需要比预计更多不同类型的作用和更多资源。一些机构在拟订请求方面有困难，要求为请求的构想提供支助。此外，可能需要一种更积极的方针以争取新的项目，并且需要组织能力建设和外联活动、追踪了解获得技术援助的国家的情况，以及对活动质量进行实地监测、共同调整和检验。

(c) 对提升投资的贡献

43. 提升投资要求在请求的形成方面有更活跃的支持结构和网络，这些结构和网络也能够支持政策制订者和政府机构的活动并同它们长期联络，以及便利获取资金。这将是确保中短期为执行行动纲领和引资计划提供资金的关键。已进行一项研究，以评估为向节能和可再生能源部门的中小规模投资提供贷款设立一个基金的潜在可能性。

4. 亚洲开发银行亚太气候技术网络和融资中心[18]

(a) 概述

44. 亚太气候融资中心经由环境基金首席执行官于 2012 年 5 月认可，2012 年 10 月在环境署和亚行联合协调之下启动。其目标是进行一项区域方针的试点研究，目的是促进部署气候技术(减缓和适应)，将能力建设、增强市场转型的扶持型环境、投资及其便利化结合在一起。亚太气候融资中心有 6 个部分，其中 3 个由亚行管理：气候技术融资需要纳入国家发展战略、计划和投资重点(第 4 部分)；催化在无害环境技术部署方面的投资(第 5 部分)；以及为便利转让建立一个低碳技术拥有人和购买人的试点“市场”(第 6 部分)。亚太气候融资中心提供咨询服务和资助研讨会、会议和培训。另外 3 个部分由环境署执行：区域网络便利化；加强国家和区域气候技术中心；以及支持为无害环境技术转染和相关能力开发制订政策。

45. 中期审查仅涵盖了亚行部分。在该中心成立之前，亚行的知识技术援助已启动，这项技术援助后来并入该中心。确立了 4 项区域对话，在亚行成员国的国家气候变化机构之间促进知识共享和推介 4 种知识产品。

(b) 效力和效率

46. 在第 4 部分之下，通过国家伙伴战略和国别业务工作计划，将气候技术纳入亚行成员国国家发展战略的主流。通过区域部门与发展中成员国达成了协议，涉及获取技术援助以便将气候技术纳入国家级和次国家级投资计划，包括先期可行性研究。7 个国家(孟加拉国、不丹、中国、蒙古、巴基斯坦、巴布亚新几内亚、越南)得到了援助。孟加拉国利用援助采纳了一系列气候投资重点项目。中国得到的援助是帮助设计湖南省的一个气候技术促进机制。然而，不进行事后评价，就不可能评估所提供的援助和国别业务工作计划的纳入是否形成了任何实际的投资项目。

47. 第 5 部分包括一个公、私营部门投资窗口。公营部门投资窗口与区域部门合作，判断亚行投资管道中有哪些项目会获益于增加技术投入，包括通过技术评估、先期可行性研究、最佳做法，以及各种技术选项的比较。为 20 个投资项目提供了援助。由于亚行的次级项目在设计上并不是要在亚行投资管道之外提出自己的项目，其可实现的成果有限。几乎不可能在项目启动后再做调整，因为贷款被锁定，不能突然改变，预期成绩通常是严格界定的，而预算也不能更改。就亚行程序而言，项目周期内要做大量技术改变是不切实际的。鉴于亚行公共部门投资项目的制订通常要求较长的前期准备，因此尚不清楚技术投入将在多大程度上转化为最终的项目设计，尤其是因为若干因素制约着亚行和相关政府有待在投资项目设计、技术选择和优先排序等方面作出的决定。

48. 私营部门投资窗口是要通过风险资本的资金催化气候技术投资。然而，在次级项目执行中，发展中亚洲的清洁技术风险资本市场据认为比较有限，特别是在初期阶段。所以，现已决定增添私募股权和其他投资领域行为者作为目标客户。受支助的私募股权基金是亚行设立的亚洲气候伙伴。因此，重点已转向 4 个核心

[18] 见 2015 年中期审查报告，可查阅 https://www.adb.org/sites/default/files/project-documents/45134/45134-001-tacr-en.pdf。

领域：支助高潜力清洁技术企业加速器和孵化器方案；支助以清洁技术为重点的风险资本和私募股权基金及投资人；扶持最佳做法和市场趋势上的知识共享；以及创建一个区域清洁技术网络。项目协助了清洁技术加速器对中国、印度和菲律宾清洁技术初创企业的监测。该项目还支助区域内促进知识共享和合作的各种活动，并推动创建一个包括投资者、提供者、初创企业和其他利害关系方的清洁技术网络。

49. 第 6 部分是以 McKinsey 公司 2010 年的一项可行性研究为基础设计的。低碳技术转让的相关中介模式的效力指标，就是该模式的以下能力：作为一种商业平台，在亚太区域内外的技术拥有者与发展中亚洲的技术购买者之间发挥中介作用，安排前者将技术转让给后者。2014 年 12 月启动的“市场”由总部设在新加坡的 IPEx Cleantech Asia 经营，这是新加坡的 DNV GL 与 ReEx Capital Asia 结成的财团。IPEx 于 2017 年 12 月终止，之前曾成功安排了一项技术转让交易，涉及一家新加坡公司将其拥有的一种工业废水处理技术转让给印度一个项目开发商，该新加坡公司支付了服务费。虽然这个市场引起了区域内外正在寻求打入发展中亚洲市场的技术拥有者的强烈兴趣，但在项目制订和预估之前并没有调研潜在买方的概况和兴趣，以及他们为新技术和中介服务付费的意愿和能力。此外，虽然可行性研究表明，这类平台需要经过 5 年运营才可能做到财务上的可行和可持续，但对市场经营者的预期是 18 个月后就要达到能够自我维持。该项目的进展在中期审查中被评为在基本满意到满意之间。

B. 全球环境基金第四次充资下的国家试点项目

50. 11 个项目中有 10 个经过了一次中期审查。半数项目的效力和效率在中期审查中没有评估或未得到连贯一致的评估，对本文评价中的估测构成障碍。5 个项目(柬埔寨(生物质能源)、墨西哥(风能)、塞内加尔(蒲草)、斯里兰卡(竹)、泰国(木薯乙醇)和塞内加尔(蒲草))在中期审查之时进展尚不足以有意义地评估其效力。中期审查之后收到了其中 4 个项目执行情况的最新信息，均已反映在本文的评价中。无论如何，还是根据成绩评估了所有项目的效力。多个试点项目的效力和效率被评为基本不满意。以下第四章概述这种情况的主要原因，但不包括项目无法控制的原因。

51. 这些项目可归类为演示型技术转让项目。环境基金的赠款用于技术援助、研究、机构建设、能力发展，此外，往往还有减少技术的采用和开发对用户和公司而言的费用。只有 SolarChill 项目的全部演示费用由赠款支付。

52. 一般而言，项目的目标往往过大，诸如要争取通过支持性的政策框架、建立供应链，还有一些目标与技术转让和开发及提升投资相关。这些项目至多可以说在新的背景下成功地演示和试用了气候技术，为进一步投资和扩大规模打下了基础。只有绿色货运演示项目完全实现了目标，该项目已有一项终期评价可供查阅。就效率而言，多数项目在及时实现目标方面得分较差，原因是执行启动延误和随后的困难。影响项目效力的因素包括政府参与项目制订过程、政府对项目的自主权和执行过程中的支持，以及项目的管理。

53. 附件三提供关于每个受审查项目效力和效率的进一步信息，特别是它们的成绩和对提升投资的贡献。

四. 试点区域中心和与技术机制相关的项目的经验教训

54. 波兹南战略方案项目，是气候技术项目制订和执行方面经验教训的丰富来源。同时，区域中心的试点工作也形成了经验，分别涉及气候技术项目的不同源起模式、不同的技术援助支助工具、技术转让机制、区域中心以气候创新体系建造者的身份发展和加强网络、建立协同关系和联系，以及帮助使项目和技术与气候融资和投资者连接起来。

A. 试点区域中心的教训

1. 项目源起

55. 了解项目源起模式及其对提升投资的潜力和手段的影响，对于加强技术机制的效力至关重要。例如，美行的项目源起模式是，由构成气候技术中心和网络集团伙伴的区域机构提出(项目)，这对技术机制具有影响。然而，欧行的投资管道源起模式却并不意味着气候技术中心和网络不能提供技术援助。

56. 现已认定，共有 4 种项目源起模式：源于没有资本赠款支助的区域开发银行投资管道(亚行)；源于有资本赠款支助、着眼于降低技术采用成本的投资管道(欧行)；源于公、私营部门实体(非行)；以及源于预先选定、具有专题专门知识、充当项目执行伙伴的区域和国家机构(美行)。需要更多信息以便了解各种模式对气候技术结果的影响。

57. 没有资本赠款支助的投资管道的项目源起，其预期影响最小，亚行的经验表明了这一点，原因是贷款已经锁定，项目界定过严，无法做任何较大改动。2018 年 10 月一份关于已核准后续技术援助的报告[19] 说，对旨在为促进亚太区域气候技术投资建立一个试点中心的区域技术援助群组进行的中期审查认为，需要通过更具战略性的国家特定分析确定各种技术选项；创建与亚行业务和贷款管道的更直接的联系；以及与亚行讨论对项目(不论是作为单立项目还是作为大项目的组成部分)的早期援助，以确保发展中成员国的自主权和承诺以及国别相关性，并提高项目规模拓展的可能性。该报告还提到需要开展更多试点项目，以便演示解决办法和支助标准化的能力，并扩大推介前景被看好的技术的机会。

58. 无法评估气候融资技转中心的项目源起方针，原因是没有信息可以了解援助在项目周期的切入点、扩大规模的条件和可能性、技术选项如何确定，或哪些技术得到支助等。

59. 非洲气候融资网络遵循两种方针：适应项目源于投资管道，减缓项目源于公、私营部门实体。然而，公营部门实体拟订请求面临困难，非洲气候融资网络需承担比设想更大的作用，并投入更多时间提供支助。经验表明，需要更为主动积极的项目源起途径和后续落实，例如，更活跃的新项目确定、现场互动，以及在现场对活动的共同调整和质量控制。这个见解很重要，认识到有必要努力设法提出符合要求的项目，因此也需要互动和能力发展。

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

2. 技术援助模式

60. 为加强技术机制的效力，必须更好地认识和区分技术援助模式，以此作为早期阶段项目加速工具，从而提升气候技术投资，尤其是因为考虑到气候技术中心和网络作为技术服务提供者的作用。然而，在试点区域中心背景下，气候技术中心和网络提供技术援助服务的具体机会极少。

61. 就亚行的中心而言，先期可行性研究证明对于确定准备纳入国别业务工作计划的潜在项目的早期阶段很有价值。还提供了其他形式的技术援助，诸如最佳做法信息、技术比较和国家特定数据。同样，美行采用了一系列技术援助模式，包括技术路线图和分析工具。

62. 关于政策支助方面的技术援助的信息较少。美行的中心在政策支助方面的工作刚刚开始，亚行中心的环境署部分结果如何尚未审查。

3. 融资

63. 对于提升投资而言，必须更好地了解试点区域中心提出的气候技术项目的融资需要，以及更好地了解促进获取资金的不同模式。

64. 气候融资技转中心可以为投资项目提供多达 25%的资本赠款支助，而其他中心无一表示可以提供融资工具。目前尚无法估测这种办法会有多大成功，因为中期审查之时还没有非行和美行的中心所提出项目带来的投资。必须确保在中短期内为执行非行的行动纲领和引资计划提供资金，并为美行项目执行机构推出的项目提供资金。

65. 没有资金，项目的提出就会失去势头，它们作为项目加速器发挥作用的能力所产生的增加值也有可能引起疑问。就非行而言，已进行了一项研究，评估可否设立一个基金，为能效和可再生能源部门的中小规模投资提供贷款。若非如此，则区域开发银行可以把部分项目纳入自己的投资管道，并提供获取气候资金的便利渠道，诸如气候投资基金、绿色气候基金、环境基金、气候变化特别基金、最不发达国家基金和适应基金等。美行和非行都需要建立与银行业务和贷款管道更为直接的联系。

4. 长期参与、自主权和能力发展

66. 联系 3 个试点区域中心，现已认明了吸收包括国家指定实体在内的国家联络点、各机构和广大利害关系方长期参与的必要性和好处，以及能力发展支助的重要性，这些都表明需要继续吸收各方参与，需要气候技术中心和网络继续通过对国家指定实体的支助发挥作用。遵循新的技术框架，必须加强国家驱动的技术支助，包括扶持型环境和能力建设，以及吸收相关利害关系方参与和与之合作。

67. 非行的中心需要提供长期参与的渠道和支助，以提高战略和政策成功执行的可能性，而不是为孤立的活动提供资金。通过较长期的参与渠道，该中心将能够与地方机构建立强有力的关系，明确能力发展需要和其他所需支助，并提供量身定制的技术援助。

68. 亚太气候融资中心由环境署执行的部分揭示出存在的挑战，即如何评估技术援助需要多长时间才能转化为政策、更大的方案或演示项目，或需要多长时间才会获得投资。此外，与联络点和利害关系方保持牢固的联系，对于以拓展技术援

助为目的，探索如何与亚行、气候技术中心和网络以及绿色气候基金合作至关重要。亚太气候融资中心当前的重点是，为伙伴国家提供技术援助，帮助它们设计和制订利用技术的方案，以促进执行国家自主贡献。各气候变化联络点之间的协调和与利害关系方的互动目前仍在发展中。

69. 美行中心的经验表明，吸收国家和地方政府参与并让它们成为项目的主人，对于帮助包括私营部门项目在内的这些项目实现长期的正当性和可持续性至关重要。

5. 时间尺度

70. 各中心和亚行牵头的“市场”投入运行的经验表明，需要有切合实际的时间框架，以便测试、发展和微调技术开发和转让加速中心的运行程序和模式，并建立良好的成绩记录。所有各中心原先都是设想为期 3 年，但其设计、建立、投入运行直到实现预期成果所花费的时间都比原先设想更长。

B. 试点项目的教训

71. 试点项目的教训集中在吸收政府参与和获取政府支持的重要性，以及成功设计和执行演示项目的扶持型环境的重要性，而不是项目机构的支助模式。然而，也需要通过先期可行性研究和其他技术经济学、市场和社会经济研究，为项目设计提供参考，而这些正是各中心和气候技术中心和网络可提供的。另一个共同的教训是，资金渠道对于演示和拓展都是关键。

1. 政府自主权

72. 对绿色货运演示项目的终期评价认为，有力的政府自主权是成功执行的关键，应当成为演示项目的先决条件之一。[20] 在这方面，广东省地方政府花费了很多时间，在各部门之间进行协调，并解决准备和执行过程中遇到的问题。HCFC 逐步淘汰和无 HFC 技术促进项目的情况也是如此，该项目的管理单位在执行战略上与政府进行了密切的合作。政府自主权也联系到项目的政府自主权。缺乏政府自主权的项目，其效力低得多。政府自主权不仅在消除新技术采用的障碍和提供激励方面具有关键作用，而且在帮助解决首创举措中遇到的协调和执行问题方面也具有关键作用。

2. 政府参与和对话

73. 必须争取关键利害关系方的参与，这从项目拟订阶段开始就是关键，与政府的对话也很重要，即便对于私营投资项目也是如此。从拟订到执行都能与政府和公共部门机构对话的项目较为成功。从在泰国开展的用木薯制取乙醇的南南技术转让项目来看，与政府的对话可以说与吸收私营部门参与同样重要，而在缅甸和老挝人民民主共和国开展的项目，在拟订过程中，政府参与方面比较薄弱，影响了在这两个国家取得的成果。

[20] 终期评价报告见 http://documents.worldbank.org/curated/en/105411467614051818/pdf/ICR2510-P119654-Box396252B-PUBLIC-disclosed-6-29-16.pdf。

3. 扶持型环境

74. 对于所有波兹南战略方案演示项目，扶持型环境，即支持性的政策和法规框架，是实现私营部门投资——因而也包括提升投资——的关键。在智利，电价净计量账单计划促进了屋顶光伏系统的推广，但由于缺乏资金，其全部潜力尚未得到发掘。俄罗斯联邦的 HCFC 逐步淘汰和无 HFC 以及节能制冷项目当前遇到障碍，原因是实行这方面的变革尚未成为法律和财政上的要务。向电网出售富余电力缺乏政策工具，这是影响柬埔寨农作物残留物生物质项目取得成功的一个因素。在泰国，政府政策和所有价值链的订价透明，是调动私营部门参与乙醇生产的关键。墨西哥风力涡轮机项目拓展战略则将依托政府发展可再生能源的国家计划。

4. 项目设计的灵活性

75. 环境基金提交《公约》缔约方会议第二十四届会议的报告指出了项目设计需要有灵活性。[21] 在预估阶段不应僵硬界定项目活动，而是要灵活，以便采取分阶段方针、添加新的活动和对设计进行微调。一些项目经过了重新设计，以顺应变化中的情况、新的政策工具和市场动态。

5. 资金渠道

76. 在半数试点项目中，为私营投资者、农民和其他技术行为方提供了资本赠款，用于支付演示的部分费用或全部费用，而在智利，则是用于降低屋顶光伏系统的贷款成本。资本赠款在墨西哥帮助企业和农户投资新技术和发展风力涡轮机项目方面发挥了关键作用。提升(投资)将取决于具备合适的融资工具，包括气候融资和商业贷款。

6. 外联

77. 据绿色货运项目表示，演示项目的设计中应包括一个有力的外联部分。所演示的技术大多属创新性质，这意味着潜在的技术使用者和政府对这类技术了解不多，因此需要至少面向潜在使用者的外联部份。例如，面向约旦农户和面向俄罗斯工业界的外联，对提高认识和引起更广泛的兴趣起了重要作用，外联将继续对提升规模具有重要意义。

7. 先期可行性研究和市场研究

78. 一些项目进展受阻，是因为在缺乏技术采用的潜在需求和条件方面的数据、信息和认识，造成执行延误和达不成目标和指标。避免这种情况的办法是，进行技术经济学的先期可行性研究和市场研究，包括研究潜在的目标用户的概况和投资条件。这些研究对市场战略选择和成功的项目执行可能至关重要。气候技术中心和网络以及试点区域中心的一个作用就是为这些研究提供技术援助，从而为项目制订提供参考。

[21] 可查阅 https://unfccc.int/sites/default/files/resource/6e.pdf?download。

8. 中期衡量指标

79. 项目的目标是减少 CO_2 排放量或增强适应力，但并不衡量项目对于建设特定技术的气候创新系统的价值和贡献。需要能够反映并衡量所创造知识的价值、外溢效果和未来投资风险消减作用的中期衡量指标。

9. 技术转让模式和机制以及良好做法

80. 试点中心和项目的执行经验突出表明，需要更好地了解应当以何种技术转让模式和机制以及良好做法为项目设计和执行提供参考。对技术转让有各种不同的支助方式，但超出演示和培训的支助情况比较模糊。关于各中心所考虑的技术转让机制的信息更少，例外情况是亚太气候融资中心的有协助的中介模式，该模式没有确立一个可复制的商业模式。

10. 项目的目标

81. 一个总体的结论是，项目的目标往往过大，诸如要争取通过支持性的政策框架、建立供应链，还有一些目标则与技术转让和开发或提升投资相关。这些项目至多可以说在新的背景下成功地演示和试用了气候技术，为在有力的政府自主权(包括吸收利害关系方参与和开展对话)之下进一步投资和提升规模打下了基础。

五. 波兹南战略方案的业务

82. 本章从方案层面论述波兹南战略方案的业务，即从项目拓展和复制、对处理全球和区域问题的相关性以及作为一种改变模式的效力的角度，对波兹南战略方案进行分析。

A. 项目的拓展和复制

83. 波兹南战略方案项目是演示项目，是要促成创新和支持测试新技术，并支持新技术的初始部署和转让。试点项目本身不大可能拓展尺度。只有在继之开展有公共资金或商业资金成份和其他支助的项目时，拓展才会是一种切合实际的结果。演示项目应当为拓展和复制打下基础，并为消减技术采用的风险做出贡献，但如果没有后续项目或没有获取气候融资的渠道，拓展不会自动发生。联系增强技术机制的效力，这表明了试点项目的贡献和确保成功试点获得拓展所需要的后续。

84. 试点项目至多可以说为拓展和复制打下了基础。例如，绿色货运演示项目带出了这个部门的一系列其他倡议，包括类似的巴西绿色货运计划，以及由中国交通部、亚洲清洁空气中心和中国道路运输协会主导的中国绿色货运行动。

85. 在为约旦灌溉项目的启动进行准备过程中，农发基金着手设计价值 1,518 万美元的约旦农村经济增长和就业项目。该项目将作为一个拓展平台，凡是在波兹南战略方案试点项目过程中证明成功并被农户接受的技术都将立即推广拓展。

86. 南南技术转让项目的执行因性质复杂而出现某些风险。需要可复制的成功经验和项目实例。

87. 气候技术中心和网络认为，可拓展性和可复制性将是未来 4 年的关键。气候技术中心和网络已表示，它将发展区域技术援助，以扩展为面临类似挑战的各国进行一次性干预的影响。

88. 环境基金在提交《公约》缔约方会议第二十四届会议的报告中，提供了工发组织通过气候技术中心和网络推动加速转让和拓展部署气候变化减缓技术的全球项目的进展情况，从中可以看出，发展中国家对气候技术中心和网络类型的服务有着很大的需求。事实上，气候技术中心和网络收到的技术援助请求越来越多：

(a) 对气候技术中心和网络类型的服务存在着得到证明的需求，作为对其他机制和倡议的一种补充。具体而言，气候技术中心和网络可提供早期阶段支助；

(b) 气候技术中心和网络具备范围广泛的现成可用资源和一个国际专家和技术网络；

(c) 存在大量拓展和复制的机会，需求驱动的气候技术中心和网络很适合估测需要和轻重缓急。

B. 处理全球和区域问题

89. 就波兹南战略方案处理全球和区域问题的相关性而言，应当强调，波兹南战略方案的设立和环境基金在这方面的努力，大大提高了人们对气候技术的开发和转让在支持各国达成《公约》目标方面重要作用的认识。

90. 一些利害关系方强调，环境基金－波兹南战略方案相互配合很重要，由此可以形成一个能够增进支持和凸显气候技术问题的全球气候技术体制结构。

91. 试点中心的主题重点一般反映的是区域优先事项。非行中心的主要焦点之一是能源的获取途径和“人人享有可持续能源”倡议。在拉丁美洲和加勒比，农业是一个主要焦点。试点项目中缺乏适应项目：虽然各中心都有一个适应部分，但对处理适应的强调不够，困难较大。

92. 各中心展示了以增强南南和北南技术转让的学习和机会为手段、同时响应国别优先事项的区域方针的好处。欧行中期审查指出，同时支持南南和北南知识转让的网络化活动可以加速市场转型。例如，吉尔吉斯斯坦和摩尔多瓦共和国出台建筑物能源绩效证书所遵循的路径相似，所面临的挑战也相似，而乌克兰则正在遇到这些情况。拟议的技术转让网络化，如能集中注意具体的机会，就可以起到加速市场转型的作用。

93. 美行中心促进和支持区域合作努力，具体办法是与作为区域项目所涵盖领域先行者的区域机构建立伙伴关系。着重强调与现有区域网络化倡议建立联系，并为之做出贡献，以期确保网络活动在项目终结后继续进行。然而，区域内的技术转让界与气候变化界之间缺乏联系，该中心正在通过其网络和项目活动加以处理。

94. 亚行中心的风险资本和孵化器部分支持区域和全球网络发展，已与清洁技术创新界和气候变化界建立了联系。

C. 一个变化模型的运用

95. 对波兹南战略方案试点项目的评估几乎无一例外地表明，需要有一个参考了准备工作、基础工作和个案研究工作结果制订的、更具战略性和更加连贯一致的方针，而各区域中心和气候技术中心和网络在这方面是完全胜任的。

96. 各区域中心和气候技术中心和网络的运作，实际上相当于气候技术项目加速器，广义而言，相当于一个气候创新系统的建造者，将技术、气候、资金和政策行为者联系在一起，创造协同作用，支持能力发展和催化学习和知识形成。

97. 它们在环境基金供资结束之后必须能以某种形式继续存在，尤其是考虑到新的技术框架，其中十分注重创新、配合努力、增进技术援助，以及增进利害关系方在国家、区域和全球层面的参与。

98. 环境基金提交《公约》缔约方会议第二十四届会议的报告认为，对气候技术中心和网络类型的服务有着很大的需求。气候技术中心和网络可以补充其他机制，尤其是提供早期阶段支助。

六. 波兹南战略方案各中心和试点项目与技术机制各中心和技术项目的重叠、互补和协同作用

99. 环境基金向《公约》缔约方会议第十六届会议提交了一份关于长期执行波兹南战略方案的计划，并在环境基金第五次充资之下为各试点区域中心提供了资金。关于技术机制，《公约》缔约方会议第十六届会议设立了气候技术中心和网络，并决定，气候技术中心应推动一个由国家、区域、部门和国际技术网络、组织和举措形成的网络，以期在议定职能方面吸收该网络成员的参与。因此，虽然《公约》缔约方会议为各中心规定的任务同为气候技术中心和网络规定的任务之间没有重叠或互补，但波兹南战略方案各中心的活动同气候技术中心和网络的活动之间存在重叠、互补乃至协同作用，本章在这方面加以论述。

A. 全球环境基金对气候技术中心和网络的支持

100. 《公约》缔约方会议请环境基金为气候技术中心和网络提供支持。根据波兹南战略方案，环境基金在第五次充资之下提供 180 万美元，支助一个具体的技术援助方案，该方案旨在通过气候技术中心和网络促进加速气候变化减缓技术的转让并拓展这些技术的部署。

101. 在亚太区域，环境署同气候技术中心和网络联合设立了亚太气候融资中心的能力建设部分，促成在气候技术中心和网络开始运行后立即形成对其服务需求的加速增长。

102. 环境基金力求促进气候技术中心和网络同各区域银行在波兹南战略方案各区域中心的问题上进行协调和配合，但总体而言是临时性的，仅限于信息共享。在技术援助或能力建设方案上的配合方面没有做具体的努力。此外，目前不清楚波兹南战略方案技术援助服务是否已达到随时可供国家指定实体使用。

B. 试点区域中心与气候技术中心和网络的配合和协调

103. 气候技术中心和网络已联系非洲气候融资网络，向其了解如何看待正在收到的技术援助请求。两个中心的活动在开始时间上大致相同，起初的配合范围比较有限；然而，二者现已进入充分运行，因此正在建立更为密切的协调和配合。例如，管道实现共享，非洲气候融资网络会把其涵盖领域之外的技术援助请求转交给气候技术中心和网络。目前还在探讨为某些中心提供联合支持的可能性。[1]

104. 亚太气候融资中心(通过第 4 部分)应当能够利用环境署支助的活动。然而，环境署和亚行活动的管理需要改进协调。应加强气候技术促进和执行的伙伴关系和协调、信息共享，以及亚行和环境署的协调和信息互通，以填补执行方面的空白，利用好各自在与政府互动方面的强项，确保项目执行过程中得到更大的支持。

105. 气候融资技转中心同气候技术中心和网络已在相互之间建立了良好的配合。欧行派代表出席了 2015 年在亚美尼亚举办的气候技术中心和网络区域国家指定实体论坛，而且欧行还负责审查气候技术中心和网络从欧行业务所涉国家收到的所有请求，并在可能情况下提供意见。

106. 美行与气候技术中心和网络集团伙伴 Bariloche Foundation 基金会和热带农业研究与高等教育中心的协作，有助于美行实现为气候技术中心与网业务提供支助的目标，并且促进它们的努力和活动的协调。

107. 气候技术中心和网络同区域银行已有一些配合，例如，气候技术中心和网络为欧行提供技术援助，用以编拟波斯尼亚和黑塞哥维那燃料转换融资建议书、与非行合办能力建设研讨会，以及支持美行项目编制(后者由气候技术中心和网络集团伙伴支助)。不过，这些多半可能是零星的个案，与波兹南战略方案的方案编制没有必然联系。

108. 在提交《公约》缔约方会议第二十四届会议的报告中，环境基金详细报告了虚拟会议的组织情况，以及各区域中心同气候技术中心和网络之间建立配合和信息互通的情况。

109. 但是，除了出席会议和就项目建议交换意见以及气候技术中心和网络为一个银行项目提供技术援助的几例情况之外，未能更为系统地探索协同作用。各区域中心应当同气候技术中心和网络合作，设法确保提高一致性、协同作用和互补性。亚太气候融资的项目如果不是在气候技术中心和网络投入运转之前就已启动，本可形成这种合作。

七. 全球环境基金对技术执行委员会就波兹南战略方案提出的有关增进技术机制效力的建议的响应

110. 在 2015 年对波兹南战略方案的评价报告中，技执委就波兹南战略方案提供了与增进强技术机制效力有关的建议。附件四是对环境基金和其他行为方响应这些建议情况的评估。

八. 就波兹南战略方案提出的有关增进技术机制效力的关键信息和建议

111. 根据本报告所述评价，技执委就波兹南战略方案提出下列与加强技术机制效力有关的关键信息和建议。

A. 关键信息

112. 除具体涉及试点中心模式的信息外，此处的信息对试点中心和项目都适用。技执委在此提出下列关键信息：

(a) 波兹南战略方案大大提高了包括多边开发银行在内的各方的认识，即认识到气候技术的开发和转让在支持各国达成气候变化减缓和适应目标方面的重要作用；

(b) 作为试点的区域中心形成了经验和更好的了解，涉及气候技术项目的不同源起模式、不同的技术援助支持工具、技术转让机制、供资需要、长期互动、自主权和能力建设的重要性，以及技术转让机制进入运行和达到能够自我维持必需有一个切合实际的时间框架；

(c) 试点区域中心和气候技术中心和网络，实际上相当于气候技术项目加速器，广义而言，相当于一个气候创新系统的建造者，将技术、气候、资金和政策行为者联系在一起，创造协同作用，支持能力发展和催化学习和知识形成；

(d) 源于区域开发银行管道和源于外部公、私营实体的项目，都是资源密集型项目，要求战略性的合作和专家参与，而且外部源起项目在拟订过程中要求能力发展和支助；

(e) 需要更好地了解不同项目源起模式的影响和局限、这些模式对新加速采用气候技术和提升投资的影响，以及对区域和国家优先事项和国别驱动性质的影响；

(f) 便利获取资金是提升气候技术投资的关键。投资——因而也包括提升投资——取决于获取气候融资的渠道，包括混合融资。现阶段判断各中心为它们提出的项目调动资金的成功与否为时过早，但可以总结一些教训。气候技术融资需求可以纳入区域多边银行的国别伙伴关系战略和成员国的国别业务工作计划；

(g) 区域中心和气候技术中心和网络的实施让人们注意到，需要与政策制订者和包括国家指定实体在内的政府机构保持长期互动，特别是在政策问题上的互动，以确保国家一级的拓展和能力发展需要；

(h) 新技术转让机制测试和投入运行(适用情况下还包括确保其能够自我维持)的时间框架需要切合实际。建立良好的成绩记录、制订业务或合作模式和微调运行程序都需要花费时间；

(i) 波兹南战略方案试点项目，是与气候技术项目设计和执行有关的经验教训的丰富来源，突出表明有力的政府自主权的必要性、与政府互动和对话的重要性、扶持型环境的重要性、外联的重要性、项目设计保持灵活的必要性、资金渠道的必要性、先期可行性研究和市场研究的重要性，以及中期衡量指标的必要性；

(j) 扶持型环境是提升气候技术投资的关键。按照新技术框架，应当为创建扶持型环境提供加强的技术支持。虽然部分中心提供政策相关技术援助，但这方面信息不够，不足以提出任何见解或建议；

(k) 试点项目和区域中心的经验表明，技术援助工具，包括先期可行性研究、技术评估和路线图，对于早期阶段支助以争取提升投资至关重要。还可以利用某些分析工具支持技术决策。需要分析不同的工具以及可用于在哪个阶段为国家和项目提供支助；

(l) 经验还突出表明，需要更好地了解应当利用哪些技术转让模式和机制为项目设计和执行提供参考；

(m) 需要能够反映并衡量所创造知识的价值、外溢效果和未来投资风险消减作用的中期衡量指标，并建立一个气候创新系统；

(n) 在波兹南战略方案项目中，对适应的触及有限，而且适应被证明对各中心构成困难。

B. 建议

113. 为加强技术机制的效力，技执委：

(a) 鼓励环境基金、气候技术中心和网络以及各区域中心考虑本报告中详述的经验教训；

(b) 鼓励在各中心和气候技术中心和网络之间以及在它们与缔约方和国家指定实体之间开展进一步学习和共享经验；

(c) 鼓励环境基金考虑各区域中心和气候技术中心和网络在提升气候技术投资水平方面继续发挥作用的各种选项；

(d) 鼓励环境基金探索如何继续支持气候技术中心和网络提供增强的技术援助；

(e) 鼓励环境基金与气候技术中心和网络和各区域中心协商，考虑该基金在各区域中心开展的活动方面加强同气候技术中心和网络合作的各种选项；

(f) 建议在环境基金、各区域中心和气候技术中心和网络之间组织一次对话，以确定教训和各中心继续开展工作的各种选项；

(g) 注意到需要加强对关键信息中着重指出的某些要素的了解并进一步加以分析，这些要素可在制订未来工作计划时加以考虑。

Annex I

Global Environment Facility support for Poznan strategic programme climate technology centres and networks

[English only]

Project	*Region*	*Agency*	*GEF financing (USD million)*		*Co-financing (USD million)*	*Status*
			GEF Trust Fund	*SCCF*		
Promoting accelerated transfer and scaled-up deployment of mitigation technologies through the CTCN	Global	UNIDO	1.8	0	7.2	Under implementation
CTNFC	Asia-Pacific	ADB/ UNEP	10.0	2.0	74.7	Under implementation
ACTFCN	Africa	AfDB	10.0	5.8	89.0	Under implementation
FINTECC	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	IADB	10.0	2.0	63.4	Under implementation

Source: FCCC/CP/2018/6.

Annex II

Pilot projects of the Poznan strategic programme under the fourth replenishment of the Global Environment Facility

[English only]

Table 1
Pilot projects of the Poznan strategic programme under the fourth replenishment of the Global Environment Facility

Project	*Country*	*Counterpart*	*Technology*	*Approach*	*GEF funding endorsed by the Chief Executive Officer*
Climate change related technology transfer: using agricultural residue biomass for sustainable energy solutions	Cambodia	UNIDO	Agrowaste biomass energy systems	TA and investment to assist transfer of biomass plants to two pilot firms; capacity-building for national suppliers and relevant government departments	USD 1.9 million GEF grant; USD 4.6 million co-financing
Promotion and development of local solar technologies	Chile	IADB	Solar: photovoltaic and CSP	Development of standards and monitoring protocols for solar panels and solar systems; training of public and private stakeholders on CSP and photovoltaic systems; public awareness campaign to promote solar technology projects for solar water heating and power generation	USD 3.0 million GEF grant; USD 31.8 million co-financing
Green truck demonstration	China	World Bank	Energy-efficient trucks	Investment in retrofitting of 150 trucks, purchase of 150 new trucks, driver training, purchase and transfer of intellectual property rights; TA for all key partners, for example on greenhouse gas measurement and verification, policy and institutional frameworks for upscaling	USD 4.9 million GEF grant; USD 9.8 million co-financing
SolarChill: commercialization and transfer	Colombia, Eswatini, Kenya	UNEP	Solar refrigeration (for rural medical application)	Testing of two SolarChill technologies; investment in procurement and installation of 100 units in each country	USD 3.0 million GEF grant; USD 8.0 million co-financing
Construction of 1,000 t/day municipal solid waste composting unit	Côte d'Ivoire	AfDB	Municipal solid waste composting unit	Investment in construction and operation of pilot 1,000 t/day industrial composting unit in the city of Abidjan	USD 3.0 million GEF grant; USD 36.9 million co-financing
Dutyion root hydration system irrigation technology pilot project to address climate change impacts	Jordan	IFAD	Innovative irrigation system	Investment in pilot demonstration of irrigation technology; TA to train local farmers and stakeholders	USD 2.4 million GEF grant; USD 5.5 million co-financing
Promotion and development of local wind technologies	Mexico	IADB	Wind	TA to increase capacity for local development and implementation of wind power technology; investment in	USD 5.5 million GEF grant; USD 33.7 million co-financing

Project	*Country*	*Counterpart*	*Technology*	*Approach*	*GEF funding endorsed by the Chief Executive Officer*
				developing and testing prototype wind turbine built using high-quality national technology and manufacturing components	
Phasing out of HCFCs and promotion of HFC-free energy-efficient refrigeration and air conditioning systems through technology transfer	Russian Federation	UNIDO	Energy-efficient refrigeration and air conditioning systems	TA to build institutional capacity for phasing out ozone-depleting substances; investment to support phase-out and destruction; TA and investment to stimulate market growth in non-HFC options	USD 20.0 million GEF grant; USD 40.0 million co-financing
Production of Typha-based thermal insulation material	Senegal	UNDP	Organic building insulation (using invasive plant material)	TA and investment for basic evaluation and research, transferring technology and know-how, establishing local production, adapting the material for local application, a demonstration project and dissemination	USD 2.3 million GEF grant; USD 5.6 million co-financing
Bamboo processing	Sri Lanka	UNIDO	Bamboo cultivation (as land rehabilitator and sustainable energy resource)	Scientific and technical analysis, TA and investment to develop policy framework, laboratory for bamboo tissue reproduction, 10,000 ha bamboo plantation, machinery for producing wood flooring and biomass pellets, and the capacity and know-how for sustainable operations	USD 2.7 million GEF grant; USD 21.3 million co-financing
Overcoming policy, market and technological barriers to support technological innovation and South–South technology transfer: pilot case of ethanol production from cassava	Thailand	UNIDO	Bioethanol production	Aimed at removing barriers to and promoting technology transfer for the production of ethanol, enhancing South–South cooperation, increasing fermentation efficiency in ethanol production, promoting private sector engagement and transferring associated technologies to other countries in South-East Asia; includes technology demonstration to enhance and motivate full-scale technology investment (e.g. offer to establish demonstration plants in collaboration with interested partners); in order to remove policy and financial barriers, training provided to policymakers, banks and entrepreneurs	USD 3.0 million GEF grant; USD 31.6 million co-financing

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

Table 2
Cancelled pilot projects of the Poznan strategic programme under the fourth replenishment of the Global Environment Facility

Project	*Country*	*Agency*	*GEF PSP funding (USD million)*	*Total GEF funding (USD million)*	*Co-financing (USD million)*	*Status*
Renewable CO_2 capture and storage from sugar fermentation industry in São Paulo State	Brazil	UNDP	3.0	3.0	7.7	Cancelled in February 2012 at the request of the agency; at the project preparation stage, investment costs far higher than expected, exceeding available financing, were identified
Introduction of renewable wave energy technologies for the generation of electric power in small coastal communities	Jamaica	UNDP	0.8	0.8	1.4	Cancelled in October 2011 at the request of the agency
Realizing hydrogen energy installations on small islands through technology cooperation	Cook Islands, Turkey	UNIDO	3.0	3.0	3.5	Cancelled in March 2012 at the request of the agency following changes to the concerned Governments' priorities

Source: FCCC/SBI/2015/INF.4, appendix 3.

Annex III

Midterm review of the effectiveness and efficiency of Poznan strategic programme pilot projects

[English only]

I. Promotion and development of local wind technologies in Mexico[1]

A. Description

1. The objectives of the IADB project are to consolidate human capacities for the design of state-of-the-art wind turbines for distributed generation; structure a value chain for the production of goods and services at the national level in the wind energy sector; consolidate technical capabilities for manufacturing, assembling, operating, testing and certifying wind turbines for distributed generation with a high share of national technology; and support the development of a 1.2 MW class 1A wind turbine for distributed generation and provide capacity-building to promote the application of wind power through distributed generation by small power producers.

2. The Mexican wind turbine is designed for distributed generation and will be constructed, commissioned and operated at the public Regional Wind Technology Centre in Mexico with the support of the GEF. The main benefit of the project is the know-how that will be developed and owned by the consortium of companies and organizations executing the project. A working and certified wind turbine prototype will be developed. This is a technological innovation project with complex specifications, which is not typical of bank projects.

B. Effectiveness and efficiency

3. Owing to the limited progress in its implementation, with disbursements of money of less than 2.4 per cent at the time of the MTR, the project was given a low rating for effectiveness. Although executed by a technically competent entity, the National Institute for Electricity and Clean Energy (formerly the Electrical Research Institute), the project has been marred by procurement and contracting regulation difficulties, by a lack of coordination between the Secretariat of Energy and the National Council for Science and Technology to access the Energy Sustainability Fund, and by a management disconnect between the GEF and the project component that is manufacturing the wind turbine.

4. However, since the MTR, the main sections of the wind turbine have been designed and manufactured and most are ready for assembly, including most of the components inside the nacelle, the tower and the basement. The tower, which was designed and manufactured by Trinity, has already been transported to where the wind turbine will be erected. The final design of the blades will be completed in April 2019, and the process for manufacturing five blades will be initiated in the first half of 2019. The blades will be manufactured at the Regional Wind Technology Centre. Work is already under way to construct the industrial plant.

5. The main priority of the National Institute for Electricity and Clean Energy is to complete the design and manufacture of the wind turbine, using grant resources and counterpart financing. Owing to recent changes within the Government of Mexico, the counterpart budget needs to be presented for authorities' approval. The strategy for scaling up the project once certified will be based on the Government's plans for the development

[1] See the report on the 2015 MTR. available at http://idbdocs.iadb.org/wsdocs/getdocument.aspx?docnum=EZSHARE-357744178-7.

of renewable energy in the country. Both the counterpart resources and the new strategy will be confirmed by the National Institute for Electricity and Clean Energy in the first half of 2019.

II. SolarChill development, testing and technology transfer outreach in Colombia, Eswatini and Kenya[2]

A. Description

6. The objectives of the UNEP project are to procure, install and field test 198 SolarChill-A vaccine cooler units (in three countries (66 in each)); laboratory test prototypes, and procure and field test 45 SolarChill-B units for food preservation for domestic and small commercial applications (15 in each country); and disseminate information (e.g. via marketing campaigns and awareness-raising) and transfer technology. The intention of the project is to stimulate the global market uptake of the SolarChill direct drive technology, especially in off-grid areas, for both health and food security applications. The project will also provide transparent field test data that can be used for outreach activities and technology transfer.

B. Effectiveness and efficiency

7. At the time of the MTR, the field tests of SolarChill-A units were ongoing in the three countries. The SolarChill-B project component was delayed, with units expected to be tested in 2018–2019. The technology transfer effort is exclusively focused on the work led by Habitat, Energy Application & Technology with The Fridge Factory (trading as Palfridge) in Eswatini. The prototypes were to be built at Palfridge and be ready for testing by the end of 2018. Production of 100 units as agreed between the German Agency for International Cooperation 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 production volumes foreseen.

8. 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 requirements (especially for SolarChill-A) related to quality, reliability and temperature performance. The result is a high initial purchase price, ranging from USD 2,585 to USD 5,762 for SolarChill-A units. Price is even more of a barrier with the SolarChill-B units as they are targeted at remote communities with limited purchasing power but no financial plan is in place to help end users afford the initial high price. Manufacturing and purchase costs are expected to decrease as more units are produced. Currently, the lifetime cost of SolarChill refrigerators normally break even with that of kerosene units after 5–10 years, depending on the price of equipment and fuel.

9. The current project plan seems to be limited to field testing. There is no commercial or financial strategy in place for the period after the field testing, for example regarding who will take over the market penetration and commercialization work. It is not clear how the units' initial price will be reduced to allow for mass adoption, production and commercialization. The project's effectiveness and efficiency were not assessed in the MTR.

[2] See the 2018 MTR report on the GEF–UNEP project "SolarChill Development, Testing, and Technology Transfer Outreach".

III. Overcoming policy, market and technological barriers to support technical innovation and South–South technology transfer: the pilot case of ethanol production from cassava in Thailand, the Lao People's Democratic Republic, Myanmar and Viet Nam[3]

A. Description

10. The main objective of the UNIDO project is to prepare Thailand as the regional hub for the South–South technology transfer of ethanol production from cassava. The project was delayed because the National Science and Technology Development Agency, the government agency that developed the concept with UNIDO, was unable to execute the project and another executing partner had not yet been found. King Mongkut's University of Technology Thonburi took up the role of executing partner at the end of 2013. Although the technology transfer involved three countries (Lao People's Democratic Republic, Myanmar and Viet Nam), there was no involvement of institutional partners 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 owing to lack of policy support from the Myanmar Government.

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

12. The main project components are (1) institutional capacity-strengthening for the dissemination of very high gravity saccharification and fermentation (advanced fermentation) technology, with King Mongkut's University of Technology Thonburi being a regional hub for supporting South–South technology transfer; (2) South–South technology transfer, including capacity-building and policy dialogue with participants from the Lao People's Democratic Republic, Myanmar and Viet Nam, including improved pricing practices and policy environments; and (3) demonstration and commercialization of the technology and private sector development.

B. Effectiveness and efficiency

13. At the time of the MTR, approximately one year after the project activities started, the project had not achieved any of the expected outputs. However, at the terminal evaluation stage, the project outcomes had been partially achieved. The outcomes under component 1 had mostly been achieved, including the technology transfer package and the recognition of King Mongkut's University of Technology Thonburi as a regional hub for fermentation technology and technology transfer. The outcome under component 2 had not been 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 its production line, with an ethanol production capacity of 200 l/day. A demonstration plant was established, on the basis of TA from the university and expert advice from the Food Industries Research Institute in Viet Nam, with an ethanol production capacity of 50 l/day.

[3] See the report on the 2015 MTR, available at https://www.unido.org/sites/default/files/2015-10/GFTHA100264_MTR-2015_Rep-F_0.pdf.

IV. Bamboo processing in Sri Lanka[4]

A. Description

14. The objective of the UNIDO project is to develop a bamboo supply chain and product industry in Sri Lanka, leading to reduced greenhouse gas emissions and a sustainable industry base. Components range from developing a policy framework for growing, harvesting, transporting and processing bamboo, producing bamboo tissue and supporting the establishment and operation of plantations, to supporting bamboo processing.

B. Effectiveness and efficiency

15. At the time of the MTR, a range of preparatory activities had taken place, such as consultant reports, analyses and studies, but these had not yet been acted upon, and most expected outputs and outcomes had not yet been delivered. The project was affected by political upheaval and the challenge of developing a supply chain from scratch. Furthermore, lack of coordination, including between government entities, unclear project ownership and project management issues affected the project's implementation.

16. However, by 2018 some progress had been made, albeit 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 functions and meetings. Recommendations on a national strategy and on including bamboo in REDD-plus had been formulated. Although 700 ha are planned for bamboo planting, land availability is still hampering project progress. Three models of plantation set-up were either realized or prepared. Some private investments in bamboo processing technology were made, and, independently of the project, a 10 MW dendro power plant is being set up in the city of Vavuniya using high-yielding bamboo chips as biomass.

17. 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 provide direct grant-based support to communities and SMEs along the bamboo value chain, as originally envisioned in the project document.

V. Climate change related technology transfer for Cambodia: using agricultural residue biomass for sustainable energy solutions[5]

A. Description

18. The objective of the UNIDO project is to achieve a sustained transfer of cost-effective and efficient 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 five envisaged outcomes are to (1) transfer clean and energy-efficient low-carbon technologies; (2) supply of national service providers in technology evaluation and technology transfer; (3) Stronger 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; and (5) Establishment of policy, legal and regulatory frameworks that sustainably promote and support renewable energy generation.

[4] See the report on the 2016 MTR, available at https://open.unido.org/api/documents/5859540/download/Mid%20Term%20Evaluation%20Report%20-%20Final%20Sri%20Lanka%20100043%20GEF4114.pdf.

[5] See the report on the 2015 MTR, available at https://www.unido.org/sites/default/files/2015-10/GFCMB12002-100223_MTR_Report-F_151022_0.pdf.

B. Effectiveness and efficiency

19. The project suffered a setback in mid-2014 when three co-financing enterprises withdrew their commitment to invest in pilot biomass energy systems. During the project's implementation, it was found that biomass-based technologies in captive power or cogeneration projects were not technoeconomically feasible for the originally targeted rubber and rice sectors. Lack of understanding and of disclosure of the energy load profiles of many enterprises in these sectors led to an overoptimistic projection of the feasibility of their use of biomass energy systems (because of their energy demand being for fewer than 10 hours a day and the seasonal availability of feedstock). Furthermore, there is no mechanism for selling excess power to the grid. Only a 24-hour biomass energy operation would be technoeconomically viable, but then the availability and cost of biomass would become an issue.

20. At the time of the MTR, efforts were ongoing to identify SMEs with more favourable conditions for biomass cogeneration, such as those with expansion plans and that are using diesel oil for steam generation. To meet the conditions for a technoeconomically feasible pilot project, however, SMEs need to have a 24-hour demand for thermal and electrical energy. Such a pilot project would be able to successfully demonstrate lower production costs for industrial enterprises.

21. Since the MTR, the project has screened industrial enterprises with a 24-hour demand for thermal and electrical energy for which cogeneration with biomass would be technoeconomically feasible. The focus was mostly on the food processing sector. Several feasibility studies were conducted and presented to the companies. UNIDO signed a contract with Amru Rice Cambodia Co., Ltd to implement a biomass gasifier cogeneration plant of approximately 40 kWe and 60 kWth. Other technologies that use biomass for heat or cooling energy were investigated, such as absorption chillers for beer processing and cooling. Several factories for which implementation would be both economically and technically viable are potential candidates for biomass cogeneration. However, several companies did not go forward with the implementation of the suggested technologies for various reasons, including the high upfront investment cost and their lack of access to appropriate finance.

VI. Production of Typha-based thermal insulation material in Senegal[6]

A. Description

22. The goal of the UNDP project was to facilitate the local production in Senegal of a thermal insulation material based on Typha. It aimed to improve the energy efficiency of both rural and urban building techniques. A research and development component was to create the conditions for transferring thermal insulation material production technologies: products would be tailored to the local building context, materials and constraints; pilot projects would demonstrate the usability of the products; awareness would be raised among relevant national stakeholders in the construction industry; training courses would be provided for the nationwide dissemination of the product; and measures for the diffusion of the technology and the use of the products, such as regulatory and incentive frameworks, would be analysed.

23. The project was expected to contribute to improving thermal comfort in housing in Sahelian countries, reduce electricity consumption from air conditioning and related CO_2 emissions and generate decentralized employment opportunities.

[6] See the report on the 2016 MTR, available at https://erc.undp.org/evaluation/evaluations/detail/7334.

B. Effectiveness and efficiency

24. None of the objectives had been achieved at the time of the MTR. 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 addition of Typha and could not be used. Therefore, it was decided to use materials with a Typha–earth mix only.

25. Samples of panels and bricks made of earth–Typha material had been prepared, but still had to be tested in different Sahelian conditions at the time of the MTR. An ecopavilion was built from compressed Typha panels by the project in the city of Diamniadio, but it did not represent the reality of the housing found in urban and rural areas in Senegal. Training modules were developed and technical training activities conducted. Some studies were also carried out. The project still required funding for the establishment of small-scale Typha-based building material production facilities at the time of the MTR.

26. However, research carried out by the GEF 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 advantage of using it in energy-efficient buildings. A follow-up project funded by the French Facility for Global Environment started in 2017.

VII. Irrigation technology pilot project to face climate change impacts in Jordan[7]

A. Description

27. The aim of the IFAD project is to promote innovative and technically reliable irrigation technologies to reduce the vulnerability to climate change of the agricultural system in Jordan and, in particular, the impacts on water resources by testing innovative, environmentally friendly and efficient water use technologies.

28. The project has two components: (1) identification, implementation and expansion of irrigation technologies in Jordan; and (2) training, capacity-building and awareness-raising. The main target group is rural farmers. Two of the eight technologies originally identified, buried diffuser and reuse of grey water, were excluded. The six technologies implemented are fertigation, solar energy water pumps, aquaponics, hydroponics, water desalination and computerized irrigation technology. While the technologies are technically appropriate, the poorest farmers cannot afford to invest in and maintain heavy technology (e.g. desalination technology costs more than USD 70,000). A call of interest was made to select farmers willing to contribute 25 per cent of the investment.

B. Effectiveness and efficiency

29. The project was significantly delayed in starting up owing to the complex selection of technologies; the need to mobilize farmers; lack of confirmation of target beneficiaries' contribution; and extensive consultations with beneficiaries on the appropriate irrigation technologies. Fertigation technology is the most affordable of the six technologies and is therefore reaching more of the farmers. The solar energy water pump is the second most affordable technology and is in high demand. Owing to the need to contribute to the cost of the technology, the project cannot reach the most vulnerable farmers; but the cost-sharing aspect was put in place both to promote ownership and to reach a larger target group.

30. At the time of the MTR, about 34 farmers had benefited from the project. In the second stage, 72 farmers are expected to benefit. The target of 300 ha area of use of the irrigation technology should be reached at the end of the project: (34 farmers in the first

[7] See the 2017 MTR report on the project "Irrigation Technology Pilot Project to Face Climate Change Impact in Jordan".

phase + 72 farmers in the second phase) x 3 ha average area = 318 ha. Component 1 of the project was rated moderately satisfactory, while Component 2 was rated moderately unsatisfactory.

VIII. Phase-out of hydrochlorofluorocarbons and promotion of hydrofluorocarbon-free energy-efficient refrigeration and air conditioning systems through technology transfer in the Russian Federation[8]

A. Description

31. The primary aim of the UNIDO project is to phase out 600 t ozone-depleting HCFCs (for the most part HCFC-21, HCFC-22, HCFC-141b and HCFC-142b) in sectors engaged in the production of foam and refrigeration equipment to achieve the 2015 target values under the Montreal Protocol on Substances that Deplete the Ozone Layer. The greenhouse gas emission reduction resulting from the phase-out of HCFCs will be approximately 15.6 million metric tonnes of CO_2. The secondary objective of the project is to incorporate more energy-efficient designs through technology transfer in the conversion of refrigeration and air conditioning manufacturing facilities.

32. The components of the project are institutional capacity-building; a HFC and HCFC life cycle performance analysis; phase-out of HCFC consumption in the key consuming sectors of foam and refrigeration; development of an ozone-depleting substance destruction facility and supporting recovery network; stimulation of market growth for energy-efficient refrigeration and air conditioning equipment; technology transfer; and a feasibility study to determine the best and most integrated strategy for dealing with the closure of HCFC production.

B. Effectiveness and efficiency

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

34. The progress in implementing a legal framework for the control of HCFCs significantly accelerated the prioritization of phasing out HCFCs across the foam and refrigeration sectors, and some foreign-owned enterprises had already voluntarily converted to non-ozone-depleting substance technology ahead of the legal obligations. By January 2015, 490 t ozone-depleting products had been phased out.

35. The implementation strategy is to bypass the adoption of HFCs by encouraging and facilitating the adoption of solutions with low global warming potential. Emphasis is being placed on natural refrigerants such as ammonia and hydrocarbons, used in appropriate applications, supplemented by the use of hydrofluoroolefins, which are currently in the development phase. This strategy appears to be supported by the chemical manufacturing sector, which does not currently produce the most common HFC refrigerants or foam-blowing agents and is keen to avoid a widespread adoption of technology dependent on foreign imports.

36. Some progress has been made in stimulating the adoption of more energy-efficient refrigeration technology. Refrigeration technicians and designers are highly engaged and a technical training centre has been established in Moscow with support from leading

[8] See the report on the 2013 MTR, available at https://www.unido.org/sites/default/files/2014-05/RUS_GFRUS11001_MTR_Dewpoint_0.pdf.

industry players to train technicians 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 any legal or financial imperative to change. The overall progress of the project was rated highly satisfactory. Its effectiveness and efficiency were not rated.

IX. Promotion and development of local solar technologies in Chile[9]

A. Description

37. The general objective of the IADB project is to support the Government of Chile and the Chilean Ministry of Energy in developing a solar energy industry for solar water heating and power generation in Chile (photovoltaic panels and CSP). The specific objectives are to promote technology transfer, institutional strengthening and capacity-building in solar technologies; develop pilot projects using solar technologies (solar water heating and power generation); and support the design of incentives, financial mechanisms and a public awareness campaign to promote solar projects with solar water heating and power generation technologies.

B. Effectiveness and efficiency

38. The project was launched in 2014 when rooftop solar systems had begun to flourish in Chile as a result of the introduction of a net billing scheme, making it easier to connect small and medium-sized (< 0.1 MWe) photovoltaic systems to the distribution network.[10] By the end of 2016, 5 MWe and 714 systems had been installed. GEF funding was used for three public solar rooftop demonstration projects totalling 150 kW in 2017, the contribution of which to the overall programme is not clearly articulated in the MTR. More importantly, the project contributed to building capacity for the design and development of public tenders associated with the installation of photovoltaic projects in the public solar rooftop programme, which reduced costs.

39. As a result of the fast-changing market, a large part of the budget for pilot solar rooftop projects was reallocated to designing a credit line for SMEs to obtain photovoltaic systems at preferential rates and tenures (grant subsidies to reduce credit and interest rates). A reassessment of the market also led to support for solar water heating being dropped from the project.

40. At the time of the MTR, the CSP component (the construction of a CSP plant in the Atacama Desert) was delayed owing to challenges associated with the corporate crisis of Abengoa, the contractor that was publicly awarded the construction, operation and maintenance of the plant. The project produced a technical study, which provided the means to design, prepare and successfully tender the first CSP plan in Chile. The Government of Chile asked that the project meet the specific demands related to the monitoring of the CSP plant being implemented by Abengoa, and provide expert advice and enable exchange of experience.

[9] See the report on the 2017 MTR, available at 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: pp.399–414.

X. Green freight demonstration project in China[11]

A. Description

41. The development objectives of the World Bank project were to demonstrate the global and local environmental benefits of the application of energy-efficient vehicle technologies and operating techniques, and to support improving energy efficiency and reduce greenhouse gas emissions in the road freight transport sector in Guangdong.

42. The project had three components. First, green truck technology demonstration facilitated communication and cooperation among energy-efficient vehicle technology suppliers, freight carriers, freight shippers and other key stakeholders, and provided project participants with access to government and commercial financing, including green freight technology rebates and performance-based payments. Six energy efficiency technologies verified by the United States Environmental Protection Agency SmartWay programme were demonstrated (low-resistance tyres, roof fairing, side skirt, gap fairing, tyre pressure monitor, and energy-efficient driving system). Second, a green freight logistics demonstration established two pilot logistics brokerage platforms, which helped to demonstrate the provision of financing through green freight technology rebates and performance-based payments. The grant was used to subsidize half of the truck driver's payment (USD 16/trip) in order to attract more users. Third, capacity-building and outreach programmes were designed. The Project Management Office organized a series of training programmes, workshops and symposiums to advertise and promote green freight concepts. By the end of the project, training had been provided to over 3,200 truck drivers and over 200 government officials and project management officials.

B. Effectiveness and efficiency

43. The effectiveness and efficiency of the project were both rated as substantial. The short-term net benefits from fuel savings were worth about USD 61.2 million, almost three times the total project cost. The project led to 161,430 t CO_2 emission reductions at a GEF grant cost of USD 23/t, which was much higher than the USD 3.5/t estimated at the time of appraisal. This was due to the fact that the technologies verified by the United States Environmental Protection Agency SmartWay programme were unable to produce the same benefits in Guangdong. In addition, the grant leveraged USD 8.02 million in private sector investment (eight times the estimated amount at appraisal), the majority of which came from two logistics companies that implemented the pilot logistics platforms and a trucking company that implemented the drop-and-hook pilot. This achievement is mostly due to the increased awareness about the benefits of energy efficiency technologies and operating techniques, as well as Guangdong's efforts to mainstream energy-efficient practices in the freight and logistics sectors.

[11] The 2016 terminal evaluation report is available at http://documents.worldbank.org/curated/en/105411467614051818/pdf/ICR2510-P119654-Box396252B-PUBLIC-disclosed-6-29-16.pdf.

Annex IV

Responsiveness of the Global Environment Facility to the Technology Executive Committee's recommendations on the Poznan strategic programme relevant to enhancing the effectiveness of the Technology Mechanism

[English only]

1. In the report on its evaluation of the PSP in 2015, the TEC provided a number of recommendations on the PSP relevant to enhancing the effectiveness of the Technology Mechanism. The following is an assessment of the responsiveness of the GEF and other actors to those recommendations.

2. **The GEF was encouraged to further catalyse the upscaling of good practices under the PSP and the sharing of experience and lessons learned among PSP elements and with relevant stakeholders:**

(a) The GEF has continued to approve projects with technology transfer objectives. In the reporting period leading up to COP 24, from July 1, 2017, to June 30, 2018, for climate change mitigation, 27 projects with technology transfer objectives were approved with USD 108 million in GEF funding and USD 402.9 million in co-financing. For climate change adaptation, eight projects promoting technologies for adaptation were approved with USD 48 million from the LDCF, USD 1.1 million from the SCCF and USD 177.9 million in co-financing;

(b) The PSP pilot regional centres and pilot projects are ongoing, with mixed outcomes so far. It would be premature to start upscaling specific practices before their results and potential have been assessed. In the follow-up to the ADB/UNEP centre that is nearing project closure, a different project origination approach is being adopted, namely developing innovative low-carbon technology projects in close collaboration with the operational departments rather than supporting projects that have already entered the investment pipeline. There is currently no assessment and insufficient information on the replicability of some of the technology transfer mechanisms and support models. However, as PSP experience has proven, there is an urgent need to learn from experience and better understand the conditions, modalities and processes for successfully demonstrating, transferring and scaling up new technologies;

(c) The CTCN has proven itself as a model, having established a track record of providing early-stage support to potential projects, for which there is much demand from countries;

(d) In its report to COP 24, the GEF highlighted that a constructive dialogue had been established with its respective agencies. It has attended a number of meetings to raise awareness about the PSP. In addition, it organized a side event at the forty-sixth sessions of the subsidiary bodies to share experience and lessons learned from the PSP.

3. **The GEF was invited to share the midterm evaluations of the PSP pilot centres and GEF-4 pilot projects with the TEC as soon as available to enhance the sharing of PSP experience.** As at February 2019, 14 of the 16 PSP projects had reached the midterm evaluation stage. All available MTR reports were made available by the GEF for input to the updated evaluation of the PSP.

4. **The PSP regional centres and the CTCN were encouraged to strengthen their institutional linkages with a view to strengthening coordination, enhancing information-sharing and creating synergies to accelerate regional climate technology development and transfer.** The GEF has convened a number of dialogues among the regional centres and UNEP and the CTCN outside of GEF Council and other meetings to share information. Other than convening meetings, no other institutional linkages have been supported by the GEF.

5. **Countries were recommended to enhance the coherence and effectiveness of their national climate technology efforts by strengthening links between national entities, and encouraged 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:**

(a) The Climate Technology Centre requested from NDEs information on their collaboration with the GEF operational focal points on matters relating to the development and transfer of climate technologies. In total, 69 NDEs responded to the survey: 64 per cent noted that they have information on the GEF portfolio in their respective countries; 49 per cent indicated that they meet regularly with the GEF operational focal points to support coordination at the national level, of which 50 per cent meet every three months or less; 60 per cent stated that they did not participate in the GEF portfolio formulation exercise in their countries and thus did not contribute to defining priority sectors for GEF funding. Finally, the survey highlighted that four subregional meetings organized by the CTCN provided a good opportunity for NDEs, GEF operational focal points and GCF nationally designated authorities to meet to discuss matters of common interest and share experience;

(b) The survey highlighted the need to strengthen country coordination mechanisms, in particular the participation of NDEs in GEF portfolio formulation exercises.

6. **The GEF was invited to structure its report on the PSP under the areas of regional and global climate technology activities, national climate technology activities, and TNAs with a view to enhancing the clarity of its reporting, strengthening coherence and building synergies between the activities of the PSP and the Technology Mechanism.** The GEF has addressed this recommendation, as reflected in the structure of its reports to the COP: the chapter on technology transfer has been structured around these areas.

7. **The GEF was recommended to report annually to the COP through the SBI on progress 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.** The GEF submits annual reports to the COP on progress in carrying out its activities under the PSP, including its long-term implementation.