FINANCING AVIATION EMISSIONS REDUCTIONS

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PREFACE

The International Civil Aviation Organization (ICAO) and its Member States are working together to develop State Action Plans to reduce CO_2 emissions from international aviation. The development and completion of States' Action Plans on CO_2 emissions reduction activities from international aviation requires the establishment of a structured cooperation process amongst national aviation stakeholders which aims to provide the State authority with the information it needs to set-up a long-term strategy for the mitigation of international aviation CO_2 emissions. The voluntary submission of an action plan to ICAO provides the opportunity for States to showcase policies and actions, including tailor-made measures that are selected on the basis of their respective national capacities and circumstances.

Many Member States, particularly Developing States and Small Island Developing States (SIDS), continue to investigate the institutional and financial resources necessary to develop and implement their action plans, and the actions therein. For example, many States, through their civil aviation authorities, are beginning to integrate environmental programmes into their planning and development, and these need to be coordinated with other government agencies. Some States also endeavour to establish or improve the national regulatory and policy frameworks necessary to encourage low carbon technology deployment, which is critical to stimulating private sector market activity. Others would also like to benefit from low carbon technologies that are being successfully developed in other parts of the world. This means that the State Action Plan initiative can be key to States developing coordinated activities aimed at reducing CO_2 emissions from international civil aviation.

ICAO has developed Doc 9988, *Guidance on the Development of States' Action Plans on CO_2 Emissions Reduction Activities,* which aims to support Member States as they develop and implement their Action Plans. As of November 2017, 105 States representing more than 90.1 per cent of global revenue tonne kilometres (RTK) have voluntarily submitted their Action Plans to ICAO. Doc 9988 presents the basket of measures that Member States can consider for reducing CO_2 emissions from civil aviation. In this regard, it is important that guidance be made accessible to ICAO Member States on the possible opportunities available for financing emissions reductions projects. This information can facilitate States' preparation and implementation of Action Plans, and related environmental programmes.

The purpose of this guidance is to inform ICAO Member States on how to finance renewable energy projects that can be deployed to reduce CO_2 emissions from international aviation activities. Developing airport renewable energy projects can also minimize CO_2 from many energy consuming activities at airports beyond those that relate to international civil aviation. Renewable energy can also be a key component in the modernization of facilities and economic development.

A significant amount of financial resources are being directed toward programmes associated with climate change mitigation. These programmes are closely tied to public climate financing through the United Nations, multinational development banks, and non-governmental organizations, and various private partners and stakeholders. This document presents an introduction to carbon emission reduction financing instruments with an emphasis on how these programmes incentivize private investment, and how they may offer opportunities for States to implement carbon emissions reduction measures. The guidance draws on experience in developed States where targeted public policies have encouraged private investment in low carbon projects, like those associated with the renewable energy industry, creating markets where such alternatives compete with energy generated from fossil fuels. Those private financiers are looking to new and emerging markets to make investments and expand their businesses. However, public finance programmes and policies are critical to reducing risks to private sector investment, which will provide new opportunities specifically for the aviation sector.

The guidance includes an initial overview of project financing, barriers to climate financing in developing States, the roles of the public and private sectors, types of financing instruments, and the types of organizations that are active in climate financing programmes. For additional information, a matrix of existing funding programmes has also been provided which includes types of financing available (see Annex A), project examples and websites. Throughout the guidance, there are examples of project that have been financed and by which organizations.

Together with guidance documents on *Sustainable Aviation Fuels*, *Renewable Energy for Aviation: Practical Applications to Achieve Carbon Reductions and Cost Savings*, and *Regulatory and Organizational Framework to Address Aviation Emissions*, this guidance on financing aviation emissions reductions will contribute to ICAO's comprehensive approach to support its Member States in the implementation of their Action Plans to address CO_2 emissions from international civil aviation.

LIST OF ACRONYMS AND SYMBOLS

ADB	Asian Development Bank
AF	Adaptation Fund
AfDB	African Development Bank
APER	Action Plan on CO_2 Emissions Reductions
APU	Auxiliary Power Unit
CFU	Climate Funds Update
CIFs	Climate Investment Funds
CDM	Clean Development Mechanism
COP	Conference of the Parties
CORSIA	Carbon Offsetting and Reduction Scheme for International Aviation
CTF	Clean Technology Fund
EBRD	European Bank for Reconstruction and Development
EIB	European Investment Bank
EPC	Engineering, Procurement and Construction
ESCO	Energy Service Company
FDI	Foreign Direct Investment
FIT	Feed-in Tariff
GCF	Green Climate Fund
GEF	Global Environment Facility
GHG	Greenhouse Gas
GPU	Ground Power Unit
IDB	Inter-American Development Bank
IFC	International Finance Corporation
IEA	International Energy Agency
IMF	International Monetary Fund
IPP	Independent Power Producer
IRENA	International Renewable Energy Agency
ISO	International Organization for Standardization
kW	Kilowatt
kWh	Kilowatt hour
LCOE	Levelised Cost of Electricity
LDC	Least Developed Country
MDB	Multilateral Development Bank
MIGA	Multilateral Investment Guarantee Agency (World Bank)
MW	Megawatt
NAMA	Nationally Appropriate Mitigation Action
NIE	National Implementing Entities
O&M	Operations and Maintenance
OECD	Organisation for Economic Cooperation and Development
PCA	Preconditioned Air
PPA	Power Purchase Agreement
PV	Photovoltaic
RET	Renewable Energy Technology
RFP	Request for Proposal
SIDS	Small Island Developing States
SREP	Scaling Up Renewable Energy Program for Low Income Countries
UNIDO	United Nations Industrial Development Organization
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
UNFCCC	United Nations Framework Convention on Climate Change
UN REDD	United Nations Collaborative Programme on Reducing Emissions from Deforestation and Forest Degradation
USD	United States Dollar

GLOSSARY OF FINANCING TERMS

The following financial and climate-related terms are referenced throughout the document.

Commercial Bank: A lender of money whose traditional role was to take savings deposits, on the basis of which it is able to make loans to individuals and companies. These lenders have increasingly taken on many *investment banking* functions and become more active players on *capital markets*. (2)

Concessional Loan: These are loans that are extended on terms substantially more generous than market loans. The concessionality is achieved either through interest rates below those available on the market or by grace periods, or a combination of these. Concessional loans typically have long grace periods. (3)

Debt Finance: Lending money to a company, government or a project in the form of a loan or *bond.* The repayment is in the form of interest, as distinct from *equity finance*. (2)

Direct Investment: Direct investment is a category of international investment made by a resident entity in one economy (direct investor) with the objective of establishing a lasting interest in an enterprise resident in an economy other than that of the investor (direct investment enterprise). (3)

Debt Service: Refers to payments in respect of both principal and interest. Actual debt service is the set of payments actually made to satisfy a debt obligation, including principal, interest, and any late payment fees. Scheduled debt service is the set of payments, including principal and interest that is required to be made through the life of the debt. (3)

Equity Finance: In financial markets, equity means ownership. An 'equity' investor takes partial ownership of a company, for which *shares* are issued. The value of the investment is related to the success or otherwise of the company, rather than the interest payments accrued by *debt finance*. (2)

Feed-in Tariff (FIT): Feed-in tariffs are typically long-term payments (e.g., 15 to 20 years) to renewable energy project owners. FIT payment levels are often calculated to cover the estimated utility's avoided cost of generation or the cost of the project plus a reasonable income. (5)

Grant: Grants are transfers made in cash, goods or services for which no repayment is required. (3)

Green Bond: A bond is a loan, which agrees in advance how long it will take to pay back, and at what interest rate. When the allotted time is up, then the original sum of money is repaid in full. With a green bond, the investor is lending money specifically for defined environmental or sustainable projects. (2)

Green Credit Lines: Lines of credit (debt finance) provided to local banks for investing in projects that meet specified 'green' criteria. (1)

Guarantee: A guarantee is an agreement by a guarantor to assume the responsibility for the performance of an action or obligation of another person or legal entity by agreeing to compensate the beneficiary in the event of non-performance. In development finance, it is mostly an instrument that mitigates political, regulatory, and foreign exchange risks of investors including the risk of expropriation and nationalization without compensation, war, and restrictions on the conversion of currencies. Both, equity and debt investments can be guaranteed. (6)

Independent Power Producer (IPP): A corporation, person, agency, authority, or other legal entity or instrumentality that owns or operates facilities for the generation of electricity for use primarily by the public, and that is not an electric utility. (4)

Interest: A regular payment made by a borrower for the use of money – in essence, a form of 'rent'. An 'interest rate' is a standardized measure, usually calculated as a percentage of the total borrowed amount that is paid in interest each year. (2)

Maturity (Bond): The expiry point of a bond, at which time the original amount (*principal*) needs to be repaid. (2)

Power Purchase Agreement: is a contract between a power generator and a power consumer (or distributor). Historically, PPAs have been frequently signed between utilities and independent power producers as a way for the utility to procure additional generation. In recent years, PPAs have been used as a way for power consumers to purchase electricity, often from solar power systems, from a third-party developer (i.e., not a utility). (5)

Principal: The amount of a loan, separate from the interest to be paid on it. (2)

Risk Management: A collective description for a variety of credit or *risk guarantees* and *risk insurance* products that are proposed as a means to make climate change investments more attractive to *capital markets*. (2)

Transaction Costs: Transaction costs are a generic label for the cost associated with making an economic exchange, although the exact definition varies. They are sometimes sub-divided into search, negotiation and enforcement costs. Search costs relate to finding parties to an exchange – for example, brokers' fees for exchanging stocks, and may also refer to the costs of finding an appropriate project to undertake in the first place. Negotiation costs determine mutually acceptable terms of trade, such as lawyers' and consultants' fees in relation to contracts (such as *Emissions Reduction Purchase Agreements*). Enforcement costs refer to legal fees and taxes levied by the institutions that regulate the exchange. (2)

Sources:

(1) UNEP. 2011. Innovative Climate Finance. Examples from the UNEP Bilateral Finance Institutions Climate Change Work Group. http://wedocs.unep.org/handle/20.500.11822/8037?show=full

(2) Institute for Policy Studies. 2012. A Glossary of Climate Finance Terms. Washington, DC. December 2012.

(3) OECD. 2017. Glossary of Statistical Terms. Organisation for Economic Co-operation and Development. http://stats.oecd.org/glossary/index.htm

(4) USEIA. 2017. Glossary. US Energy Information Administration. https://www.eia.gov/tools/glossary/

(5) NREL. 2017. Renewable Energy Project Finance. Glossary https://financere.nrel.gov/finance/content/glossary

(6) World Bank. Glossary of Selected Innovative and Conventional Financial Instruments and Mechanisms. October 9, 2009.

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BACKGROUND

The 39th Session of the ICAO Assembly, held from 27 September to 7 October 2016, adopted Resolution A39-2: *Consolidated statement of continuing ICAO policies and practices related to environmental protection — Climate change*. Resolution A39-2 reflects the determination of ICAO's Member States to provide continuous leadership to international civil aviation in limiting or reducing its emissions that contribute to global climate change.

The 39th Session of the ICAO Assembly reiterated the global aspirational goals for the international aviation sector of improving fuel efficiency by 2 per cent per annum and keeping the net carbon emissions from 2020 at the same level, as established at the 37th Assembly in 2010, and recognized the work being undertaken to explore a long-term global aspirational goal for international aviation in light of the 2°C and 1.5°C temperature goals of the Paris Agreement. The 39th Assembly also recognized that the aspirational goal of 2 per cent annual fuel efficiency improvement is unlikely to deliver the level of reduction necessary to stabilize and then reduce aviation's absolute emissions contribution to climate change, and that goals of more ambition are needed to deliver a sustainable path for aviation. To achieve international aviation's global aspirational goals, a comprehensive approach, consisting of a basket of measures has been identified, namely:

- *Aircraft-related technology development* – purchase of new aircraft and new equipment to retrofit existing aircraft with more fuel-efficient technology.
- *Alternative fuels* – investments in the development and deployment of sustainable aviation fuels.
- *Improved air traffic management and infrastructure use* – improved use of communication, navigation and surveillance/air transport management (CNS/ATM) to reduce fuel burn.
- *Economic/market-based measures* – researching and building awareness of low cost, market-based measures to reducing emissions such as emission trading, levies, and off-setting.

All of these measures, in addition to contributing to carbon neutral growth, advance the social and economic development associated with the UN Sustainable Development Goals (SDGs).

A central element of Resolution A39-2 is for States to voluntarily prepare and submit action plans to ICAO. It also lays out an ambitious work programme for capacity building and assistance to States in the development and implementation of their action plans to reduce emissions, which States were initially invited to submit by the 37th Session of the ICAO Assembly in October 2010, and update every three years thereafter. ICAO State Action Plans provide the opportunity for States to showcase policies and actions and are intended to be individualized and reflect the specific national circumstances of each ICAO Member State and the opportunities available to them in implementing measures to mitigate CO_2 emissions from international aviation activities. ICAO has prepared ICAO Doc 9988, *Guidance on the Development of States' Action Plans on CO_2 Emissions Reduction Activities* to describe the process of developing or updating an action plan. As of November 2017, 105 Member States, representing 90.1 per cent of global RTK have voluntarily submitted their action plan to ICAO.

At airports, many advances are being made toward mitigating carbon emissions. These include designing projects that: (1) employ on-site energy generation powered by renewable facilities and transportation powered by sustainable aviation fuels; (2) conserve energy demand by facilitating natural heating and cooling, employing insulation, and directing the installation of highly efficient (low energy use) systems; (3) employ reused and recycled materials to limit the amount of energy necessary for harvesting and processing virgin products; and (4) encourage the use of non-motorized and communal transportation modes to move more people using less energy. These projects present opportunities to mitigate carbon emissions in the aviation sector as well.

This guidance on financing aviation emissions reductions provides ICAO Member States with an overview of project financing for low carbon technologies, the role of public and private organizations in providing financing, and a list of financing programmes and policies to help them fund their mitigation measures. It is part of a series of guidance documents developed as part of the capacity-building and assistance project implemented by ICAO, in cooperation with the United Nations Development Programme (UNDP), with financing from the Global Environment Facility (GEF). The primary focus of this assistance project is on identifying and facilitating the implementation of measures to reduce CO_2 emissions from international civil aviation. With the support of GEF and UNDP, ICAO is working with SIDS and developing States to strengthen their national capacities and improve national processes and mechanisms for the reduction of aviation emissions by:

- improving understanding the costs and environmental benefits associated with implementation of various mitigation measures for international aviation emissions;
- enhancing policy framework through a series of policy instruments, including the development of guidance documents;
- sharing knowledge and resources through an integrated environmental portal, as well as other awareness-raising initiatives; and
- developing Pilot Projects, such as the installation of solar technology at airports, thus equipping Developing States and SIDS with tools to carry on similar projects and multiplying their environmental benefits.

ICAO also has a project with the European Union (EU) on “Capacity Building for CO_2 Mitigation from International Aviation,” a project directed to a selected group of 14 States in Africa and the Caribbean. This joint ICAO-EU assistance project is supporting climate change mitigation through the development and implementation of States’ Action Plans on CO_2 emissions reduction from international aviation, establishing aviation environmental systems for emissions monitoring at the State level, and evaluating and implementing mitigation measures. These projects demonstrate how States can implement tangible CO_2 emission reduction projects while using public financing to expand private sector experience to new geographic markets and in new industry sectors associated with aviation.

ICAO Member States, working with other stakeholders, including airport authorities and airlines, are the primary organizations positioned to implement environmental protection measures. ICAO’s efforts on climate change mitigation seek to augment the capabilities of States to implement the programmes agreed to by ICAO Member States to achieve sustainable aviation growth.

BARRIERS TO FINANCING SUSTAINABLE GROWTH MEASURES

Global climate change mitigation can be costly, requiring a diverse financing strategy. Public financial resources are limited and must be used wisely, and to the maximum advantage. Private financial resources are available and can be mobilized to finance low carbon technologies and projects, if investment risks are minimized, a return on investment can be demonstrated, and the environmental benefits can be validated. Private sector financing for climate change mitigation is becoming more customary as financial institutions increase their understanding of and confidence in technologies, and the private markets, particularly in the insurance industry, begin to account for the costs of inaction. However, barriers to investment in developing countries remain due to a limited amount of capital and a lack of market maturity necessary to attract significant private investment. Public finance policies and programmes can be used to absorb and subsidize some of the risk, build market confidence, and make private sector investments more lucrative.

USING PUBLIC FINANCING PROGRAMMES FOR SUSTAINABLE AVIATION

In the world of climate finance, public sector funding is being deployed in a strategic way to minimize the risks of private investment. This is being accomplished by (1) developing new management structures and building capacity in existing institutions around low carbon technologies to facilitate their development and operation; (2) funding high risk resource exploration and other high risk pre-financing expenses; (3) subsidizing the higher cost of borrowing particularly in developing States; and (4) developing regulatory programmes that drive demand for low carbon technologies and reduce their relative costs. Guidance to States is necessary to ensure that they are familiar with financing opportunities for low carbon technologies in order to allow them to work with stakeholders to pursue the mitigation measures identified in ICAO Doc 9988, *Guidance on the Development of State Action Plans on CO_2 Emissions Reduction Activities for International Aviation*.[1]

[1] http://www.icao.int/environmental-protection/Pages/ClimateChange_ActionPlan.aspx

1.0 INTRODUCTION

As an introduction to financing aviation emission reduction activities, this section provides an overview of project financing basics, describes financing barriers, and introduces potential public policy solutions. The context for this introduction is that public sector financing is develop private markets and is most efficient when targeted at the barriers to private investment.

1.1 BASICS OF PROJECT FINANCING

Regardless of the type of financing ultimately provided, all development projects rely on a similar framework of financial resources to achieve development success. This includes initial costs necessary to define the project (referred to as at-risk development costs) followed by capital to fund the project construction and operation which is a mixture of equity (assets of the project owners) and debt (funds loaned by a financial partner such as a bank). Once the project is constructed, the owners and investors must be able to pay for the project cost including payback of debt and return on investment.

The financial inputs and outputs of project finance are illustrated in the **Figure 1-1** by a simple example of an energy producing project referred to here as a special purpose vehicle (SPV), which is a company set up just for the purpose of developing the project. The "sponsor" is the entity proposing the project and investing equity in its development; the "bank" is providing a loan which must be repaid; the "Power offtaker" is an entity that is purchasing the power produced by the project which will substantiate future project revenue; and the "EPC" (Engineering Procurement Construction) entity is the contractor hired to build and maintain the facility.

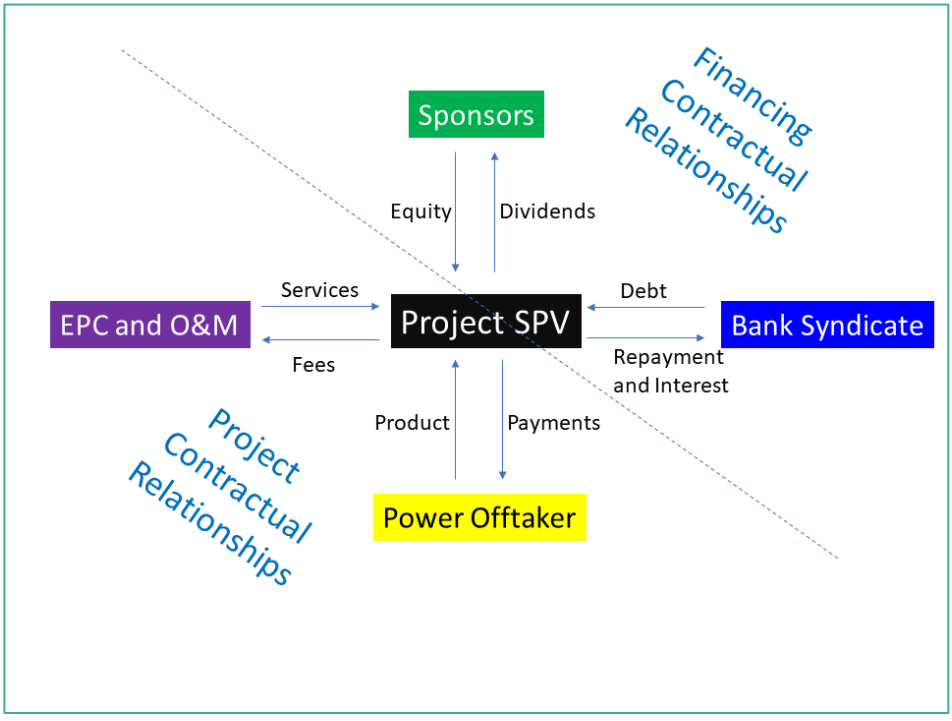


FIGURE 1-1
Financial input and output for energy project Example (Source: author).

A key to understanding project financing is that none of the participating parties – sponsors, bank, offtaker, or EPC – will participate in the project unless they are confident that they will earn an adequate return on their investment for their effort. Particularly in developing States where markets are not well developed, one or more of the parties may encounter market risks that would dissuade them from participating. Public financing can be applied strategically at any point in the development where there exist such market weaknesses to shore up project

economics and development success. However, because public resources are finite, they must be deployed in a manner as to maximize benefits not only from the subject project but by compounding benefits to similar projects. These resources can be deployed at different stages during the project development.

1.1.1 AT-RISK DEVELOPMENT COSTS

Before a project can be financed, it must be defined and its potential for economic success must be understood. Money is spent to identify a project site, evaluate the resources of the site, design the project, obtain regulatory permits and approvals, and prepare required financial analyses needed by financing entities to assess the risk of their participation. These expenditures are made at risk by the project sponsor and build equity (or ownership) in the project. Despite the risk, these costs are essential to ensuring the success of the project. Only after this information is collected will all parties understand the project economics and financing entities will be able to understand the risks of investment.

For specific low carbon projects, significant funds may be necessary to define the project and understand its economic viability. For renewable energy, as an example, studies are necessary to measure the renewable energy resource available at the project site. These studies are critical to the entire project financing because the amount of resource (e.g., solar, geothermal, wind) will determine how much energy the project will generate, and the amount of energy generated will determine how much revenue the project could produce. Financiers will base their funding estimates on the amount of data collected from the project site and the detailed analysis of the natural resource availability. Where they have multiple years of data, they can provide greater certainty into their estimates; with one year or less of data, the estimates will be less certain.

The project design will also help to identify equipment and construction costs, which are the largest costs for renewable energy projects. As more funding is put into refining the design, the estimate of project cost often become more accurate. However, as project approvals are sought, the agencies issuing the permits may require the design and construction of additional infrastructure to meet environmental or electrical standards which will increase project costs. In a worst case, these funds spent at-risk and before financial approval to define the project costs and revenues may determine that the project is not cost effective. If this were the case, the information collected is used to advance a more cost-effective strategy or to increase the knowledge base. Successful private investors will minimize their losses or lose their competitive edge in the marketplace. Where public funds are employed, losses can be absorbed by the collective benefit of increasing project development understanding. Lessons learned can be used to more effectively deploy public funds for future projects.

1.1.2 EQUITY AND DEBT FINANCING

Equity and debt are the two primary options for financing project construction. Projects typically require equity in the form of cash or other hard assets which establish project ownership, and debt which is borrowed cash to pay for equipment and labour to complete construction. The percentage of equity versus debt can vary depending on available resources and the cost of borrowed money as expressed by the interest rate. Where borrowed money is cheap (i.e. offered with low interest rates), it may be more economical to increase the share of debt. However, the lender may also require a minimum amount of equity to participate and loan rates will vary based on the amount required and terms of repayment.

Because the amount of equity in a project is often limited, debt and the cost for securing it are critical to the project development. Debt is money borrowed to finance the project and is provided in the form of a loan that is repaid once the project is constructed and begins generating revenue. The cost of borrowing money is measured in part by the interest rate on the loan. Loans with comparatively higher interest rates reflect a higher risk of repayment either due to the credit worthiness of the borrower or the inherent risk of the project to generate sufficient revenue for repayment. Where repayment is more certain, competition for making loans increases, which drives down interest rates. **Figure 1-2** simply illustrates how the credit rating of the borrower (and also the risk of the project) affects the cost of the loan and therefore contributes to the overall expense of the project. There are a variety of terms for different types of loans, some of which are described in Section 2.

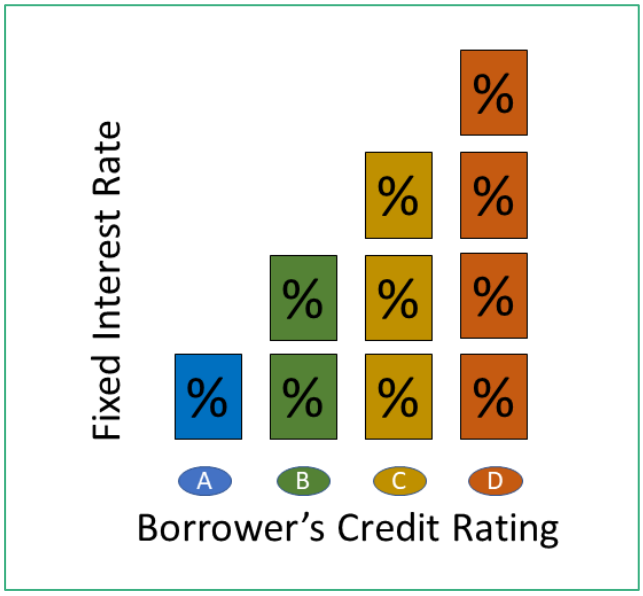


FIGURE 1-2
Strong credit rating (A) results in lower borrowing costs (Source: author)

Borrowers with strong credit ratings (A) are charged lower interest rates which translates into comparatively lower project costs. Those with weak credit ratings have a higher interest rate and pay more to borrow the money. For example, a wind energy developer that has developed a number of successful projects with borrowed money and a strong economic performance will be able to secure lower interest rates with each successive project. A competitor who is new to the industry and has no projects with demonstrated success will likely be subject to a higher interest rate on the money borrowed.

Borrowers in developing States often have higher credit ratings (resulting in higher interest rates) which reflect a higher risk of repayment which increases project costs. Public financing through organizations like the World Bank can provide concessionary loans for projects in developing States using public money to cover the difference between the market (higher) rate and a subsidized (lower) interest rate to bring a lender to finance a project and improve project economics.

1.1.3 OWNER AND INVESTOR REPAYMENT

The owners of a project may be any entity with the experience necessary to develop and operate the project. Project ownership can change during development, after construction, or during operation. Some renewable energy developers develop projects and sell them to companies that are experienced in owning and operating such facilities. Other developers develop projects and also own and operate them. Financial parties may provide development investment with an interest long-term ownership as well.

The owners and investors of a project (or SPV) in development stage will have prepared a pro forma, or financial spreadsheet, which lays out project costs, annual revenues, and schedules for loan repayment including the investors' return on investment. Lenders will analyse the pro forma in-depth to ensure that the estimates of project costs are based on recent and geographically relevant data, and that the resource assessment is sufficiently comprehensive to demonstrate reliable project revenue from future power generation.

Based on the project evaluation and risk assessment, a financial institution will make a loan to a project with amount, interest rate, repayment terms and other requirements detailed. The owner will use the loan to complete construction. Once the project is operational and generating revenue, the owner will use the revenue to operate the project and repay project debts. If the pro forma was well-researched and substantiated by a third party and the project produces the amount of revenues that were forecast, the project will pay all outstanding debts, cover the return on investment and provide the owner with cost savings for, in the case of renewable energy, the avoided cost of electricity supplied by the system that otherwise would have been purchased from the electric grid.

1.1.4 RELATIONSHIP BETWEEN PUBLIC AND PRIVATE FINANCING

Both public and private financing are important to developing market technologies like those for carbon emissions reduction. Each has a role, and the amount of public financing applied depends on the maturity of the market. Too much intervention from public financing can crowd out private sector investment and constrain the market. Insufficient public financing preserves financial and political barriers that present a high risk to private sector investments and elevated project costs.

Public financial resources are scarce and in high demand. They are most effectively applied where they can leverage other funding sources to accomplish their objective. In low carbon markets, public financing is initially required to help create the market. In doing so, competition will increase, production will scale up, costs of production will bring prices down, and experience throughout the sector will accrue. As markets mature, the intent is to decrease the role of public financing and allow private sector financing to meet the demand.

Private financing will be mobilized when projects are forecast to produce sufficient revenue to operate and maintain the facility, repay outstanding obligations, and provide a return on investment that the investors, at a minimum, expected. Private capital will wait until those conditions can be accurately predicted to avoid losses and promote growth. When those conditions occur, private capital can be put to work to solve problems including those identified with climate change.

An example showing public and private investment impacts can be seen in **Figure 1-3**. It shows the development of the solar photovoltaic market in the U.S. In the early years, the number of projects was small and the cost to develop them was high. In those years, public financing was being used to help early developers improve the efficiency of the technology and demonstrate successful deployment and operational experience. Significant public investment was made in 2008-09 as part of a larger economic stimulus programme where government spending was expanded to off-site the impacts of an economic recession. That investment led to a large increase in project development, which resulted in competition to decrease production costs. Incentives that created demand for renewable energy further fuelled the competition. The solar PV industry matured by driving down development costs and providing a low carbon alternative to traditional fossil fuel generated electricity.

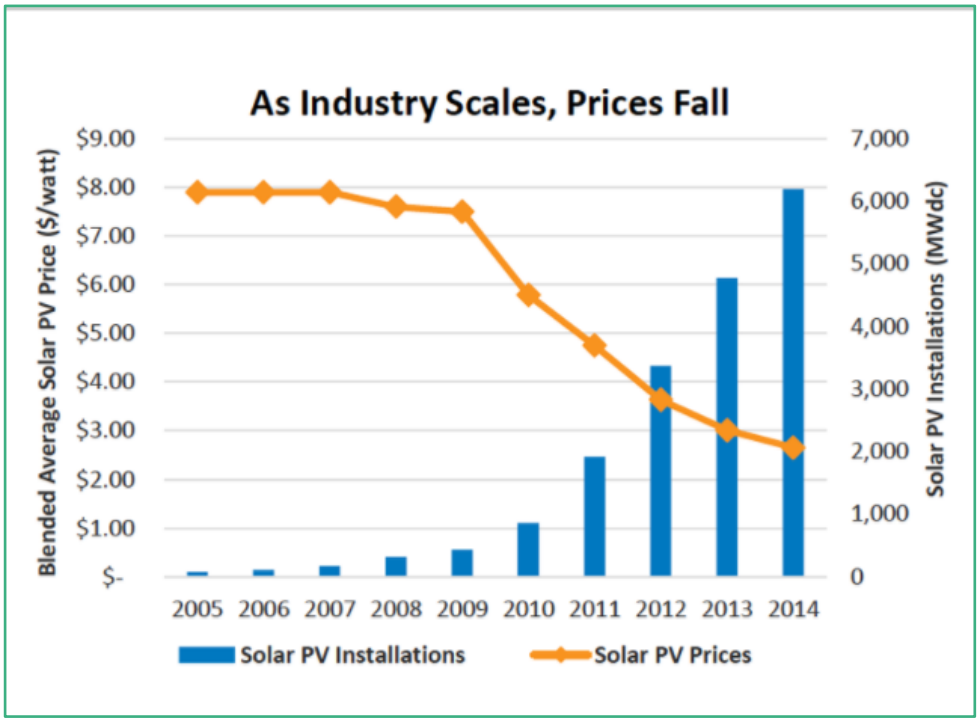


FIGURE 1-3
Example of expanding solar PV market in the U.S. (Source: US Solar Energy Industries Association).

1.1.5 OWNERSHIP STRUCTURES

The public and private sectors can also cooperate on project development to take advantage of the strength of each in response to specific development conditions. The two relevant ownership alternatives are public-sector ownership and the public-private partnership (PPP).

In the public-sector ownership model, the public entity capitalizes, owns, and operates the facility. Typically, the public entity has strong credit due to its ability to authorize tax payer supported budgets and projects improving financing certainty. The public entity may also have access to subsidized financing which can limit project costs. It will release bids for design and construction thereby working with experts in the private sector to develop the project. These contracts often include operations and maintenance as well as guarantees that the facility will operate and generate revenue and savings as predicted. The public entity will pay back the project from the cost savings accrued from avoided costs of purchasing energy from the electric grid.

In the PPP model, the public entity will lease public assets to a private entity who will capitalize, build, own and operate the facility. As a tax paying entity, the private partner can monetize available tax credits which can significantly reduce project development costs and result in more competitive prices. In some cases, the public entity may also execute a long-term contract to acquire electricity generated from the facility, which will provide the developer with a guaranteed cash flow during the project life and support private financing. In other cases, the developer may lease equipment to the public entity and decrease the cost of the lease payments by the value of the tax credits monetized. Then the public entity will make regular lease payments in the amount of the value of avoided electricity that otherwise would have been purchased from the electric grid.

Both ownership models can be successful. Which to use will depend on the public policies in place and a cost-benefit analysis of each option.

1.2 BARRIERS TO PROJECT FINANCING

The cost to mitigating climate change is predicted to be significant and cannot be borne solely by the public sector.[1] The majority of the financial capacity needed to develop the low carbon economy must come from private sector investment. However, there are a number of barriers to private investment that must be overcome by targeted public policy intervention if the private sector is going to play a meaningful role in combatting climate change.

1.2.1 FINANCIAL BARRIERS

Financial barriers are primarily the result of underdeveloped capital markets. These markets can be underdeveloped for a number of reasons that are associated with the characteristics of low carbon technologies. For example, the initial costs to develop renewable energy projects are generally greater than conventi0nal projects but the long-term operational costs are lower. To incentivize private investment in the low carbon alternative, policies can be put into place to decrease the cost of low carbon projects (e.g., through a subsidy) or increase the cost of conventional projects (e.g., pollution tax). Another option is a long-term financing instruments (e.g., loan) with extended payback terms to allow the project to take advantage of the low operating costs of the renewable energy project.

Project scale can also hinder the financial viability of low carbon projects. For example, while wind and solar power are now being developed at a larger scale, many renewable energy projects are designed to be smaller to meet a local, on-site energy demand. As many of the transaction costs (e.g., legal fees, financial review, etc.) associated with financing are incurred regardless of project size, this can further increase the costs of development per unit of energy generated.

In developing economies, capital for investment may be scarce. What capital is available will be directed toward the lowest risk and most secure investments. In addition, interest on loans tends to be higher in developing States as the risk of such loans not being repaid is higher. For example, the International Monetary Fund (IMF) reported interest rates on borrowing for energy projects of 15.1 per cent and 16.5 per cent in Honduras and Ethiopia respectively, compared to 5 per cent in North America or Europe.[2]

Mobilization of financial markets can be inhibited by a lack of experience and understanding of a new industry such as low carbon technologies. Over the past ten years however, a considerable amount of experience has been accrued specifically in renewable energy and energy efficiency in developed States to the point where traditional financial institutions such as commercial banks are comfortable offering loans for these energy projects at favourable rates. This is often not the case in developing States which must then rely on international financial institutions, like the regional development banks, that assume some of the financial risks of lending and subsidize interest rates in relatively unstable financial markets. One fundamental problem is that banks rely on credit ratings and billing structures to recover periodic loan repayments and this information may not be available for projects in developing States. Their access to financing may also be limited by the priority-setting decisions of international financial institutions which becomes a problem if low carbon technology projects are not a priority.

1.2.2 POLICY BARRIERS

Policy barriers encompass both conditions of the political status quo, and the uncertainty of future policy that may affect low carbon markets. The status quo in the electricity industry is where power is generated at a central power plant and distributed to customers over a vast electric grid. One government entity may operate both the power plants and the electricity network, in part, to make sure that there is a high level of government oversight to ensure that power is provided and the lights stay on. In some States that have enacted reforms, power plants are operated by private entities. The downside of centralized control is that power is generated far from the users, making the electric grid vulnerable to disruption which is an increasing problem in developed economies that rely on computers and digital information powered by electricity. The centralized model also crowds out competition from innovators and entrepreneurs. Public policy is necessary to shift away from this status quo.

Other policy barriers may be associated with how power projects are reviewed and approved. The so-called “interconnection process” for new generation facilities requires reform when changing from a closed power generation system with only a few larger power plants, to one with many new sources, like renewable energy, that must be accommodated. The reforms must retain the technical and safety precautions that ensure the quality of systems approved, while also allowing for a more flexible and responsive approval process more closely connected to private market conditions.

Policy measures can also create incentives to encourage consumption of low carbon products instead of carbon-intensive ones. Incentive programmes have been enacted in developed and developing States creating a demand for renewable energy. Such programmes may either decrease the cost of renewables, increase the cost of traditional power, or create a market demand for renewables.

Incentive policy can also turn into a constraint when markets rely on the incentive and proposals to undermine the policy are put forward. Many incentive programmes are enacted with a sunset provision (i.e. a date when the incentive programme will end), which, if not changed, allows the market to respond to a predictable change. It can be more politically expedient to enact a short-term extension to incentive programmes. Unfortunately, such actions result in market inefficiencies which would be avoided by enacting longer term programmes with stability and certainty in policy.

1.3 PUBLIC POLICY TO OVERCOME BARRIERS

Public policy seeks to direct resources toward overcoming the barriers to private sector investment, such that the investment can be freed up and mobilized. Private sector investment will be directed to the most profitable and lowest risk projects. A number of barriers identified above increase the cost of low carbon projects and make them more costly than conventional alternatives. These barriers increase the risk of project success and discourage investment. Public sector intervention by governments that creates financial instruments and policy programmes to decrease costs for low carbon projects (or increase costs in conventional alternatives), limit investor risk and encourage further investment.

Public financing policy is particularly critical in developing States and SIDS where risks to private sector investment are higher than in the developed States. Risks include government instability, regulatory uncertainty, lack of local knowledge, lack of a technology and financial track record, and higher transaction costs. Finance policies that reduce risk, decrease costs, and create market demand will lead to improved conditions that will attract private development.

Financial instruments available to decrease private sector risk of investment are described in Section 2. Financing Organizations and Programmes are described in Section 3.

2.0 FINANCIAL INSTRUMENTS

Financial instruments refer to the types of funding available. The instruments described below are grants, loans, bonds, guarantees, and direct investment. Each serves a different purpose, though all seek to lead to increased private investment and project implementation.

2.1 GRANTS

Grants are typically used in the earliest project stages to investigate and support potential project development opportunities (sometimes referred to as "seed" money) rather than relied on as a key component of project financing. Grants are simple and actionable with the capacity to provide immediate and direct funding for a targeted purpose. However, the trade-off to simplicity and liquidity is that they are difficult to manage and lack control for accountability making them a high-risk form of funding. Grants should only be targeted toward small/pilot projects or high risk activities otherwise, as a regular funding mechanism they might discourage private sector participation. ICAO's assistance projects with UNDP/GEF and EU are both examples of grants.

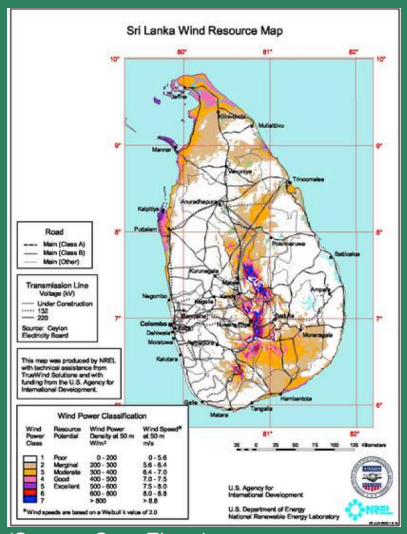
The following are some of the uses for grants in low carbon project development.

2.1.1 PROJECT DEVELOPMENT COSTS

The work necessary to move a project from an idea to a financeable project is the highest risk investment. During these early project stages, the project components may not be well defined and the project economics will be little more than best estimates. Initial project funding needs to be deployed to conduct the analysis necessary to understand the costs of development and expected long-term revenue and cost savings necessary to help pay for and maintain the project. Grants can be used to collect early stage project information that will be useful in defining the project and determining how to optimize the project's efficiency and profitability. Wind energy projects provide a useful example of this type of work and the risks associated with early stage investment, as described in the following box.

Renewable energy projects produce energy from a natural power source, like the sun or the wind, which will vary in different locations. The amount of power that can be generated by the project will determine how much revenue the facility will produce during its lifespan. Wind energy developers use available wind resource information from government entities and weather collecting stations to model the wind resource at an identified location to screen for potential sites. However, to attract project investors, it is necessary to collect one or more years of site-specific wind data to confirm the wind resource and produce an accurate financial model for the project's future revenue generation.

A wind resource map based on existing data is shown below for the State of Sri Lanka. The cost necessary to install an on-site meteorological tower (shown below, right) and analyze the wind data collected may be for no purpose if the data suggests that the site is not economical. This is why the investment in the data collection equipment and effort has a high level of risk.



(Source: OpenEi.org)


(Source: National Renewable Energy Laboratory)

2.1.2 CAPACITY BUILDING

Grants are being deployed in emerging economies to increase understanding of and planning for climate mitigation and adaptation. These grants are used to bring together government, business, and other interested parties to discuss potential impacts of climate change and opportunities to address solutions in individual States and regions. Capacity building must cover a broad array of stakeholders and be deployed in a variety of ways, some of which are illustrated in **Figure 2-1**. This capacity building work is essential for providing a foundation for decision-making and project development.

FIGURE 2 1
Various aspects of capacity building (Source: author)

Because capacity building requires a broad approach with the potential for large expenditures with no immediate business return, the private sector is not going to expend capital for these types of projects. Funding, typically in the form of grants that can be deployed quickly and directly, is provided by governments and not-for-profit institutions to increase the local knowledge base and improve the landscape for more certain future investment.

2.2.3 POLICY DEVELOPMENT

As an extension of broader capacity building, grants can be very effective in supporting policy development to encourage and incentivize private investment of low carbon emission markets. The general capacity building programme can be deployed to identify low carbon approaches that best match the State or region. The next step in climate change planning is to identify and develop public policy that will decrease barriers to private sector investment.

Examples of such policies include requiring governments and utilities to use low carbon technologies such as renewable energy.

The private sector may not deploy its investment funds unless government uses policy tools to create a market demand for the low emission technology product. However, as the private sector makes investments and competition drives down the cost of technology development, a previously expensive and price-supported technology may become cost competitive in the marketplace.

2.2 LOANS

Involvement of credit worthy entities is essential to project financing. It can be a challenge to identify interested partners in emerging economies due to a high risk of default on loan repayment. The most extensively used financial instrument in public climate financing is the secured loan.

The primary role of banks is to provide access to money to develop a project. This is typically accomplished through a loan which is repaid overtime as part of the project's operational costs. For example, a bank may loan money to a wind power project developer. The developer requires the money to buy the wind turbines, install them, and connect them to the electrical grid. The bank and developer sign a contract for the loan that sets the terms, including the amount of the loan, interest on the loan, and payback period. The bank structures the loan to ensure that it makes a profit on the transaction while also ensuring that the developer can successfully earn income to pay back the loan plus interest. Once the project is connected to the grid, it will generate electricity and earn the developer revenue. **Figure 2-2** provides a simple illustration of the amount lent and the amount that must be paid back.

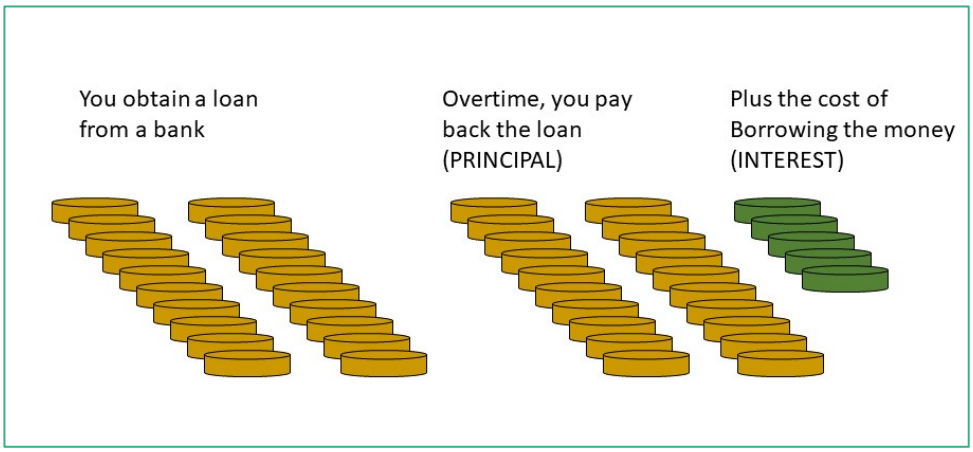


FIGURE 2-2
Simple concept of a loan (Source: author).

One significant challenge for low carbon projects is that in-State commercial banks, which have experience developing appropriate costs and terms for non-renewable projects (like grocery stores), lack similar experience for new project types like low carbon emission projects. Banks rely on credit ratings and billing structures to assess the risk of loans and ensure the recovery of loan repayments plus a profit. This information may not be available for projects in developing States due to the lack of experience. Without this track record, they are unable to accurately account for the risk associated with loan repayment. Banks either become unwilling to risk making a loan or apply very high interest payments and other loan conditions to protect against the risk that the projects will not generate the income necessary to repay the loan. Referring back to **Figure 2-2**, the amount of interest increases making the project more expensive to develop.

Public entities can assume some of the risk of such loans thereby protecting the commercial bank or other private sector financier from the risk and enabling them to participate. MDBs, such as the World Bank and other regional development banks make loans in developing States and assume the risk. Some of the instruments they use are described below.

2.2.1 CONTINGENT LOANS

Contingent loans are loans that can be forgiven or turned into a grant if the project is not built or as an incentive to reward operation. They are often provided early in project development to cover high risk early investment. They are structured like a typical loan with an annual interest rate. However, should the project not reach a financial state where it can make the repayment, the loan is written-off as a loss rather than an ongoing liability to the project owner.

2.2.2 CONCESSIONARY LOANS

Concessionary loans are any loan that provides more generous terms than the market would provide. The terms are typically associated with interest rates and repayment timeframe. Whereas the market may offer high interest rates for risky loans in emerging economies, public financing will offer low interest rates as they do not require the same level of profit (if any) as commercial lending institutions. Long repayment terms may also be costlier for private sector lenders, whereas public financing can allow the longer repayment and accept lower returns.

2.2.3 SENIOR DEBT

This is a loan that is provided early in the project financing to decrease the overall project cost and make it more attractive to the private markets. Senior debt is the first debt repaid at project close and therefore, is the lowest risk form of debt. In targeting the loan to the early project stage, it will attract private sector involvement. The senior debt can be structured for different debt repayment scheduling and amortization to fit with project cash flows, including extending repayment of the principal.

As an example, Clean Technology Funds (CTF) have been used to develop the renewable energy laws in Kazakhstan. Policies have targeted reducing existing subsidies for fossil fuel power generation and providing new incentives for low carbon technologies to attract private investment.

(Source: Government of Kazakhstan, Strategy 2050)

2.2.4 CREDIT LINE

Loans can also be provided in the form of a credit line which may offer more flexibility to the recipient than a loan agreement. The credit line could be used for paying project costs in similar ways as a contingent or concessionary loan. Credit lines may also be extended through typical commercial financial institutions or other intermediaries. These credit lines can encourage intermediaries to extend their own financing programmes to low carbon emission projects by helping them build capacity and experience while also decreasing the project costs and attracting other private sector partners.

The Clean Technology Fund (CTF) (Section 3, paragraph 3.1.2 provides further information on the CTF) has provided lines of credit to financial intermediaries from both the public and private sectors to incentivize local financial institutions to invest in low carbon emission projects. As illustrated by the adjoining example in Kazakhstan, CTF projects have targeted barriers to investment including high lending costs and lack of local capacity by providing dedicated lines of credit on concessional terms to financial intermediaries combined with technical assistance for strengthening their capacity to appropriately assess the risks and reflect these within structuring of deals.

2.2.5 MICROFINANCING

Microfinancing programmes can expand the reach of low carbon emission project financing by making many small loans and grants to small businesses and consumers. Any one loan is not a significant risk; however, in aggregate, the risk can be high. Microfinancing programmes supported by public financing agencies assume that risk by facilitating many small loans.

Microfinancing has been most successful in cases where the borrower needs a relatively small loan for a short period of time and has a strong likelihood for payback due to a known and reliable future revenue source. The best example is the farmer who needs a loan for fertilizer to increase crop yields and can pay back the loan after a successful harvest. Microfinancing can also be applied to more capital-intensive expenditures with longer paybacks, such as a residential solar hot water system. Such support is similar to that described for other loan programmes providing generous (below market) interest rates and repayment terms.

2.3 BONDS

Bonds are debt secured by an investor. When one buys bonds, the amount of the purchase is an investment with a guaranteed annual rate of return. The debt is used by the bond issuer to provide capital investment for a project. When the bond term ends and the project has been constructed, the bond issuer pays back the investment and bond purchasers receive back their original investment, plus interest. The timeline for a 10-year bond is illustrated in **Figure 2-3**.

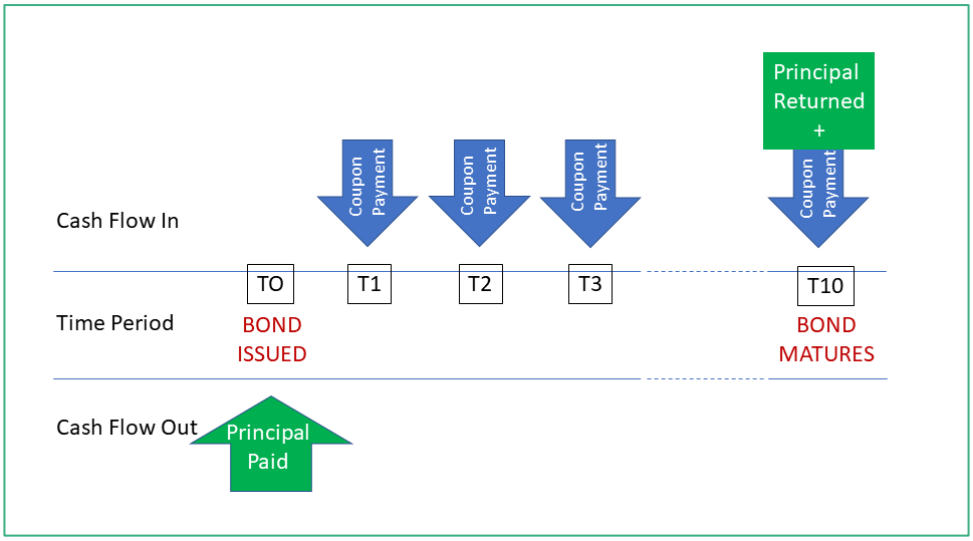


FIGURE 2-3
Timeline of a bond
(Source: author)

Bonds can be issued by private companies (i.e. corporate bonds), supranational institutions (e.g., multilateral development banks), and public entities (local, regional, federal government). Corporate bonds may be used to fund an acquisition, while government bonds often finance infrastructure projects and are backed by future tax payments. Investment banks underwrite the bonds and ensure that the issuer complies with complex regulatory requirements. Bond rating companies provide an independent assessment of the credit-worthiness of the bond issuer which informs investors of the relative certainty of payback.

Since 2008, the World Bank has issued over USD 9.7 billion equivalent in Green Bonds through more than 125 transactions in 18 currencies. Green bonds are also issued by the African Development Bank, Asian Development Bank, European Investment Bank, and the World Bank's International Finance Corporation.

Learn more about World Bank Green Bonds at:
http://www.worldbank.org/en/topic/climatechange/brief/green-bonds-climate-finance

Because the bond investment fundamentals, such as interest paid and term, are set prior to the investment, and given the highly-regulated nature of the bond programmes, it is a less risky investment appropriate for investors with a fixed income. These bonds can then also be bought and sold on the market providing additional opportunity for investment and return. Bonds that are bought and sold are riskier as they are valued based on less predictable market activity.
Figure 2-4 shows how bonds are used to provide project financing.

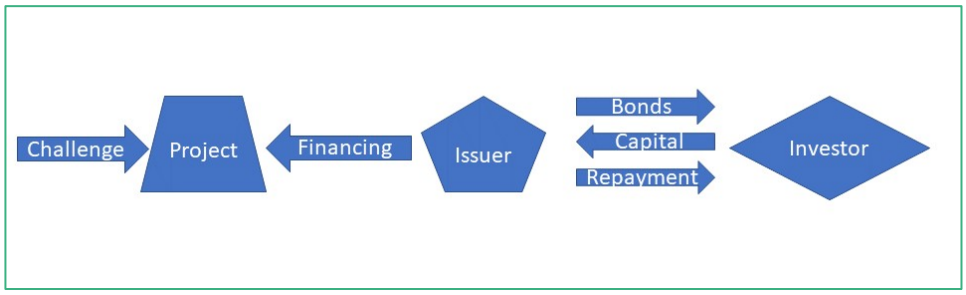


FIGURE 2-4
Bond Project Financing
(Source: author)

2.3.1 GREEN BONDS

Green bonds are a financing mechanism for sustainable development projects, including those associated with climate mitigation and adaptation. Investors considering green bonds evaluate both the financial stability of the investment and the environmental benefit of the project that the investment will be funding.
Green bonds were initially backed by MDBs responding to a small level of demand from a specific type of investors interested in funding climate beneficial projects, and to demonstrate their environmental credentials. The first projects focused on renewable energy and energy efficiency projects that had developed a strong record in developed States and offered opportunities to expand to developing States. The World Bank now offers green bonds associated with climate mitigation and adaptation projects. Its leadership in this area is highlighted in the adjacent box.

The market for green bonds has grown significantly in recent years, funded primarily by investors in developed States for projects also in developed States. The types of bond issuers have also grown from the MDBs to include private multinational energy companies such as Energies Nouvelles (EDF), ENGIE (formerly GDF SUEZ), and local government.[3] However, there is a broadening interest from investors in directing funds to developing States to support international development and climate mitigation. Big infrastructure projects, such as new green airports have been financed by green bonds (e.g., the new Mexico City Airport). This rise in private investment is related to enhanced investor interest in sustainable development as a result of increased social awareness of environmental protection and climate change. Investors enjoy low investment risks and transparency from the issuers communicating project progress and results. An example from the World Bank's International Finance Corporation (IFC) for managing green bond investments is illustrated in **Figure 2-5**. Generally, it shows how the cash from investments made to purchase green bonds are delivered to local banks and other financial intermediaries to fund eligible projects, and how investors received a fixed return at the time of repayment.

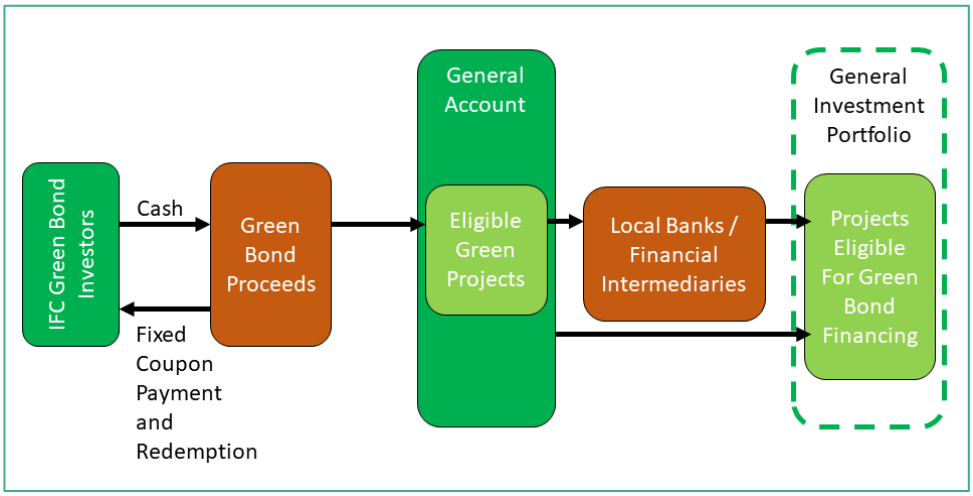


FIGURE 2-5
Flow of cash for IFC Green Bond Programme
(Source: author)

There has also developed a standardization in the financing community over principles that establish environmentally-beneficial and protective projects. One such framework is known as the "Equator Principles", administered by the Equator Principles Association with the backing of multinational financial institutions, including Barclays, CitiBank, and Credit Suisse. Local and regional banks in developing States seeking to attract private investment through green bonds have ratified the Equator Principles to validate their commitment to enforcing customary standards of environmental and socially responsible investing.[4]

MDBs that offer green bonds raise funds from fixed income investors to support MDB lending for eligible projects that seek to mitigate climate change or help affected people adapt to it. Investment in these bonds provides both a financial and environmental return. As an example, the product offered by the World Bank was designed in partnership with Skandinaviska Enskilda Banken (SEB) to respond to specific investor demand (pension fund) for a triple-A rated fixed income product that supports projects focused on climate solutions. MDBs can also play an important role in attracting private investment through green bonds, which might not be supportable under a strict private market risk assessment. This would be accomplished by providing concessionary loans with guarantees and discounted terms, or by aggregating many small projects and assuming the costs of the increase in transaction costs relative to larger projects with a higher profit margin.

The primary steps associated with a green bond programme include:

1. Define project selection criteria: the issuer identifies the type of projects to be funded (e.g. low emission) and the criteria used to select projects. These criteria will be reviewed by an independent party to provide investors with assurance that the selection criteria will meet the investors' objectives.
2. Establish project selection process: Projects undergo a rigorous review to ensure that they will meet the programme's objectives. Then, they are formally approved by the organization's executive body.
3. Earmark and allocate proceeds: Projects are funded. Monies are disbursed as agreed and as pre-assigned milestones are met.
4. Monitor and report: The issuer monitors the project development, and measures and confirms its environmental benefits.

2.3.2 TRADITIONAL INFRASTRUCTURE BONDS

Traditional infrastructure bonds may also provide an opportunity to fund climate mitigation projects. They are typically issued by government entities to finance public infrastructure initiatives, including energy and transportation projects that can convert fossil fuel to electricity and sustainable biofuels, and produce electricity from carbon-free sources. Federal and local governments in emerging economies may seek to include carbon-free components of infrastructure projects financed by bonds, but their ability to attract investors will depend on their credit rating and other independently verified sources. Programmes funded by MDBs may also be used to co-finance projects undertaken through traditional infrastructure bonds.

2.4 GUARANTEES AND INSURANCE

Private investors have a low tolerance for risk. Insurance policies and guarantees offered through public financing entities can assume aspects of risk that allow private entities to invest.

Guarantees and insurance are instruments that decrease the risk associated with project development. These types of programmes can be purchased in the private market in the form of equipment warrantees and insurance hedges against an unanticipated weather event to protect against financial loss to the project. However, such market products may not be available or adequate for new technologies that have not established an operational record for performance, or where such guarantees cannot be assured given regional or political conditions. While private insurers will issue policies to cover risks that can be predicted, public insurance programmes are necessary to cover risks that the private market considers unprofitable or too difficult to measure.

> An example of a successful guarantee programme to reduce private investment liability for small scale (under 10 MW) renewable energy facilities in Costa Rica, El Salvador, Guatemala, Honduras, Nicaragua, and Panama, was implemented by the Central American Bank for Economic Integration (CABEI) using Global Environment Facility (GEF) financing as a partial guarantee. The public financing guaranteed the payment of any first losses to private banking partners.

Climate Funds can provide financing to support guarantees and insurance provided through MDBs. CTF resources were used to encourage MDBs to increase the use of guarantees to reduce potential risk from low carbon emission investments. An individual guarantee can cover a portion of the potential losses from a financier. For a loan as an example, the guarantee could ensure repayment.

The purpose of a guarantee is to persuade commercial banks to provide medium- and long-term loans with lower collateral requirements than they would otherwise need. Under a guarantee, this is achieved by using public finance to cover any potential first loss associated with a loan default. GEF has been one source of public financing used to mitigate risk, as illustrated in the example herein. While these funds help reduce risk, it remains imperative for the success of such projects to conduct rigorous screening of financing partners so that the public financing capacity is not over used. Private partners will also assume some amount of loss in their financial models but repeated occurrence of default will result in programme failure.

Figure 2-6 shows the activities associated with a World Bank Loan Guarantee. In this example, the World Bank is providing a guarantee to mitigate risk for payment or performance default by government to a private project, which triggers payment default under a commercial loan between the project and commercial lenders.

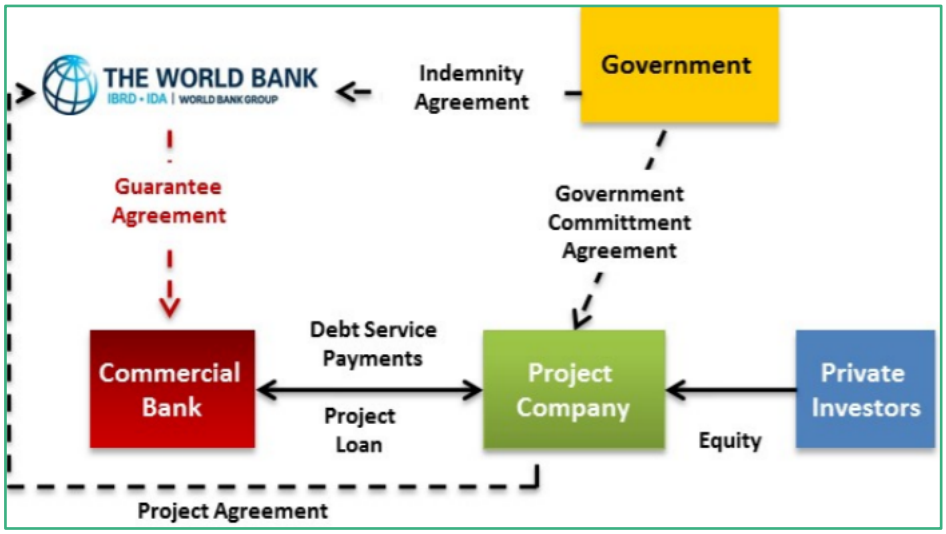


FIGURE 2-6
World Bank Guarantee for government default (Source: The World Bank Group)

World Bank project-based guarantee programmes are described further in http://pubdocs.worldbank.org/en/376701440595374380/ProjectBasedGuarantees.pdf.

2.5 DIRECT EQUITY INVESTMENT

Direct equity investment is a cash payment that immediately infuses the project with financial value and enhances viability for development. This type of project investment can come from two primary sources: government and private.

2.5.1 GOVERNMENT

Government investment in low carbon projects is provided through an overall bilateral development programme. Governments seek to invest in developing State projects to increase influence and support international trade. Companies that achieve success in project development domestically may seek to expand opportunities to developing States where future market growth is greatest. Governments utilize their international development aid programmes to provide opportunities for domestic companies to build their international experience. In such cases, the donor State will work with the recipient State to identify projects that are then implemented by companies from the donor State.

2.5.2 PRIVATE

Established development companies, commercial banks, and private investment funds are always looking for low risk, high return investments. As introduced above, low carbon development in developing States tend to be high risk investments that discourage established private investors. However, as public finance provides project support to reduce risks, private investors will step up and invest, in part, for profit certainty, as well as to gain experience in new business areas and geographic regions, if it determines that the risks have been sufficiently minimized. As these markets mature and risks are limited through increased experience, enhanced political stability, and financing reform, private entities will increase their investment action.

3.0 FINANCING ORGANIZATIONS AND PROGRAMMES

Financing for carbon emission reduction projects is provided by governments, intermediaries, and the private sector, and responds to investment opportunities created by open markets. Public financing can be particularly complex, with new organizations being created, programmes being developed, and with changing funding objectives.

Funds flow through multilateral – both within and outside of the United Nations Framework Convention on Climate Change (UNFCCC) financing mechanisms – and bilateral channels, as well as through regional and national climate change programmes and funds.[2] The Peruvian and French Governments, in their capacities as Presidents of the 20th and 21st Sessions of the Conference of the to the UNFCCC Parties (COP), respectively, commissioned a study of climate financing and concluded that USD 62 billion in public and private sources were directed to developed States from developing States in 2014.[5] It is estimated that 53 per cent of climate finance has been directed to climate mitigation projects which are comprised of energy efficiency and renewable energy initiatives.[6] Furthermore, the majority of climate related funding comes from the private sector, and the amount of additional financing over and above existing public financing efforts and development finance commitments (often referred to in climate financing as "additionality") is unclear.

The Climate Funds Update (CFU), a website run by a collaboration of organizations, is dedicated to providing information on the growing number of international climate finance initiatives and is designed to help developing States address the challenges of climate change.[3] CFU has been used to identify parties involved in climate finance that could be engaged to support climate change mitigation, some of which could be used by the aviation sector. This section provides an overview of the different types of organizations involved in climate financing, with a focus on public entities. A detailed matrix of programmes is also provided in Annex A of this guidance document.

3.1 MULTILATERAL CLIMATE FUNDS

Multilateral climate funds have become the preferred organizational vehicle for delivering climate development assistance from developed States to developing ones due to transparency and accountability. In this structure, donor States commit funds to the multilateral climate programmes. These "climate funds" are overseen by international and non-governmental organizations (NGOs), including the United Nations. The growth in multilateral funds has been significant in recent years, which has also paralleled the growth in climate financing.

Multilateral climate funds are often administered by NGOs created for the sole purpose of administering the programmes. Other programmes are administered by established MDBs, who act as trustees. MDBs may also receive monies from Climate Funds to administer specific programmes directed by the fund. The key point is that both the Climate Funds and the MDBs provide transparency and expertise in administering and delivering development aid, which has been used to set up programmes for public climate financing.

[2] The UNFCCC has the mandate to stabilize greenhouse gas concentrations in the atmosphere and facilitates oversight and coordination on climate financing opportunities to Member States to achieve reductions.

[3] www.climatefundsupdate.org

Developed States also make specific financial commitments to climate funds as one means of directing international aid to developing States. Many developed States also have their own bilateral programmes which are not subject to the same level of oversight and give the individual State control in pursuing the many interests in distributing aid (see Section 3.2).

3.1.1 UN-RELATED PROGRAMMES

UN-related multilateral organizations operate with considerable transparency and allow donors and recipients access to administration and decision-making about financing and disbursement.

The GEF, an NGO, was established in 1991 and has been one of the primary organizations facilitating multilateral financing for climate change mitigation and adaptation in the developing world. GEF funds are primarily grants supplemented by other financial instruments with partners (such as MDBs) to initiate broad-scale climate programmes in targeted regions and toward States most at need. The projects build awareness of climate issues, help create governmental and nongovernmental structures to support programming, and implement actions to reduce barriers through policy reform and demonstration projects.

Donor States make funding commitments to GEF. In its most recent funding cycle in 2014 (the sixth replenishment), GEF received commitments of funding from 30 States for USD 4.43 billion, with USD 1.1 billion specified for climate change.[7] GEF also administers the Least Developed Countries Fund (LDCF) and the Special Climate Change Fund (SCCF) under the guidance of the UNFCCC COP, which are directed toward national adaptation plan development and associated capacity building in each State. GEF is one of the largest funders of climate change mitigation projects, including energy efficiency and renewable energy.

Also linked to the UNFCCC is the Adaptation Fund (AF) which is financed through a 2% levy on the sale of emission credits from the Clean Development Mechanism, as well as by contributions from developed States. Since its creation in 2009 up to 2015, AF has capitalized USD 487 million and financed 51 projects with USD 325 million.[8] The AF was the first UN fund that could be accessed directly by developing States through National Implementing Entities (NIE) as an alternative to working with the UN or MDB.

The UNFCCC Green Climate Fund (GCF) was created at COP 17 in November 2011 and is expected to be the primary channel for distributing public funding in the future. It is intended to fund the paradigm shift to a low carbon economy in developing States, with a 50% allocation to climate adaptation and mitigation. Like the AF, funds can be accessed either through the UN or MDBs, as well as directly from approved NIEs. The GCF's first eight projects, valued at US 168 million, were approved in November 2015.[9] **Table 3-1** lists information on the eight projects approved. To better deploy funds, the GCF has established an accreditation programme designed to assess whether partners are capable of strong financial management, and of safeguarding funded projects and programmes against any unforeseen environmental or social harm. ICAO has applied to the GCF to become an accredited partner.

Name	Recipient	Mitigation/ Adaptation	Type / Amount
Building the Resilience of Wetlands	Peruvian Trust Fund for National Parks	Mitigation & Adaptation	Grant, USD 6.2m
Scaling Up of Modernized Climate Information and Early Warning System	Disaster Management Authority, Malawi	Adaptation	Grant, USD 12.3m
Restoration of Productive Bases of Salinized Land	Center for Forest Ecology, Senegal	Adaptation	Grant, USD 7.6m
Climate-Resilient Infrastructure Mainstreaming	Local Engineering Department, Bangladesh	Adaptation	Grant, USD 40m
KawiSafi Ventures Fund, East Africa	Acumen Fund to 10-15 solar companies for off-grid solar in Kenya and Rwanda	Mitigation & Adaptation	Equity, USD 20m Grant, USD 5m
Energy Efficiency Green Bonds in Latin America and the Caribbean	Colombia, Dominican Republic, Jamaica, and Mexico	Mitigation	Equity: USD 20m Grant, USD2m
Support of Vulnerable Communities to Manage Climate Change-Induced Water Shortages	Maldives Ministry of Environment and Energy	Adaptation	Grant, USD 23.6m
Urban Water Supply and Wastewater Management Project	Fiji Ministry of Finance	Adaptation	Grant, USD 31m

TABLE 3-1
Green Climate Fund
first round of project approvals

3.1.2 NON-UN PROGRAMMES

A report prepared by the UN's Standing Committee on Finance, published in late 2014 and which assesses climate finance flow, indicated that a substantial amount of funding is being channelled through institutions that are not under the UNFCCC COP.[10]

The Climate Investment Funds (CIFs), administered by the World Bank but operated in partnership with regional development banks, has pledged USD 7.53 billion in financing support since it was established in 2008. Regional bank partners include the African Development Bank (AfDB), Asian Development Bank (ADB), European Bank for Reconstruction and Development (EBRD), and the Inter-American Development Bank (IDB). The CIFs fund programmatic interventions in selected developing States with the objective of improving understanding of how public financing is best deployed at scale to assist the transformation of development trajectories. Individual funds within the CIFs include a CTF (USD 5.3 billion), and a Strategic Climate Fund, which is composed of the Pilot Program for Climate Resilience (USD 1.13 billion), Forest Investment Program (0.6 billion), and the Scaling Up Renewable Energy Program for Low Income Countries or SREP (USD 0.5 billion). The CTF and SREP are the primary funds for climate change mitigation, including energy efficiency and renewable energy.[11] Examples of projects recently funded under the CTF are included in **Table 3-2**.

The World Bank has integrated climate change assistance throughout its lending programme. However, it has also established specific financing programmes targeted to climate mitigation and adaptation. The AfDB administers the Congo Basin Forest Fund, and the European Investment Bank administers the Global Energy Efficiency and Renewable Energy Fund (GEEREF). The AfDB also finances enhanced climate financing readiness through the German funded Africa Climate Change Fund with the first projects being approved in 2015. A number of other programmes, including those for supporting climate adaptation for agriculture and forestry, were identified but are likely not applicable to the aviation sector.

Name and Size	Recipient	Type / Amount
Sere Wind Farm, 100 MW	Eskom, South Africa Electric Utility	"Soft" loan, USD 100m 40-year tenor, 10-year grace period, and 0.25% service on disbursements [12]
Central Thailand Solar Power Project, 57 MW	Asian Development Bank to Solarco, solar developer owned by Yanhee Holdings	Loan, USD 100m with lower interest rates, long-term financing, and subsidized transaction costs
Turkish Sustainable Energy Financing Facility	Turkish National Banks for creation of lending products, pipeline of projects for energy efficiency and renewable energy	Loan, USD 50m 15-year tenor, 7-year grace period
ECOCASA Energy Efficiency Program	National Housing Development Bank of Mexico to home builders	Bridge Loan, USD 52m with lower interest rates, long-term financing, and subsidized transaction costs
Noor Concentrated Solar Power Program, Phase I, 160 MW	World Bank to ACWA Power	Loan, USD 238m with lower interest rates, long-term financing[13]

TABLE 3-2
Clean Technology Fund project examples

3.2 BILATERAL FINANCE

There is evidence that a growing proportion of climate financing is being directed through bilateral agreements rather than through multilateral institutions.[14] Bilateral channels are developed through existing and enhanced development agreements between two States. The advantage of the bilateral agreement is that the donor State has control over the project and may enjoy a higher level of influence as a result of it. The disadvantage is that there is a lack of transparency, making it difficult to track and coordinate with other public climate finance initiatives. The Climate and Policy Initiative reported that USD 12-19 billion was directed for climate finance in 2014 through governments, ministries and bilateral agreements that were not publicly disclosed or otherwise coordinated with international efforts.[15]

Another key benefit of bilateral finance is that developed State can direct the aid such that it is implemented by domestic industries, providing them with the opportunity to gain international experience and grow their business in international markets. Renewable energy is an excellent example of an industry that has grown and matured in developed States, encouraging companies to look for new markets in developing States.

Some national funds provide financing through both multilateral and bilateral channels. Germany's International Climate Initiative has approved USD 1.1 billion for 37 projects directed toward mitigation, adaptation, and deforestation. The funding is partly provided through proceeds from the sale of national tradeable emission certificates. The United Kingdom's (UK) International Climate Fund is capitalized at USD 5.95 billion and has directed much of its funding toward UNFCCC and MDB programmes, like the GCF and the CIF.[16]

Several European States have also collaborated on specific funding initiatives. Germany and the UK contribute to the Nationally Appropriate Mitigation Action (NAMA) Facility, which funds such actions in developing States that want to implement ambitious mitigation programmes. Denmark, Germany, and the UK also support the Global Climate Partnership Fund, which focuses on renewable energy and energy efficiency through public-private partnerships.

Developed States have a number of mechanisms for distributing aid and involving private sector actors. The simplest programmes establish regional funds with specific bilateral agreements with each participating State. Once the agreements are in place, the donor State, through one of its aid agencies, releases a request for proposals from the recipient States and selects projects to be constructed, often by companies from the donor State. Examples of such programmes include the Government of Japan's programme with South Pacific island nations for solar and desalination projects to provide much needed renewable energy and new public drinking water technology. Donor States also may work with established NGOs to provide increased validation for their programmes, as is the case for the United Arab Emirates' (UAE) South Pacific partnership with the International Renewable Energy Association (IRENA).[17] Under this programme, IRENA helps identify and screen potential projects and also implements its broader capacity building programmes to facilitate improved project identification, while the UAE, through the Abu Dhabi Development Fund, awards project funding. Projects are constructed by Masdar, the UAE's renewable energy public-private partnership.

3.3 MULTILATERAL DEVELOPMENT BANK

MDBs have been set up to provide traditional private sector-type financing (primarily through loans) directed to facilitate private investment in geographic and technical areas with high investment risk. In doing so, a private financing bank model can be used with the public financing support coming in the form of the MDBs absorbing the financing risk associated with uncertain development markets. The MDBs often work with climate funds in developing States to offset the risk of low private sector rates of return and by securing financial guarantees to support projects consistent with national climate policy. As noted above, climate funds work closely with MDBs, including the World Bank, to administer the funds. This strategy is effective because MDBs are already set up to distribute aid and attract potential private sector investment to increase the potential private-public ratio of financing. Climate financing has used these existing organizations and mechanisms to effectively carry out programmes. MDBs include the following organizations in addition to the World Bank Group:

- African Development Bank (AfDB)
- Asian Development Bank (ADB)
- European Bank for Reconstruction and Development (EBRD)
- European Investment Bank (EIB)
- Inter-American Development Bank (IDB)

EXAMPLE OF MDB RENEWABLE ENERGY FUNDING

The client company builds, owns and operates multiple independent solar power plants. The MDB made its first investment (venture capital) in the client company in 2010, when the company had just commissioned 2 megawatts (MW) of solar photovoltaic capacity. The MDB support has been provided at a critical stage of the client company's growth trajectory, crowding-in other investors enabling the client company to access the global knowledge and good international practices, and to broaden and diversify its sources of funding. With the MDB financial and technical support, the client company has since grown to become one of the leading solar power producers within its State with 240 MW of installed capacity and another 420 MW under implementation. The MDB provided venture capital, private equity, non-concessional loans and direct mobilization of additional investors. Furthermore, the MDB made a significant contribution to strengthen the client company's corporate governance and risk management, in particular, in the areas of asset liability gap risk, contingent loss risk, and environmental and social risks.

Source: MDB Joint Report 2016

In 2015, the MDBs collectively committed more than USD 25 billion in climate finance which attracted co-financing of an additional 55 billion.[18] The MDBs commit their own resources but also act as trustees for other programme resources, including bilateral donors and international climate funds like the GEF and the CIF. Approximately 93 per cent of all MDB resources in 2015 came from internal programmes, with the remainder flowing from external programmes.[19] In 2015, about two-thirds of MDB mitigation funding was received by public entities, and one-third was received by private entities. In 2015, 75 per cent of MDB financing came in the form of loans, with the remaining amount including grants, guarantees, equity and lines of credit, as well as specific policy changing programmes which utilized multiple instruments.

The MDBs are scaling-up related activities to strengthen policy, build institutional capacity, provide access to finance, and deliver technical support to client States and their private sectors. Programmes seek to lower the investment risk of the private sector for specific low carbon emission reduction projects. This can be achieved in many ways. For example, MDBs can provide contingent loans that do not need to be paid back if the project fails. They may also offer below market interest rates to reduce the financial burden of project investment and long-term financing that would otherwise not be justified by a private lender due to a long return on investment. They can also provide investment guarantees that ensure repayment to creditors that could not otherwise be supported without public financing. The following scenario describes the value of MDB support for low carbon emission reduction project development.

The establishment of MDBs across regions also has provided a streamlined mechanism for getting funding to the geographic areas of interest. This allows aid and climate programmes to be more readily tailored to the needs of regions based on their geographical and climate conditions. For example, SIDS in the Caribbean and South Pacific will require different resources and programmes than States in Central Asia.

3.4 REGIONAL AND NATIONAL FUNDS

A number of developing States have also established regional and national funds that are partly funded by domestic budget allocations, but that also receive funding from international institutions and private sector sources. The Indonesian Climate Change Trust was one of the first such organizations to be established.[20] The Amazon Fund administered by the Brazilian National Development Bank is one of the largest national climate funds with a commitment of more than USD 1 billion from Norway through calendar year 2015.[21] There are also national climate change funds in Bangladesh, Benin, Cambodia, Ethiopia, Guyana, the Maldives, Mali, Mexico, the Philippines, Rwanda, and South Africa.[22] The amount of finance available from these national funds is modest compared to the multilateral and bilateral programmes.

Regional programmes are less widespread. The Caribbean Catastrophic Risk Insurance Facility was established in 2007 with support from the World Bank, but it now receives funding from individual States as well.[23] The Africa Risk Capacity centre presents a similar model as a specialized agency of the African Union.[24]

3.5 PRIVATE FINANCING

Successfully implemented public financing attracts a greater amount of private financing. This is the overall goal of climate financing programmes. In fact, the largest share of climate mitigation financing in the form of renewable energy projects comes from private investment. Private actors can range from a single household to a multinational corporation. Most private finance comes from so-called “balance sheet financing”, meaning that the investment is made from the profits of the business (or homeowner). Whether made by the business or the homeowner, the drive to make these investments are encouraged by profit and financial savings. The following are some of the types of private actors that have become involved in low carbon emission reduction projects.

3.5.1 PROJECT DEVELOPERS

Developers are those entities which seek to finance and build a project and achieve an above market rate of return when compared to other investment opportunities. Developers of carbon emission reduction projects are also driven by the opportunity to both earn a profit and be beneficial for the environment.

Renewable energy projects are one of the more common and successful low carbon emission measures that have been deployed by the private sector in recent years. Developers have gained experience developing projects in developed States where market incentives were created and financial institutions are strong. They seek to expand to new markets, but may be discouraged by barriers and risks to project development financing.

3.5.2 INVESTORS

Investors include private investment funds that offer clients investment opportunities in different markets, both by geography, and by technology. Funds are now available for investing in climate mitigation including renewable energy projects. The funds must identify opportunities for their clients to direct their investments to social and environmental causes, while also having some certainty in earning a return on investment. When funds begin establishing a record of returns and the record shows low or negative returns, it will attract fewer investors. Therefore, it is important for the fund managers to pick projects with complementary financing from other partners that will reduce the risk to their clients.

Some funds manage risk by investing in climate commodities that have market value, such as emission trading credits and renewable energy certificates. Others may contribute private financing for project development where returns are guaranteed through a partnership with a MDB or other vehicle for public financing.

Other types of investors include private equity, venture capital, infrastructure funds, and institutional investors. They are constantly looking for investment opportunities primarily in established markets, but are also exploring new markets, including climate mitigation.

3.5.3 COMMERCIAL BANKS

Commercial banks traditionally provide loans for home ownership and commercial interests in specific geographic areas and business lines where they have expertise. Banks have become more common players in providing debt to renewable energy projects that fit an appropriate scale and level of risk for the bank. Multinational banks with established experience in developed States may be a source of private debt financing where they can partner with MDBs. In addition, national banks located in States receiving climate financing may be developing experience in low emission projects incentivized through cooperative programmes with MDBs and other actors involved in climate finance.

4.0 HOW TO IDENTIFY AND ACCESS FINANCING

ICAO and its Member States are working together to develop State Action Plans on CO_2 emission reduction activities. The State Action Plans help States report international aviation CO_2 emissions to ICAO, outline policies and actions to reduce CO_2 emissions, and provide information to ICAO on the basket of measures considered, reflecting their respective national capacities and circumstances, and on any specific assistance needs. The plans identify carbon emission reduction projects that seek to eliminate, reduce, or sequester carbon emissions. Four out of every five US dollars spent on climate finance worldwide was directed to mitigation. Emissions reduction projects are primarily in the area of renewable energy and energy efficiency.[25] The majority of these projects are concentrated in developed States.

In developing States and SIDS, economic incentives are being directed toward encouraging carbon emission reduction demonstration projects to seed new and expanding markets. In Europe, the United States and other developed economies, carbon emissions reductions are occurring as the result of public policy programmes, such as emission trading, tax incentives, and renewable energy procurement requirements. This chapter summarizes some of the planning activities that can be followed to identify and access potential financing opportunities.

4.1 PREPARING A PROJECT CONCEPT

The financing strategy needs to be developed in association with a specific project. Therefore, the first step in identifying a financing approach is to prepare a project concept. This can be achieved by using the State Action Plan to identify an appropriate project, define the objectives and benefits of the project, and prepare a strategy for implementation, including those associated with project financing.

4.1.1 THE STATE ACTION PLAN

Each developing State and SIDS is encouraged to determine which carbon emission reduction strategies can best meet the needs of the State and its circumstances. The purpose of developing a State Action Plan is to articulate the goals for achieving carbon emission reductions and the measures to be implemented toward obtaining those goals.

ICAO has prepared ICAO Doc 9988, *Guidance on the Development of States' Action Plans on CO_2 Emissions Reduction Activities,* to communicate the process of action plan development. ICAO is also implementing a robust capacity building programme to help developing States with the preparation and submission of action plans. This programme includes the provision of direct technical assistance to states, convening of conferences and workshops, development of carbon emissions assessment tools, and preparation of web-based information and publications. Individual efforts are also being led by ICAO and the European Union (EU) to accelerate the preparation and implementation of action plans through the ICAO-EU joint assistance project "Capacity Building for CO_2 Mitigation from International Aviation." This document prepared under the ICAO-UNDP assistance project is an important component of the capacity building programme.

Each State will have a different carbon emission baseline to consider and varying resources available from which to build an emission reduction strategy. Through the planning process associated with the development of the State Action Plan, each State will identify its path for implementing carbon emission reduction projects.

Five required elements of a State Action Plan:

1. *Contact information.* The focal point and any other person(s) responsible for the compilation and submission of the action plan should be identified.

2. *Baseline (without action) fuel consumption, CO_2 emissions and traffic (2010 or earlier, to 2050).* Annual historic fuel consumption and traffic from international aviation from 2010 or earlier should be submitted. In addition, projected future fuel consumption and traffic to 2020, and if possible to 2050, in the absence of action should be submitted. Although any available data would be welcome, in order to assess progress towards the global goals, baseline data for the years 2010, 2020 and, if possible, 2050 should be provided.

3. *Measures to mitigate CO_2 emissions.* The measures being proposed to address CO_2 emissions from international aviation, distinguishing between those that are already in place and those that are being considered for future implementation, should be listed.

4. *Expected results (fuel consumption, CO_2 emissions and traffic with the actions in #3).* Similar to #2, in order for ICAO to understand the global effect of the actions being proposed by States, projected fuel consumption and traffic for the same future years provided in #2 that quantifies the effect of the actions listed in #3 should be submitted.

5. *Assistance needs.* A description of any specific needs (for example, financial, technological or capacity building) for the implementation of future actions should be described, if applicable.

4.1.2 DEFINE PROJECT OBJECTIVES

Through the State Action Plan development process, States and SIDS will identify carbon emission reduction objectives which can be met through the implementation of specific projects. Projects will likely have a primary objective of reducing carbon emissions; however, projects may have other objectives that should be identified early in project planning. Other project objectives (also referred to as co-benefits), may include:

- Enhancing electricity supply delivery
- Diversification of energy supply
- Improved local air quality
- Facilitating economic development
- Improving quality of life
- Increasing stakeholder engagement
- Demonstrating national leadership

In communicating the broad objectives of the project through the action plan, the potential project benefits can be identified and summarized to attract potential financial partners.

4.1.3 IDENTIFY PROJECT BENEFITS

It is essential for project success to identify the specific benefits early in the project development phase so that they can be used to build support and attract investment. For example, if one of the project objectives is to enhance power supply delivery, the associated benefits could include fewer supply interruptions that negatively impact business and quality of life. Enhancing electricity supply delivery may also encourage economic development that was constrained by electricity service instability.

Table 4-1 lists the project objectives identified above and the potential project benefits associated with each. As the benefits will be specific to States and SIDS, some benefits listed below may not apply in all cases.

Objective	Benefit
Enhancing electricity supply delivery	Increased certainty for computer and digital services
	Greater electricity supply for household needs
	Expanded electricity service to underserved areas
	Decrease in business interruptions
Facilitating economic development	Providing business opportunities to local industry
	Building in-country experience
	Making local business more efficient
	Demonstrating new business models and partnerships
Improving quality of life	Powering homes and communities
	Providing income opportunities
	Decreasing power costs
	Facilitating new demand for consumer products
Increasing stakeholder engagement	Building partnerships
	Increasing communication
	Expanding opportunity
	Broadening education
Demonstrating national leadership	Building national pride
	Improving international cooperation

TABLE 4-1
Example of project objectives and associated benefits

4.1.4 PREPARE A CONCISE CONCEPT AND IMPLEMENTATION PLAN

With information compiled from the preceding steps and informed by the State Action Plan process, States should prepare a concise project concept and implementation plan that is consistent with their State Action Plan. It should include an initial description of the project and how it will achieve the stated carbon emission reduction objectives. It should also describe the project benefits and potential stakeholders who will be interested in the project. It may identify general project costs and potential partners and funding sources. It should also provide a timeline for implementation with key milestones to be achieved.

The project concept, at this stage, should be concise and uncomplicated. The concept needs to be educational and easily communicated. The purpose of developing the project concept is to provide a solution that is understandable and can garner support from interested parties. The concept can evolve and accumulate detail as feedback is provided and partners engage.

4.2 BUILDING SUPPORT WITHIN THE STATE

Once a project concept and an implementation plan have been drafted, the plan and its merits need to be communicated with interested parties to grow the project and build support. The following steps should be considered to advance project implementation.

4.2.1 IDENTIFY PROJECT PARTNERS

The first step for building support is to identify potential partners. Partners are entities that have a mutual interest in the objectives of the project. Their interests and potential value to the project will be diverse, so it is necessary to cast a broad net in identifying potential partners. Partners will build the knowledge base, diversity of ideas, and potential resources for the project. Partners will be self-motivated by the project's objectives but may not be aware of the project and the potential opportunities, so it is important to be proactive in identifying and reaching out to them.

In considering potential partners, begin by reviewing the objectives of the project and determining what other types of organizations may have interests in the same goals. For carbon emission reduction, environmental groups, scientific institutions, and economic development organizations could each find mutually beneficial aspects from a carbon emission project. It is also important to recognize that governments, private companies, and NGOs in different sectors all may see opportunities in the success of carbon emission reductions. Government can achieve its objectives through environmental policy; private companies may see an opportunity to profit or gain valuable work experience that can be marketed for future work; and NGOs can pursue their organization's mission. Once the project partners are identified, meetings can be set up to present the project concept plan.

The National Action Plan Team that helped develop the State Action Plan will be a good resource for identifying specific partners. As described in Doc 9988, a diverse set of aviation stakeholders are consulted in the development of the State Action Plan and the action plan team will be able to provide input with respect to those stakeholders that may be most interested in a particular project.

4.2.2 PREPARE COMMUNICATION TOOLS

An important part of marketing the project within the State to build support is to prepare communication tools which allow interested parties time and resources to learn more about the project on their own. The objective of initial meetings will be to gain their interest by focusing on the exciting aspects of the project and how it can benefit other partners. Following those meetings, potential partners may want to verify some of the discussion points and identify follow-up topics. Communication tools can include a power point presentation to guide the meeting, a project fact sheet which succinctly outlines the main aspects of the project and its benefits, and a project webpage which can be a place to further describe the project details and provide background material. More sophisticated communication tools such as videos and monitoring displays can be developed during project implementation to communicate the project's successes.

4.2.3 SPECIFY ROLES OF FORMAL PARTNERS

Different partners will fulfil different project roles. Some partners may act as advisors brought in periodically to provide an independent perspective on the project proposal and its implementation. Other partners may be identified as critical to project implementation, with some playing an active project role, and also be a recipient of funding. Private sector engagement may be obtained informally as part of the project formulation and can be a source of information that can be useful for scoping the project. In follow-on project stages, these partners may need to compete for project engagement through a tender process. NGO partners can fill a diversity of roles depending on their available resources and how closely the project's objectives align with their own.

4.3 APPLYING FOR FUNDING AND SPONSORING THE PROJECT

With a solid project concept prepared and project partners enlisted, the project leader must identify appropriate funding sources and apply for project funding. Funding programmes will vary based on project type and stage. Seed funding may be available through grants, while development funding may come from concessionary loans. Private sector contributions may also be made depending on the maturity of the financial markets and the success of public financing to limit investor risk.

Multiple funding sources may be necessary to implement the programme depending on its type and extent. Partners may also be an asset for identifying funding programmes, gathering knowledge on how to access such programmes, and providing a comprehensive team approach in the funding request. Refer to the programmes and organizations described in Section 3, as well as the matrix of programmes provided in Annex A.

5.0 FINANCING FOR DIFFERENT CARBON EMISSION REDUCTION MEASURES

Successful carbon mitigation projects are being implemented, aided by many of the partners in the public and private financing sectors. Many of those projects and measures are applicable to the aviation sector. Emissions are produced by aircraft upon arrival and departure, and while at the gate. They are also produced by aircraft supported activities associated with the terminal, and transport of goods and passengers to the aircraft.

This section is a summary of financing carbon emission reduction measures by practice area, that may be applicable to ICAO Member States. They are in the areas where airports directly generate carbon emissions through electricity, heating and cooling, and transportation. Project types that can mitigate these impacts are in the areas of renewable energy, energy efficiency, electrification and alternative fuels.

5.1 RENEWABLE ENERGY

Renewable energy represents the largest area of climate mitigation activity. Because all aspects of world society use electricity and there is a need to expand electricity service to underserved parts of the world, renewable energy offers great opportunity to reduce carbon emissions, while also maintaining and expanding economic opportunity and quality of life.

Much of the success in renewable energy has been accomplished in the developed world where, in recognition of the environmental impacts of fossil fuel power generation, public policies have been put into place to create a demand for renewable energy. As private industry has improved technology efficiency and production processes, development costs for renewable energy have decreased resulting in new buyers who are interested in producing green power, but also maintaining market competitiveness. Today, a number of renewable energy technologies - namely solar, wind, and hydro - are being produced successfully by the private market with only modest financial incentives.

With the technology component proven, the barriers to deployment of renewable energy projects in developing States and emerging economies is primarily related to financing and development certainty. The various public climate financing entities and programmes have stepped in to fill gaps necessary to reduce barriers to renewable energy development. Climate funds have been working with local governments to develop policy incentives that create local markets and attract private investment to respond to new demand for renewable energy. MDBs offer concessional loans that mitigate assumed risk for private investors who otherwise have experience in financing renewable energy technology, but lack experience working in specific regions with local partners.

With a strong international private market for many renewable energy technologies already established and proven, the best use of public financing is to build local markets through policy reform, capacity building in the government and finance sectors, and demonstration projects to develop in-country experience. Renewable energy companies are looking for opportunities to expand and are poised to deploy financial resources where investment risks are limited. Public finance can also be used to demonstrate unproven renewable energy technologies, such as wave and tidal energy to help those industries put construct demonstration projects to advance technology development and site specific advantages.

The Noor Concentrating Solar Power Plant Phase I (shown in Figure 5-1 in the foreground) began operating in the spring of 2016 in the Souss-Massa-Drâa area in Morocco, about 6 miles from Ouarzazate town. The technology uses mirrors to concentrate the heat of the sun on a central tower to heat steam and drive a traditional steam turbine to generate electricity. Phase I has a capacity of 160 MW and offsets approximately 250,000 tonnes of CO_2 emissions annually. Two additional Phases are also underway (Phase II can be seen in development above in the background) that will triple the facility's capacity and provide electricity for 1.1 million Moroccans. The project was supported by loan guarantees and below market financing through the World Bank and African Development Bank, which significantly decreased the cost of the facility.

FIGURE 5-1
Noor Concentrating Solar Power Plant, Morocco
(Source: energyeducation.ca)

5.2 ENERGY EFFICIENCY

Like that of renewable energy, the energy efficiency sector has seen significant expansion over the past ten years due to improvements in technology and market development. The cost of deploying more energy efficient technologies has become cost competitive particularly when evaluating such purchases on a life cycle basis.

Examples of energy efficiency technology include lighting, heating and cooling, and energy management. The phasing out of incandescent light bulbs and development of light emitting diodes (LED) has been a revolutionary change and one that has been readily adapted by all types of public and private organizations across the world. Similarly, variable frequency drive (VFDs) are being incorporated into a variety of machinery and mechanical systems which reduces the power requirements by programming the drives to respond to variable demand. Other simple measures include weatherization in both hot and cold climates to reduce the effect of outside weather on internal temperature.

The city of Sisak, Croatia partnered with the UNDP and GEF to implement an energy efficiency programme to reduce energy consumption in public buildings. Over two years, 24 projects cut energy consumption by 13% and saved the city budget USD 220,000 per year. CO_2 emissions were reduced by 780 tonnes. The Sisak pilot project was expanded throughout Croatia and now 52% of all public-sector buildings in the State are now incorporating energy-efficiency measures under the programme. The success of the programme is directly linked to an investment in energy audits to identify the most cost-effective and energy reducing projects.

An important step in identifying energy savings opportunities is through the completion of energy efficiency assessments. Public climate finance has effectively incorporated energy efficiency assessments into their capacity building programmes and the private sector has been willing to fill the vacuum of required technical assessment and technology deployment. In addition, these projects minimize the demand on public financing due to a low capital investment per project and therefore, a lower investment risk. The technological expertise for deploying energy efficiency technology is likely available within the State, reducing the need for outside support. An additional benefit is that the projects are readily repeatable, allowing for a single investment to readily be multiplied.

A goal of the UN's Sustainable Energy for All initiative is to double the rate of energy efficiency. The UNDP implements 55 energy efficiency projects in 40 States worldwide, mobilizing a total of USD 161 million in GEF resources and leveraging about USD 1 billion in co-financing from other sources.[26]

As Climate Funds look to deploy financing quickly and efficiently through a holistic, societal funding approach, energy efficiency represents an effective, if not necessarily high profile, opportunity to reduce energy consumption and limit carbon emissions.

5.3 ELECTRIFICATION

Converting fossil fuel burning uses to electricity can be an important step in reducing carbon emissions. When combined with an on-site renewable energy generation project, a complete conversion from carbon emitting to carbon free power can be achieved. Electrification projects can be employed at airports wherever fossil fuels are currently used. The two primary areas of opportunity include heating/cooling systems and vehicles.

Heating and cooling systems may be powered by a fossil fuel such as oil, propane, gas, or wood. They may also be powered already by electricity supplied from the electric grid. Where heating/cooling systems are powered by fossil fuels, the fuel must be delivered to the point of consumption by pipeline or truck. Supply shortfalls or disruption in delivery as a result of unusual circumstances like extreme weather events can cause heating/cooling systems to be temporarily taken offline, though the same can be true for systems powered by grid-delivered electricity where the electrical distribution network is compromised. Converting systems to electricity and incorporating on-site renewable electricity generation along with electricity storage capabilities can help the airport cut emissions and control its own supply of on-site energy, though comprehensive projects such as these require public financing support due to high costs of deployment.

Airports require support vehicles used by staff to move around the airport and to support aviation activities. These vehicles are likely powered by gasoline or diesel fuel, but could be retrofitted or replaced with electric vehicles. Besides staff operated on-road vehicles used around the airport, ground support equipment (GSE) such as tugs, fuelling trucks and belt loaders, operate at the ramp supporting the aircraft on the ground in between flights. The short distance use of vehicles at airports is well-suited for electric vehicles allowing for smaller,

relatively less expensive batteries for charging purposes. Charging stations are required in appropriate locations to ensure that the vehicles can be properly charged and ready for use. Where intermittent sources of renewable energy are generated at an airport, vehicles provide an opportunity to store power for use at a later time (e.g., at night) when the renewable energy generator (e.g., solar photovoltaic) is not able to function.

Equipment can also be installed at the terminal gate that allows aircraft to obtain power and air conditioning from terminal sources, and turn off their engines. Referred to as “gate electrification equipment”, the two primary units are a ground power unit (GPU) converter and a preconditioned air (PCA) unit, both of which can be attached to the underside of the passenger boarding bridge. The GPU converter changes the frequency of electricity produced in the terminal to that which can be used by the aircraft to power lights and on-board electronics while parked at the gate. The electricity is critical for diagnostic testing of aircraft systems prior to embarking safely on the next flight. The PCA provides heating and cooling to the aircraft cabin while it is on the ground to allow staff to appropriately transition the plane for the next flight and ensure that it is a comfortable temperature when passengers begin boarding. Traditionally, this power has been supplied by an auxiliary power unit (APU) located in the tail of the plan which runs on jet fuel. Given that aircraft can be parked at the gate for between 1 and 3 hours depending on the size of the plane and the duration of its next flight, running the APU at the gate can be a significant source of carbon emissions.

Alaska Airlines and Seattle-Tacoma International Airport (Sea-Tac) partnered to replace fossil-fuel-powered ground support equipment (GSE), including belt loaders and baggage tugs, with electric vehicles. As part of the project, the Port of Seattle, which operates Sea-Tac, has constructed 296 charging stations on the north half of the airport with another 280 stations scheduled for construction in 2017. To complete the project, Alaska Airlines purchased 204 electrically-powered GSEs, resulting in a reduction of 2,000 metric tonnes of CO_2 emissions annually.

ICAO and UNFCCC have worked together to develop two CDM methodologies for electrification: AM0116 “Electric taxiing systems for airplanes” and AMS-I.M. “Solar power for domestic aircraft at-gate operations”. The implementation of electric taxiing (e-taxiing) systems improves an aircraft’s energy efficiency by eliminating the aircraft’s need to burn fuel when taxiing. Instead the aircraft’s APU powers an e-taxi system, which allows the aircraft to taxi while the main engines are switched off. The implementation of solar power for aircraft at-gate operations (solar-at-gate) allows airports to reduce their use of fossil fuel through the installation of solar panels. The electricity provided through the solar panels is then directed for use by aircraft parked at the airport gates. Each implementing State must apply a baseline and monitoring methodology in order to determine the amount of Certified Emission Reductions (CERs) generated by a mitigation CDM project activity.

5.4 SUSTAINABLE AVIATION FUELS

Technologies described above under renewable energy, energy efficiency, and electrification are commercially proven and are supported by a strong private market driven by investors, producers, and consumers. Biofuels formulated through the processing of plant material and waste have been used as a supplement to traditional gasoline for many years, but a comprehensive transition to aviation use, specifically to power aircraft, has only been demonstrated, until recently in Oslo Airport, on a pilot basis. Therefore, financing is very much reliant on a patchwork of options, including public financing to mitigate risk to private investment, independent research institutions to standardize and validate safe products, and private investment from willing producers and consumers, along the sustainable aviation fuel supply chain.

While not the focus of this financing guide, it is important to highlight that the UN has been working with a variety of actors in the transportation biofuel sector to limit private investment risk. The United Nations Industrial Development Organization (UNIDO) has produced a Biofuels Strategy which states that it will fund projects to reduce the risks of private investment in the sector and improve technology transfer to developing States.[27] In a similar fashion to the work of the Climate Funds and MDBs, UNIDO seeks to work with local governments to encourage regulatory reform to facilitate private markets, and banks and investment funds to provide private investment at reduced risk. However, many of these efforts are directed toward funding non-aviation related biofuel use and would need greater partnerships to bring resources and knowledge to sustainable aviation fuel. The ICAO Carbon Offsetting and Reduction Scheme (CORSIA) will include the possibility to reduce emissions from international aviation through the use of sustainable aviation fuel. In order for alternative fuels to be considered under the CORSIA, the fuels will need to meet a number of sustainability criteria. Details of the sustainability criteria will be defined within the CORSIA Standards and Recommended Practices, under development by ICAO.

ICAO is currently developing a *Sustainable Aviation Fuels Guide* as a part of the ICAO project with UNDP/GEF. This document will provide guidance to ICAO Member States, especially SIDS, on how to develop a sustainable aviation fuel supply chain within their State, including links to resources and examples of best practices. One of the resources available to States is the ICAO Global Framework for Aviation Alternative Fuels (GFAAF), an online database that identifies relevant news and activities, past and ongoing initiatives, and answers to frequently asked questions about sustainable aviation fuels.

In January 2016, Oslo Airport started regular supply of a sustainable aviation fuel (SAF) blend through its existing common fuel distribution system. This is the first time an airport has made SAF available to all refueling aircraft relying on existing infrastructure. Oslo Airport is operated by Avinor, a wholly state owned limited company under the Norwegian Ministry of Transport and Communications which is responsible for 46 state-owned airports. Avinor's goal is to reduce the total greenhouse gas emissions associated with its airports regardless of traffic growth, and be a driving force in reducing overall GHG emissions from Norwegian aviation. The successful launch of the SAF project was enabled by government action to provide biofuel and initiate its integration into existing jet fuel supply chains.

CONCLUDING SUMMARY

ICAO Member States are working together with their national stakeholders to develop State Action Plans to reduce CO_2 emissions from international aviation. As part of the planning process, States are reviewing the basket of measures available to reach their emission reduction goals. A key component to implementation of action plans is understanding funding opportunities and developing a financing strategy to support the implementation of selected measures.

There exists a complex network of public financing programmes that direct funding for climate mitigation and adaptation projects. These programmes are building capacity by informing existing government institutions about climate challenges and opportunities, providing information on new regulatory and legal frameworks, and connecting staff with other stakeholders that can help advance climate programmes.

This guidance document provides an overview of climate programmes that may be available to ICAO Member States to help them implement their State Action Plans. It is important for States to become aware of these programmes, what type of funding is available, and how to begin the process of applying for funding as part of a broader national climate development programme. This guidance document shows that:

- Project financing can be complex and may require that the National Action Plan Team coordinate with other national stakeholders in order to access specific information and expertise.
- Financial instruments long used in international development have been modified to benefit climate financing. They provide great opportunity for developing States, but depend on close cooperation with international agencies like the World Bank Group.
- Public financing to reform the energy sector and incentivize low carbon energy, which must be developed within the State, are critical to attracting private investment.
- State Action Plans developed using ICAO Doc 9988 can be a good starting point for financing projects to reduce international aviation emissions.
- Using internationally approved plans and methodologies as the basis to assess potential CO_2 benefits from projects can highly facilitate the approval of green financing for selected aviation projects.

While each State and airport has different challenges and opportunities, this report should provide the reader with insight into public climate financing programmes and how they may be accessed to provide long-term sustainable growth in the international aviation sector.

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ANNEX A

DIRECTORY OF PUBLIC FINANCING PROGRAMMES FOR MITIGATING INTERNATIONAL AVIATION EMISSIONS

The following section provides a summary table including a listing of public financing programmes that are available as of November 2017 to assist Member States in funding their international aviation emission reduction projects. For each programme, a short summary is provided, key information, and sources for collecting additional detail. This Annex is meant to provide suggestions on the kind of existing financing programme, and is not intended as a comprehensive e list of funding opportunities; researching these programmes may also lead to additional funding sources, available from both public and private organizations, as well as help build relationships with stakeholders who can provide support for the international aviation emission reduction efforts.

No	Name	Administrator	Donors	Type of Funding	Amount	Recipients	Website
I	Clean Technology Fund	Climate Investment Fund, housed at the World Bank Group, working with Multilateral Development Banks	International Bank for Reconstruction and Development (IBRD) at the World Bank	Concessional financing, senior loans, convertible grants/contingent recovery grants, equity, local currency swaps and guarantees, contingent recovery loans, subordinated debt, plus technical assistance and capacity building.	USD 5.6 billion committed/ USD 3.8 billion approved which has attracted an estimated USD 46 billion in co-financing.	Chile, Colombia, Egypt, India, Indonesia, Kazakhstan, Mexico, Morocco, Nigeria, Philippines, South Africa, Thailand, Tunisia, Turkey, Ukraine, Vietnam	http://www-cif.climateinvestmentfunds.org/fund/clean-technology-fund
II	Scaling Up Renewables Energy in Low Income Countries	Climate Investment Fund, housed at the World Bank Group working with Multilateral Development Banks	International Bank for Reconstruction and Development (IBRD) at the World Bank	Concessional financing, senior loans, convertible grants/contingent recovery grants, equity, local currency swaps and guarantees, contingent recovery loans, subordinated debt, plus technical assistance and capacity building.	USD 780 million committed / USD 194 million approved which has attracted an estimated USD 1.2 billion in co-financing.	Armenia, Bangladesh, Benin, Cambodia, Ethiopia, Ghana, Haiti, Honduras, Kenya, Kiribati, Lesotho, Liberia, Madagascar Malawi, Maldives, Mali, Mongolia, Nepal, Nicaragua, Rwanda, Sierra Leone, Solomon Islands, Tanzania, Uganda, Vanuatu, Yemen, Zambia	https://www-cif.climateinvestmentfunds.org/fund/scaling-renewable-energy-program
III	GEEREF (Global Energy Efficiency and Renewable Energy Fund)	GEEREF	European Investment Bank Group, including the European Investment Bank and the European Investment Fund	Invests public and private risk capital in private equity funds which provide equity financing for small and medium sized renewable energy and energy efficiency projects in emerging markets.	Seeded by European Union, pledged funding of EUR 222 million through May 2016.	146 countries are eligible with funding directed through regional fund managers based in Central America, South America, Middle East and North Africa, Sub-Saharan Africa, Central Asia, Asia and Southeast Asia.	http://geeref.com

No	Name	Administrator	Donors	Type of Funding	Amount	Recipients	Website
IV	Global Environment Facility (GEF)	GEF	GEF with support from donor countries	Multilateral Grants, contingent loans, loan to grant, mitigate technology specific risks, microfinancing for residences.	A recent funding round, GEF-5, attracted USD 1.35m from 40 donor States.	Government agencies, civil society organizations, private sector companies, research institutions, among the broad diversity of potential partners, to implement projects and programmes in recipient countries.	www.thegef.org
V	Green Climate Fund	Climate Fund Board, an operating entity of the UNFCCC with the World Bank	Direct private sector engagement in transformational climate-sensitive investments through the Private Sector Facility (PSF)	Grants, concessional loans, subordinated debt, equity, and guarantees, giving flexibility to match project needs. Risk-bearing capacity, allowing the Fund to support innovation, and leverage and crowd in additional financing.	Developed countries will jointly mobilize USD 100 billion per year by 2020. 50% for mitigation, 50% for adaptation.	National Designated Authorities (NDAs) or focal points are supported with Readiness Funds. 138 NDAs have been certified through 2015.	www.greenclimate.fund
VI	Global Climate Change Alliance (GCCA)	European Commission	European Union	Budget support through grants delivered to the country in tranches, with supplemental funds delivered on completion of the previous programme.	EUR 316.5 million committed by the end of 2014.	30 country programmes, and 8 complementary regional programmes in the most vulnerable and poorest parts of the world as defined by the UN.	www.gcca.eu

No	Name	Administrator	Donors	Type of Funding	Amount	Recipients	Website
VII	Development Cooperation Instrument	European Commission Directorate-General for International Development	European Union	Grants to organizations or projects being developed by them. Contracts through tendering process for goods and services. Budget support to countries through financial transfers to national treasuries. Funding directly to specific in-country sectors.	Funds come from the European Development Fund (EDF) and the European Union general budget. EUR 82 billion committed during 2014-2020 period of which EUR 30.5 billion is from the EDF.	Countries and regions where aid is needed. Organized by regions including Africa, Asia, Central Asia, Latin America, Sub-Sahara, Caribbean, the Gulf, and the Pacific.	ec.europa.eu/europeaid/how/finance/dci_en
VIII	Pilot Auction Facility for Methane and Climate Change Mitigation	World Bank	Funded by Germany, Sweden, Switzerland, and the United States.	Performance based payments for carbon credits valued through an annual auction. World Bank issues a bond which is backed by donor countries. In a first phase, it will support projects that cut methane emissions at landfill, animal waste, and wastewater sites facing low carbon prices.	The facility has a capitalization target of USD 100 million.	Private companies developing energy projects in developing countries.	www.pilotauctionfacility.org
IX	Africa Climate Change Fund	African Development Bank	Governments of Germany, Italy, and Belgium, as well as multilateral climate funds (GEF, CIF, etc.)	Variety of financing measures from grants, to loans to technical assistance to support capacity building, strategic planning, policy development, project implementation.	Initial funding of EUR 4,725 million from Germany. Additional funding of EUR 4.7 million from the government of Italy and EUR 2 million from the government of Flanders, Belgium.	African governments, NGOs, Research Institutions, and Research Organizations	www.afdb.org/en/topics-and-sectors/initiatives-partnerships/africa-climate-change-fund

No	Name	Administrator	Donors	Type of Funding	Amount	Recipients	Website
X	Sustainable Energy Fund for Africa	African Development Bank	Governments of Denmark and the United States	Grant funding to target renewable energy development from feasibility to financial close. Grants for technical assistance and project preparation. Equity investments through the Africa Renewable Energy Fund, managed by Berkeley Investments. Grants to fund public activities that enable private investments.	Committed USD 50 million for private development.	Private companies, organizations	www.afdb.org/en/topics-and-sectors/initiatives-partnerships/sustainable-energy-fund-for-africa/africa-climate-change-fund
XI	International Climate Fund	Interdepartmental Team within the Government of the United Kingdom	Government of the United Kingdom	Project grants, investments in climate funds. Grants primarily provided for bilateral projects. Concessional loans provided to multilateral programmes.	GBP 5.8 billion between April 2016 and March 2021, including at least GBP 1.76 billion in 2020.	Funds directed through global multilaterally administered programs (such as the GCF) rather than towards specific country initiatives	www.gov.uk/government/publications/international-climate-fund/international-climate-fund
XII	International Climate Initiative	German Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety	Government of Germany	Grants support policy advisory, capacity building and appropriate training measures, and also technological lighthouse projects and technological cooperation scheme.	Funded through auctioning allowances under the emissions trading scheme and through the Special Energy and Climate Fund. Since 2008, a total of 264 mitigation projects with funding totaling around EUR 879 million have been approved.	Developing and newly industrialized countries, as well as countries in transition.	www.international-climate-initiative.com

No	Name	Administrator	Donors	Type of Funding	Amount	Recipients	Website
XIII	NAMA Facility	NAMA Board, Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH	Government of Germany with support from the UK, Denmark, and the European Commission	Grants, concessional financing, technical assistance for transformational changes in sector development driven by in-country planning and implementation.	EUR $60 million provided for 4th call for funding in 2016.	Developing countries and emerging economies.	www.nama-facility.or
XIV	Global Climate Partnership Fund (GCPF)	GCPF	Governments of Germany, Denmark, the UK, the International Finance Corporation, and the Dutch and Austrian Development Banks	Uses public funding to leverage private capital; local financial institutions through dedicated funding in the form of senior or subordinated debt; Mid to long-term financing; Total facilities usually amounting to USD 10 million – USD 30 million, with flexible funding schedules. Also provides technical assistance to financial institutions to build their green financing portfolios.	Through 2014, USD 100m committed to partner institutions with USD 300m in uncommitted funds.	Financial institutions and some private companies building projects in developing countries.	www.gcpf.lu
XV	Global Climate Change Initiative (GCCI) Low Emissions Development Strategy (LEDS)	US Agency for International Development (USAID)	Government of the United States	Technical assistance to advance countries plans and programmes to mitigate and adapt to climate change.	2014-2015 include: Mobilizing USD 647 million to fund LEDS action in 10 countries.	20 partner countries: Albania, Bangladesh, Cambodia, Colombia, Costa Rica, Ethiopia, Gabon, Georgia, Guatemala, Indonesia, Jamaica, Kazakhstan, Kenya, Macedonia, Malawi, Mexico, Moldova, Peru, Philippines, Serbia, South Africa, Thailand, Ukraine, Vietnam, Zambia	https://www.ec-leds.org

No	Name	Administrator	Donors	Type of Funding	Amount	Recipients	Website
XVI	Climate Technology Initiative's (CTI) Private Financing Advisory Network (PFAN)	United Nations Industrial Development Organization (UNIDO) and the Renewable Energy and Energy Efficiency Partnership (REEEP)	Governments of the United States, Sweden Australia and Norway	Identifies promising clean energy projects at an early stage and provides mentoring for development of a business plan, investment pitch, and growth strategy, significantly enhancing the possibility of financial closure.	87 projects have achieved financial closure with over USD 1.2 billion of investment raised.	Private companies	cti-pfan.net/
XVII	Powering Agriculture: An Energy Grand Challenge for Development (PAEGC)	Hosted by the US Agency for International Development (USAID)	Funding from the Governments of the Germany, Sweden, and the United States as well as Duke Energy, and the Overseas Private Investment Corporation (OPIC)	Grants, technical assistance to develop work plans, access to business technical firms and consultants, communication with investors, advisory services for business development and marketing.	Not available	Small agricultural companies and cooperatives	poweringag.org/
XVIII	UAE South Pacific Partnership Fund	Abu Dhabi Fund for Development	Government of the United Arab Emirates	Grants and technical assistance.	USD 50 million annually.	Governments of Fiji, Kiribati, Samoa, Tonga, Tuvalu, Vanuatu	www.mofa.gov.ae/EN/Pages/UAE-Pacific-Partnership.aspx

No	Name	Administrator	Donors	Type of Funding	Amount	Recipient	Website
X IX	IRENA/ADFD Project Facility	IRENA	Abu Dhabi Fund for Development	IRENA selecting and recommending promising renewable energy projects in developing countries. ADFD then offers sovereign funding through soft (concessional) loans to these projects. IRENA also provides capacity building, Renewable Readiness Assessments, resource assessments, grid stability studies.	USD 350 million over seven annual cycles.	Members of IRENA; about 120 countries.	adfd.irena.org
XX	Pacific Environment Community (PEC) Fund	Pacific Island Forum Secretariat	Government of Japan	Grants and technical assistance for sea water desalination and renewable energy projects.	USD 66 million committed.	Forum Island Countries (FIC): Cook Islands, Federal States of Micronesia, Fiji, Kiribati, Nauru, Niue, Palau, Papua New Guinea, Republic of the Marshall Islands, Samoa, Solomon Islands, Tonga, Tuvalu, and Vanuatu	www.forumsec.org/pages.cfm/strategic-partnerships-coordination/pacific-environment-community-pec-fund

No	Name	Administrator	Donors	Type of Funding	Amount	Recipient	Website
X XI	UAE-Caribbean Renewable Energy Fund	Abu Dhabi Fund for Development	Government of the United Arab Emirates	Grants and technical assistance.	USD 50 million annually.	Governments of Antigua & Barbuda, Bahamas, Barbados, Belize, Cuba, Dominica, Dominican Republic, Grenada, Guyana, Haiti, Jamaica, St Kitts and Nevis, St. Lucia, St. Vincent and the Grenadines, Suriname, and Trinidad and Tobago	http://newenergyevents.com/wp-content/uploads/2017/02/UAE-Caribbean-Renewable-Energy-Fund-Guidelines.pdf

I. CLEAN TECHNOLOGY FUND (CTF)

ADMINISTERED BY THE CLIMATE INVESTMENT FUND AT THE WORLD BANK

PURPOSE

Increase the development of low carbon technologies including renewable energy.

FUNDING TYPES

Financing, senior loans, convertible grants/contingent recovery grants, equity, local currency swaps and guarantees, contingent recovery loans, subordinated debt, plus technical assistance and capacity building.

WEBSITE

www.climateinvestmentfunds.org/fund/clean-technology-fund

SUMMARY

The USD 5.8 billion Clean Technology Fund (CTF) is empowering transformation in developing and emerging economies by providing resources to scale up low carbon technologies with significant potential for long-term greenhouse gas (GHG) emissions savings.

Over USD 3.8 billion (66 percent of CTF resources) is approved and under implementation in clean technologies such as renewable energy, energy efficiency, and clean transport. This is expected to leverage another USD 38 billion in co-financing.

The Dedicated Private Sector Programmes, created under the CTF to finance large-scale private sector projects with greater speed and efficiency, have allocated a total of USD 467 million to geothermal power, mini-grids, mezzanine finance, energy efficiency, solar PV, and early-stage renewable energy programmes so far.

EXAMPLE

In Thailand, USD 100 million from the CTF administered by the Asian Development Bank, is supporting a number of pioneering projects under the Private Sector Renewable Energy Programme. These projects are expected to lead to over 430 MW installed capacity. Also in Thailand, the International Finance Corporation (IFC) blended USD 8 million in commercial financing from its own resources with USD 4 million in concessional finance from the CTF to support expansion of one of Thailand's earliest solar PV developers, female entrepreneur Wandee Khunchornyakong's Solar Power Company Group (SPCG.) This financing enabled SPCG to mobilize additional financing from local banks and bring 12MW in utility-scale solar power capacity over the finish line. Wandee received the prestigious Momentum for Change award from the United Nations' Climate Change Secretariat in 2014 for this groundbreaking initiative. By demonstrating the commercial viability of private sector utility-scale energy generation projects, the programme is overcoming risk perceptions. It does this by establishing replicable business models for renewable energy technologies - a track record of investments will catalyze market transformation.

II. SCALING UP RENEWABLE ENERGY IN LOW INCOME COUNTRIES (SREP)

ADMINISTERED BY THE CLIMATE INVESTMENT FUND AT THE WORLD BANK

PURPOSE

Increase the development of renewable energy in developing countries.

FUNDING TYPES

Concessional Financing, senior loans, convertible grants/contingent recovery grants, equity, local currency swaps and guarantees, contingent recovery loans, subordinated debt, plus technical assistance and capacity building.

WEBSITE

www-cif.climateinvestmentfunds.org/fund/scaling-renewable-energy-program

SUMMARY

The USD 839 million Scaling Up Renewable Energy in Low Income Countries Program (SREP), a funding window of the CIF, is empowering transformation in developing countries by demonstrating the economic, social and environmental viability of renewable energy. Channeled through five multilateral development banks (MDBs), SREP financing supports scaled-up deployment of renewable energy solutions to increase energy access and economic opportunities. To date, USD 264 million is approved and under implementation for 23 projects and programs, expecting USD 1.9 billion in co-financing from other sources.

EXAMPLE

Dhiffushi Solar Ice Project: The Maldives was selected for SREP financing in July 2010. Subsequently, the country prepared an investment plan that embraces SREP objectives. These include demonstrating the social and environmental viability of low-carbon development trajectories in the energy sector through a carbon-neutral policy that will result in a switch from fossil fuel to renewable sources of energy by 2020. Under the plan, this transformation will be achieved through large-scale generation of electricity using solar, wind, and waste-driven energy sources, in addition to hybrid systems. Such a transformation would also support socioeconomic development and contribute to poverty reduction and sustainable development. The Maldives' plan was endorsed by the SREP Sub-Committee in October 2012.

The project will result in the provision of 21 MW of new solar capacity, 27.6 GWh of annual electricity output, and 7 MWh of energy storage. About 4,600 households will benefit from increased access to electricity in the first five subprojects. The number of beneficiaries will increase as the programme covers more islands. In 2016, the Dhiffushi Solar Ice Project was completed on Dhiffushi Island in the Maldives. The project features the installation of a 40 kW grid-connected photovoltaic (PV) system and an ice-making machine.

III. GLOBAL ENERGY EFFICIENCY AND RENEWABLE ENERGY FUND (GEEREF)

ADMINISTERED BY GEEREF WITH SUPPORT FROM THE EUROPEAN INVESTMENT BANK GROUP

PURPOSE

Provide attractive, low risk financial investments that will produce economic, environmental, and social benefits.

FUNDING TYPES

Invests public and private risk capital in private equity funds, which provide equity financing for small and medium sized renewable energy and energy efficiency projects in emerging economies.

WEBSITE

geeref.com

SUMMARY

The Global Energy Efficiency and Renewable Energy Fund (GEEREF) is an innovative Fund-of-Funds, catalysing private sector capital into clean energy projects in developing countries and economies in transition. It invests in private equity funds which focus on renewable energy and energy efficiency projects in emerging markets. GEEREF's funds concentrate on infrastructure projects that generate clean power through proven technologies with low risk. GEEREF was initiated by the European Commission in 2006 and launched in 2008 with funding from the European Union, Germany and Norway, totaling EUR 112 million. GEEREF successfully concluded its fundraising from private sector investors in May 2015, which brought the total funds under management to EUR 222 million. GEEREF invests in private equity funds which, in turn, invest in private sector projects, thereby further enhancing the leveraging effect of GEEREF's investments. It is estimated that, with EUR 222 million of funds under management, over EUR 10 billion could be mobilised through the funds in which GEEREF participates and the final projects in which these funds invest.

EXAMPLE

Esidai Wind Project: This is a 50 MW wind project utilizing the wind resource generated by the Kenyan rift valley. The project is located along the rift valley escarpment in the area between Ngong Hills and Isinya, in Kajiado County, Kenya. The project will be connected to the Kenyan national grid via Isinya substation. The project is in in the mid-stage of development. DI Frontier Market Energy & Carbon Fund is substantial shareholder in the project company, Esidai Wind Power Generation Company Limited, with a view to contributing to the project development and providing equity for the construction of the project.

IV. THE GLOBAL ENVIRONMENT FACILITY (GEF)

ADMINISTERED BY THE GEF

PURPOSE

To help developing countries and countries with economies in transition to meet the objectives of international environmental conventions and agreements.

FUNDING TYPES

Multilateral grants, contingent loans, loan to grant, mitigate technology specific risks, microfinancing for residences.

WEBSITE

www.thegef.org

SUMMARY

The Global Environment Facility (GEF) administers several trust funds and provides Secretariat services, on an interim basis, for the Adaptation Fund.

The GEF Trust Fund was established on the eve of the 1992 Rio Earth Summit, to help tackle our planet's most pressing environmental problems. GEF funding to support the projects is contributed by donor countries. These financial contributions are replenished every four years. The funds have been provided by the 39 donor countries of the GEF.

EXAMPLE

Cook Islands Renewable Energy Sector Project: A GEF grant has been used to fund the development of over 3 MW solar PV including storage and energy management system in the Cook Islands. The project includes the installation of a battery energy storage system (BESS) with a preliminary capacity of 1 MW and 4 MWh, which will provide load shifting to offset renewable generation at the existing 1 MW solar PV facility at the Rarotonga Airport. The proposed BESS will allow 2 MW of additional solar PV generation, which is about 8 per cent progress towards the total estimated renewable generation. This funding allows the Cook Islands to develop additional solar PV generation and accelerate its timeline to meet 100 per cent renewable energy goals for the southern island group.

[1] ICAO, in partnership with GEF and the United Nations Development Programme (UNDP) have an initiative to support capacity building in developing States and SIDS for implementing concrete measures to reduce CO2 emissions from international aviation.

V. GREEN CLIMATE FUND (GCF)

ADMINISTERED BY THE GCF BOARD UNDER THE UNFCCC, WITH SUPPORT FROM THE WORLD BANK

PURPOSE

To advance the goal of keeping the temperature increase on earth below two degrees Celsius by investing into low-emission and climate-resilient development.

FUNDING TYPES

Variety of financial instruments available, including grants, concessional loans, subordinated debt, equity, and guarantees, giving flexibility to match project needs. Risk-bearing capacity, allowing the Fund to support innovation and leverage and crowd in additional financing.

WEBSITE

www.greenclimate.fund

SUMMARY

The Green Climate Fund (GCF) is a new global fund created to support the efforts of developing countries to respond to the challenge of climate change. The GCF helps developing countries limit or reduce their GHG emissions and adapt to climate change. It seeks to promote a paradigm shift to low-emission and climate-resilient development, taking into account the needs of nations that are particularly vulnerable to climate change impacts. It was set up by the 194 States who are parties to the United Nations Framework Convention on Climate Change (UNFCCC) in 2010, as part of the Convention's financial mechanism. It aims to deliver equal amounts of funding to mitigation and adaptation, while being guided by the Convention's principles and provisions.

EXAMPLE

The Renewable Energy Financing Framework in Egypt: This project will help Egypt to its target of 20 per cent renewable energy generation by 2022, through two complementary components. The first is a comprehensive technical assistance programme to enhance renewable energy integration, policies, and planning. The second component is to scale up investments to support the development and construction of renewable energy projects totaling USD 1 billion. This will be done by blending GCF and European Bank for Reconstruction and Development (EBRD) financing to leverage debt financing from international and development financial institutions, and at a later stage, from commercial banks and private sector investments.

The Framework will launch the first wave of private renewable energy projects in Egypt, overcoming financial barriers due to uncertainty and high transaction costs, as well as the macroeconomic situation which has resulted in increased cost of capital and limited availability of debt. The Framework will use debt financing from EBRD and GCF of up to USD 500 million, including up to USD 150 million in loans from GCF. The projects to be implemented with co-financing from the Framework are expected to generate around 1,400 GWh electricity annually and result in avoided GHG emissions of about 800,000 tCO_2e annually once all projects are operational.

VI. GLOBAL CLIMATE CHANGE ALLIANCE (GCCA)

ADMINISTERED BY THE EUROPEAN COMMISSION UNDER THE EUROPEAN UNION (EU)

PURPOSE

To help the most vulnerable and least developed countries address climate change through support of their national programmes.

FUNDING TYPES

National budget support with funds sent directly to the country in tranches with supplemental funds delivered on completion of first programme.

WEBSITE

www.gcca.eu

SUMMARY

The Global Climate Change Alliance (GCCA) was established by the European Union (EU) in 2007 to strengthen dialogue and cooperation with developing countries, in particular least developed countries (LDCs) and small island developing States (SIDS). With a budget of more than EUR 300 million, it supports 51 programmes around the world and is active in 38 countries. It focuses on increasing the capacity of the poorest and most vulnerable countries to adapt to the effects of climate change, in support of the achievement of the UN Millenium Development Goals (MDGs). In 2014, a new phase of the GCCA, the GCCA+ flagship initiative, began in line with the European Commission's new Multiannual Financial Framework (2014-2020).

The GCCA+ aim is to boost the efficiency of its response to the needs of vulnerable countries and groups. Using ambitious and innovative approaches, it will achieve its goals by building on its two mutually reinforcing pillars:

- Under the first pillar, the GCCA+ serves as a platform for dialogue and exchange of experience between the EU and developing countries, focusing on climate policy and bringing renewed attention to the issue of international climate finance. The results feed into negotiations for a new climate deal under the UNFCCC.
- Under the second pillar, the GCCA+ acts as a source of technical and financial support for the world's most climate-vulnerable countries, whose populations need climate finance the most. Extra efforts will be made to strengthen the strategically important issues of ecosystems-based adaptation, migration and gender equality.

EXAMPLE

West Africa Capacity Building and Communication Strategy Project: This project seeks to mainstream climate issues into national decision-making. Funding is delivered through the African Biofuel and Renewable Energy Company (ABREC) to support its Member States in the development of projects in the areas of renewable energy and clean technology and in mobilising the required funds for their implementation. Support is mainly delivered through ABREC's Technical Assistance Facility. Currently, ABREC, in cooperation with West African Economic and Monetary Union (WAEMU), is planning to launch a Regional Program for the Development of Renewable Energy and Energy Efficiency in WAEMU Member States.

VII. DEVELOPMENT COOPERATION INSTRUMENT (DCI)

ADMINISTERED BY THE EUROPEAN COMMISSION DIRECTORATE GENERAL UNDER THE EUROPEAN UNION

PURPOSE

To support EU Development Policy and "Agenda for Change" including sustainability goals.

FUNDING TYPES

Grants to organizations or projects being developed by them. Contracts through tendering process for goods and services. Budget support to countries through financial transfers to national treasuries. Funding directly to specific in-country sectors.

WEBSITE

ec.europa.eu/europeaid/how/finance/dci_en.htm_en

SUMMARY

The objectives and general principles of the Development Cooperation Instrument (DCI) have been formulated in line with the Lisbon Treaty and the latest policies, notably the 'Agenda for Change' of EU development policy. Its prime objective is the reduction of poverty. It contributes also to the achievement of other goals of EU external action, in particular fostering sustainable economic, social and environmental development as well as promoting democracy, the rule of law, good governance and respect for human rights. Relevant funding comes from the DCI Thematic programmes benefiting all developing countries under the 'Global public good and challenges'. This programme addresses climate change, environment, energy, human development, food security and migration while ensuring coherence with the poverty reduction objective.

EXAMPLE

Facilitating India’s transition towards low carbon development by implementing national policies and programmes for offshore wind: The specific objective is to create an enabling environment through resource mapping, policy guidance and capacity building measures to unlock the offshore potential of India. The action will utilise the EU offshore learning to reduce technical barriers and financial risks; it will also undertake techno-commercial studies to showcase offshore wind potential.

VIII. PILOT AUCTION FACILITY FOR METHANE AND CLIMATE MITIGATION (PAF)

ADMINISTERED BY THE WORLD BANK WITH FUNDING FROM THE GOVERNMENTS OF GERMANY, SWEDEN, SWITZERLAND, AND THE UNITED STATES

PURPOSE

To support a market for carbon credits.

FUNDING TYPES

Grants to organizations or projects being developed by them. Contracts through tendering process for goods and services. Budget support to countries through financial transfers to national treasuries. Funding directly to specific in-country sectors.

WEBSITE

ec.europa.eu/europeaid/how/finance/dci_en.htm_en

SUMMARY

The Pilot Auction Facility for Methane and Climate Change Mitigation (PAF) is an innovative mechanism that pioneers the use of auctions to allocate public financing for climate action efficiently. The PAF was initiated as a result of a report from the Methane Finance Study Group, an international group of experts convened at the request of the G8. The facility demonstrates a new pay-for-performance mechanism that takes advantage of existing tools and experience developed at the multilateral level under the Clean Development Mechanism (CDM) and related carbon markets to deliver financing, in the form of a price guarantee, to projects that address climate change. The guaranteed floor price will be delivered through the auctioning of put options supported by donor funding. The competitive nature of the auction used to allocate the price guarantee will reveal the minimum price required by the private sector to invest in climate mitigation projects, therefore maximizing the impact of public funds and achieving the highest volume of climate benefits per dollar. The PAF is backed by several government donors and has a capitalization target of USD 100 million. In a first phase, it will support projects that cut methane emissions at landfill, animal waste, and wastewater sites facing the challenge of low carbon prices.

EXAMPLE

First Auction Recipients: In July 2015, the World Bank's PAF conducted an online auction of put options, which gave winning bidders the right, but not the obligation, to sell future carbon credits to the facility at a price determined by the auction. Winners redeem these options annually, with the first payments made in November 2016.

In total, 28 firms participated in the auction last year, and 12 won options to sell carbon credits to the PAF at USD 2.40 per carbon credit over a 5-year period. The auction provided winners with approximately USD 20 million in options, or about USD 4 million per year. Over the past 17 months, the owners of these contracts have invested in and sustained projects that reduce methane emissions, relying on the guaranteed payment for carbon credits to back their investments. The options were structured in the form of World Bank bonds that pay zero interest and provide a final redemption amount of USD 2.40 per carbon credit, as long as the bondholder surrenders an eligible carbon credit. Citi Bank acts as Global Agent for the bonds. The first tranche of the bonds matured on November 30, 2016, and five investors chose to exercise their right to redeem, receiving a total payment of USD 3.1 million in exchange for carbon credits, representing the equivalent of over 1.3 million metric tonnes of reduced carbon dioxide (CO_2) emissions. The carbon credits came from four projects: the Jeram landfill gas recovery project in Malaysia, the Kamphaeng Saen West and East: Landfill Gas to Electricity Projects in Thailand, and the Central de Resíduos do Recreio Landfill Gas Project in Brazil.

IX. AFRICA CLIMATE CHANGE FUND (ACCF)

ADMINISTERED BY THE AFRICAN DEVELOPMENT BANK, FINANCED BY VARIOUS CLIMATE FUNDS AND DONOR COUNTRIES

PURPOSE
To support low carbon development and climate resiliency.

FUNDING TYPES
Grants for capacity building, strategic planning, policy development, project implementation.

WEBSITE
www.afdb.org/en/topics-and-sectors/initiatives-partnerships/africa-climate-change-fund/

SUMMARY
In 2011, the African Development Bank (AfDB) mobilised USD 596 million for its egional member countries (RMCs) to use on adaptation projects, and another USD 925 million for mitigation projects. This has been made possible thanks to climate finance instruments created and/or administered by the Bank, such as the Climate Investment Funds (CIFs), the GEF, and the Sustainable Energy Fund for Africa (SEFA). The scope of the ACCF is sufficiently wide to permit a broad range of activities, including: preparation for accessing climate funding; integration of climate change and green growth into strategic documents and/or projects; preparation and funding of adaptation and mitigation projects; climate change-related knowledge management and information sharing; capacity building; preparation of climate change-resilient and low-carbon strategies and policies; green growth analysis work; advocacy and outreach.

EXAMPLE
Advancing clean energy projects in Cabo Verde: The project aims to enhance capacity to access climate finance, while helping Cabo Verde to meet its proposed targets towards a low-carbon development pathway set out in its intended nationally determined contribution to the UNFCCC. The project will develop nationally appropriate mitigation actions (NAMAs) for the key strategic sectors of energy and waste. It will further support the mobilization of climate finance for the implementation of NAMAs.

X. SUSTAINABLE ENERGY FUND FOR AFRICA (SEFA)

ADMINISTERED BY THE AFRICAN DEVELOPMENT BANK, FINANCED BY THE GOVERNMENTS OF DENMARK AND THE UNITED STATES

PURPOSE

To support private sector-led small and medium scale renewable energy development in Africa.

FUNDING TYPES

Grant funding to target renewable energy development from feasibility to financial close. Grants for technical assistance and project preparation. Equity investments through the Africa Renewable Energy Fund, managed by Berkeley Investments. Grants to fund public activities that enable private investments

WEBSITE

www.afdb.org/en/topics-and-sectors/initiatives-partnerships/sustainable-energy-fund-for-africa/

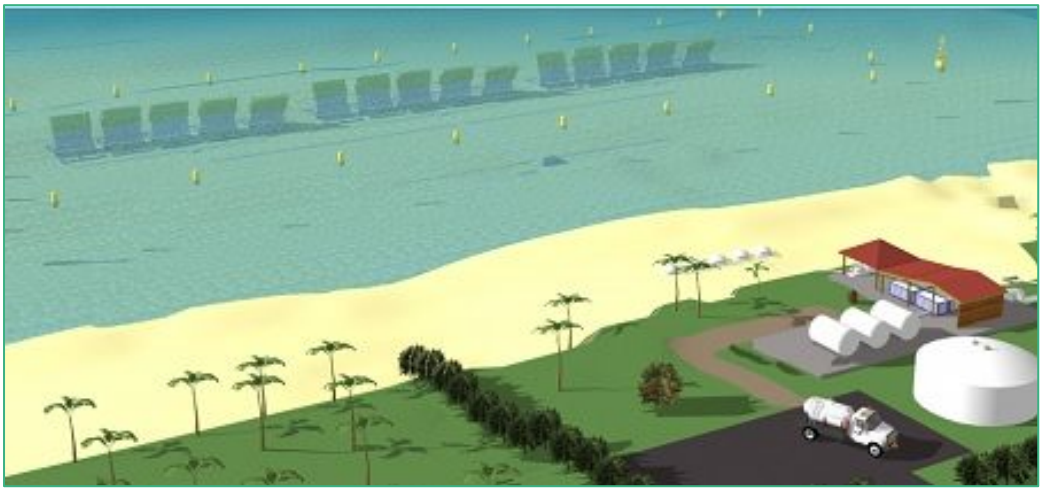
SUMMARY

The Sustainable Energy Fund for Africa (SEFA) was designed to operate under three financing windows.

1) Poject preparation provides cost-sharing grants and technical assistance to private project developers/promoters to facilitate pre-investment activities for renewable energy and energy efficiency projects. Grant funding will target development activities from feasibility up to financial closure for projects with total capital investments in the range of USD 30 million – 200 million.
2) Equity investments seek to address the lack of access to early stage capital for small-and medium-sized projects, as well as the low managerial and technical capability of smaller entrepreneurs and developers. The SEFA equity capital combined with a dedicated technical assistance envelope will be deployed by the SEFA co-sponsored Africa Renewable Energy Fund (AREF), a pan-African Private Equity Fund (PEF) solely focused on small/medium (5-50 MW) independent power projects from solar, wind, biomass, hydro as well as some geothermal and stranded gas technologies. Investment decisions are the sole responsibility of AREF's Fund Manager –Berkeley Energy LLC.
3) Enabling environment support provides grants for public sector activities that create and improve the enabling environment for private sector investments in the sustainable energy space in Africa. This includes advisory and implementation of legal, regulatory and policy regimes that provide clear and predictable rules for project development, implementation and operation, capacity building activities to allow the public sector to act as a reliable and creditworthy counterparty in energy projects and programmes. This component is not bound by project size limits, and includes interventions spanning the off-grid, mini-grid, and grid-connected segments.

EXAMPLES

Wave-Driven Desalination Demonstration Project. Cabo Verde was awarded a US $930,000 grant by the AfDB-hosted SEFA on December 21, 2015 to develop the world's first wave-driven desalination system. Wave2O™, to be located in Praia Grande, Cabo Verde, will operate completely "off-grid" and supply more than 48,000 people with clean fresh water at a competitive cost. The system is expected to have a capacity of 4,000 m3/day of water, and will eliminate 5,400 metric tonnes of CO_2 per year.



XI. INTERNATIONAL CLIMATE FUND (ICF)

ADMINISTERED BY THE GOVERNMENT OF THE UNITED KINGDOM

PURPOSE

As the United Kingdom's primary source of climate finance, it funds existing multilateral and national programmes focused on supporting private sector innovation and public-private partnerships, including renewable energy development in Africa.

FUNDING TYPES

Project grants, investments in climate funds. Grants primarily provided for bilateral projects. Concessional loans provided to multilateral programs.

WEBSITE

www.gov.uk/government/publications/international-climate-fund/international-climate-fund

SUMMARY

The International Climate Fund (ICF) is the UK government's commitment to developing countries to help them address the challenges presented by climate change, and benefit from the opportunities. The ICF invests in a broad range of activities around the globe to support sustainable economic growth, build resilience to the impacts of climate change and help sustainably manage natural resources such as forests. The ICF helps make some of the poorest and most vulnerable communities more resilient to climate change, for example, by supporting the distribution of flood resilient crops and improving early warning systems. It is also helping create a reliable source of energy for communities, which improves health, education, and enables businesses to grow, creating jobs and improving incomes and standards of living for the poorest communities. It seeks to prevent emissions now or in years to come by demonstrating how countries can shift to cleaner, low carbon approaches and technologies.

EXAMPLES

The ICF often provides financial support to other climate funds and multilateral financing programmes. These include the NAMA Facility, Global Climate Partnership Fund, and the Climate Investment Funds. See those individual funds for specific project examples.

XII. INTERNATIONAL CLIMATE INITIATIVE (IKI)

ADMINISTERED BY THE GERMAN FEDERAL MINISTRY FOR THE ENVIRONMENT, NATURE CONSERVATION, BUILDING AND NUCLEAR SAFETY

PURPOSE

To mitigate GHG emissions, adapt to climate change, conserve carbon sinks, and conserve biodiversity.

FUNDING TYPES

Grants to support policy advice, capacity building and appropriate training measures, and also technological lighthouse projects and technological cooperation scheme.

WEBSITE

www.international-climate-initiative.com/en/

SUMMARY

Since 2008, the International Climate Initiative (IKI) of the Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety (BMUB) has been financing climate and biodiversity projects in developing and newly industrialising countries, as well as in countries in transition. In the early years of the programme, its financial resources came from the proceeds of auctioning allowances under the emissions trading scheme. To ensure financial continuity, further funds were made available through the Special Energy and Climate Fund. Both funding mechanisms are now part of the Federal Environment Ministry's regular budget.

The IKI is a key element of Germany's climate financing and the funding commitments in the framework of the Convention on Biological Diversity. The Initiative places clear emphasis on climate change mitigation, adaption to the impacts of climate change and the protection of biological diversity. These efforts provide various co-benefits, particularly the improvement of living conditions in partner countries. Projects are Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH.

EXAMPLES

Industrial and Commercial Solar Colling in Jordan: As part of a sectoral mitigation strategy, this project lays the foundations for largely CO_2-free air conditioning and refrigeration based on solar energy. To this end, it is establishing partnerships between German and Jordanian companies and institutes involved in cooling machines. A demonstration project is setting new energy efficiency standards, thus saving around 20,000 tonnes of CO_2, assuming systems have a 30-year life cycle. This roughly corresponds to the average annual CO_2 emissions of 5,500 Jordanian citizens. These standards feed into a sectoral approach for designing climate-friendly strategies and regulations for Jordan's air conditioning sector.

Other representative projects can be reviewed at:
www.international-climate-initiative.com/en/nc/projects/projects/

XIII. NAMA FACILITY

ADMINISTERED BY THE NAMA BOARD AND IMPLEMENTED BY DEUTSCHE GESELLSCHAFT FÜR INTERNATIONALE ZUSAMMENARBEIT (GIZ) GMBH

PURPOSE

Implement ambitious mitigation projects in developing and emerging economies.

FUNDING TYPES

Funding for transformational changes in sector development driven by in-country planning and implementation.

WEBSITE

www.nama-facility.org

SUMMARY

In 2012, the German Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety (BMUB) and the Department for Business, Energy and Industrial Strategy (BEIS) of the United Kingdom (UK) jointly established the NAMA Facility. The Danish Ministry of Energy, Utilities and Climate (EFKM) and the European Commission joined the NAMA Facility as new donors in 2015. In total, four calls for funding have been issued to date, totaling EUR 258 million.

NAMAs are country-driven and anchored in national development strategies and plans; are sector-wide programmes that are national in scope, even if regional or municipal elements could form part of the overall design; and consist of a combination of policies and financial mechanisms. Policies should serve to create an enabling environment and channel financial flows into low-carbon investments. Financial mechanisms should serve to address potential barriers for investment and leverage potential public support for mitigation activities; and be flexible in order to provide tailor-made solutions that are appropriate for the circumstances and capabilities of different countries. NAMAs are seen as concrete measures to achieve the objectives of Nationally Determined Contributions (NDCs) that were adopted through the Paris Agreement at the 21st Session of the Conference of the Parties (COP21) to the UNFCCC in December 2015.

EXAMPLES

Burkina Faso – Biomass Energy NAMA Support Project: The NAMA will contribute to more stable supply chains and continuous, more affordable energy access while addressing one of the main drivers of deforestation: biomass energy.

Chile – Self-supply Renewable Energy NAMA: The NAMA in the energy sector will contribute to increased energy security and independence by financing the expansion of decentralised renewable energy systems for self-supply.
Other representative projects can be viewed at: http://www.nama-facility.org/projects

XIV. GLOBAL CLIMATE PARTNERSHIP FUND (GCPF)

ADMINISTERED BY THE INVESTMENT FIRM RESPONABILITY INVESTMENTS AG, AND FINANCED BY THE GOVERNMENTS OF DENMARK, GERMANY, AND THE UK, THE INTERNATIONAL FINANCE CORPORATION, THE DEVELOPMENT BANKS OF AUSTRIA AND THE NETHERLANDS, AND PRIVATE INVESTORS

PURPOSE

Use public funding to leverage private capital in order to mitigate climate change and drive sustainable growth in developing and emerging markets.

FUNDING TYPES

Dedicated funding to local institutions in the form of senior or subordinated debt; mid- to long-term financing with flexible schedules; direct financing for projects in the late stage of development through direct funding primarily in the form of senior debt; maturities of up to 10 years; equity or mezzanine debt, provided in smaller amounts where this strengthens the funding package.

WEBSITE

www.gcpf.lu/investing-in-renewable-energy-and-energy-efficiency.html

SUMMARY

The Global Climate Partnership Fund (GCPF) is an investment company under Luxembourg law. It was established by the German Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety (BMUB) and KfW Entwicklungsbank in 2011. It is administered by responsAbility Investments AG, an asset manager focused on international development investments. As an innovative public-private partnership, GCPF uses public funding to leverage private capital in order to mitigate climate change and drive sustainable growth in developing and emerging markets. GCPF mainly invests through local financial institutions but also directly. Targeting small and medium-sized businesses and private household. Project size less than 15 MW.

EXAMPLE

A total of 25 companies are currently based in the Astro Nicaragua industrial park, which covers an area of 55 hectares. Astro Nicaragua meets 27 per cent of itsenergy needs using solar energy. The solar PV system has an installed capacity of 2.52 MW and generates electricity from dawn to dusk. The investment was partially financed by a ‘Green Line’ loan from the GCPF partner BanPro and the cost will be recuperated through energy savings within 8 years.

XV. GLOBAL CLIMATE CHANGE INITIATIVE (GCCI)

ADMINISTERED BY THE US AGENCY FOR INTERNATIONAL DEVELOPMENT (USAID)

PURPOSE

Support plans and programmes to mitigate and adapt to climate change in developing countries.

FUNDING TYPES

Various measures from direct technical assistance, grant funding, and financial supports through partner agencies.

WEBSITE

www.usaid.gov/climate

SUMMARY

The Global Climate Change Initiative was launched in 2010. It helps countries pursue development goals and grow their economies in ways that reduce GHG emissions and increase climate resilience. It establishes climate-smart laws and policies including low emissions development plans, adaptation plans, disaster preparedness plans, policy incentives for renewable energy, coordinated and capable institutions, and social and environmental safeguards. It provides access the climate information including greenhouse gas inventories, vulnerability assessments, early warning systems, weather information and services, and high-quality and user-friendly climate information and analysis. There are six primary programmes addressing climate change mitigation that the GCCI supports.

- The Enhancing Capacity for Low Emissions Development Strategies (EC-LEDS) programme – a USAID administered programme that partners with more than 20 countries to develop robust and coordinated low emission development strategies (LEDS). These LEDS support sustainable, long-term development while slowing the growth of GHG emissions.
- Grid Integration of Renewable Energy – a USAID administered programme that supports projects seeking to transform small electricity grids powered by fossil fuels to renewable power.
- Greening the Grid, a USAID programme, is a toolkit of information and guidance materials to support developing countries in defining and implementing grid-integration road maps. Toolkit resources provide: 1) concise and comprehensive overviews of emerging practices for addressing grid-integration challenges through policy, market, and regulatory mechanisms; and 2) guidance on applying these mechanisms to develop robust grid-integration road maps. The programme also provides direct technical assistance tailored to the unique power system characteristics and priorities in each partner country. See http://greeningthegrid.org for more information.
- The Energy Toolbox, hosted by USAID, offers training and field support on a range of energy-related topics including energy efficiency, electricity sector reform, grid-connected renewable energy generation, and infrastructure training. Individual toolkits include additional resources, links to case studies, information on implementation approaches, and location information.
- The Private Financing Advisory Network (PFAN), hosted by the United Nations Industrial Development Organization (UNIDO), identifies promising clean energy projects at an early stage and provides mentoring for development of a business plan, investment pitch, and growth strategy, significantly enhancing the possibility of financial closure. See separate page description.
- The Powering Agriculture: An Energy Grand Challenge for Development (PAEGC) programme, hosted by USAID but with several funding partners, supports new and sustainable approaches to accelerate the development and deployment of clean energy solutions for increasing agriculture productivity and/or value in developing countries. See separate page description.

XVI. PRIVATE FINANCE ADVISORY NETWORK (PFAN)

ADMINISTERED BY THE UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION AND THE RENEWABLE ENERGY AND ENERGY EFFICIENCY PARTNERSHIP

PURPOSE

Provide free business consulting services to early stage clean energy development projects in emerging economies.

FUNDING TYPES

Free advisory services, networking to bring entrepreneurs in the developing world together with investors from the developed world.

WEBSITE

cti-pfan.net

SUMMARY

Launched in 2006, the Private Financing Advisory Network (PFAN) identifies promising clean energy projects at an early stage and provides mentoring for development of a business plan, investment pitch, and growth strategy, significantly enhancing the possibility of financial closure. In May 2017, PFAN was relaunched under a new hosting arrangement with UNIDO and the Renewable Energy and Energy Efficiency Partnership (REEEP). PFAN is a multilateral, public-private partnership initiated by the Climate Technology Initiative (CTI) in cooperation with the UNFCCC Expert Group on Technology Transfer. Under the new hosting, its operations will be scaled up by a factor of two to five by 2020. Partners include USAID, Swedish International Development Cooperation Agency (SIDA), Australian Government Department of Foreign Affairs and Trade, and the Norwegian Ministry of Foreign Affairs. PFAN has developed regional networks covering Latin America, Asia, Africa and the Commonwealth of Independent States (CIS) and Central Asia, as well as in-country networks of developers and investors.

PFAN is an alliance of private-sector companies that are experienced in providing investment and financial advisory services to climate-friendly projects. Network members include specialist investment funds, institutional investors, and financial advisers. PFAN provides a variety of services to clean energy businesses to help them secure financial closure. There is no direct cost to the project developer for the initial stage of mentoring.

EXAMPLE

ASEA One Biomass Power Plant: CTI PFAN Asia helped ASEA One develop its business plan, and provided deal facilitation support.

In summary:

- ASEA One Power Corporation, Biomass Power Plant
- Capacity: 12 MW
- Total Investment: USD 30M
- Annual GHG Mitigation Potential: 40,000 TCO squared eq
- Location: Banga, Aklan, Philippines

XVII. POWERING AGRICULTURE: AN ENEGRY GRAND CHALLENGE FOR DEVELOPMENT

ADMINISTERED BY THE US AGENCY FOR INTERNATIONAL DEVELOPMENT

PURPOSE

Support new and sustainable approaches to accelerate the development and deployment of clean energy solutions for increasing agriculture productivity and/or value in developing countries.

FUNDING TYPES

Grants, technical assistance to develop work plans, access to business technical firms and consultants, communication with investors, advisory services for business development and marketing.

WEBSITE

www.poweringag.org/

SUMMARY

In 2012, Powering Agriculture: An Energy Grand Challenge for Development was launched by its Founding Partners, the United States Agency for International Development (USAID), the Government of Sweden, Duke Energy Corporation, the Government of Germany, and the Overseas Private Investment Corporation, to catalyze resources and focus attention on the lack of access by many farmers and agribusinesses in developing countries to reliable, affordable and clean energy. This limits their ability to adopt modern agricultural practices, increase food production, improve efficiency of their operations and benefit from broad-based, low-carbon economic growth.

The Powering Agriculture Founding Partners recognize that many farming communities face substantial barriers in incorporating clean energy solutions into their operations. Often farmers are not aware of what technology is available, the technology that is available does not match the performance characteristics or price points required in emerging markets, or there is little appropriate financing to assist in paying the relatively high, up-front capital costs of new technology.

Powering Agriculture: An Energy Grand Challenge for Development utilizes the financial and technical resources of its partners to promote new ideas and innovation at the point where clean energy and agriculture intersect, the clean energy/agriculture nexus.

EXAMPLE

Village Industrial Power (VIP), a firm that specializes in the development of innovative biomass fueled co-generation plants, has designed steam plants powered through the combustion of biomass waste produced at local agricultural processing facilities. The VIP plants generate mechanical/electrical/thermal energy for use in a diverse range of agricultural activities, such as processing fruit, palm, rice, and cocoa; dairy pasteurization; purifying water; and powering irrigation pumps.

To date, VIP, with its partner Camco Clean Energy, have installed five units in three locations. Three palm oil processing businesses in South Eastern Benin have tested the VIP unit in order to displace diesel consumption that is used in running the expeller press and the kernel and fiber separator. The VIP mini-grid in the village of Uchindile, Tanzania, has electrified over 15 shops, homes, and a hospital, and is looking to test the system for an agricultural application, such as an irrigation pump or a small mill. A rural clinic near Kigoma, Tanzania, tested the VIP unit to power a submersible pump and other equipment with the electricity produced by the unit. Training to operate and maintain the units has been provided at all sites.

XVIII. UAE SOUTH PACIFIC PARTNERSHIP FUND (UAE-PPF)

ADMINISTERED THE ABU DHABI FUND FOR DEVELOPMENT AND FINANCED BY THE GOVERNMENT OF THE UNITED ARAB EMIRATES

PURPOSE
To diversify energy mix and advance sustainability.

FUNDING TYPES
Grants and technical assistance.

WEBSITE
http://www.masdar.ae

SUMMARY
The UAE-Pacific Partnership Fund (UAE-PPF) is a USD 50 million initiative delivering grant-funded renewable energy projects to Pacific Island nations. The fund's 11 projects were deployed by Masdar 's Special Projects unit in cooperation with the UAE Ministry of Foreign Affairs and International Cooperation and each nation's government, with funding provided by the Abu Dhabi Fund for Development (ADFD).

The highly customized projects were designed to drive economic growth and sustainable development, following the identification of renewable energy as a key growth enabler for the region. The projects support the participating island countries to increase their energy resilience, bolster job creation and capacity building efforts, and contribute to renewable energy targets.

EXAMPLES
Masdar Special Projects is involved with a wind farm on the Samoan island of Upolu, which is home to nearly 75 percent of the population.

The innovative project will supply 1,500 MWh of power per year, delivering USD 475,000 in annual fuel savings. It also will reduce the island's CO_2 footprint by more than 1,000 tonnes each year.

The pioneering project includes two 55-metre wind turbines that can pivot at the base and be lowered and locked in place in less than one hour. This collapsible design helps to avoid damage from the region's numerous cyclones

XIX. IRENA / ADFD PROJECT FACILITY

ADMINISTERED THE INTERNATIONAL RENEWABLE ENERGY AGENCY (IRENA) AND FINANCED BY THE ABU DHABI FUND FOR DEVELOPMENT (ADFD)

PURPOSE
To overcome financial barriers to clean energy development.

FUNDING TYPES
IRENA provides technical assistance and capacity building, ADFD provides concessionary loans.

WEBSITE
adfd.irena.org

SUMMARY
The International Renewable Energy Agency (IRENA) and the ADFD have collaborated to create a joint Project Facility to finance transformative and replicable renewable energy projects in developing countries. The facility involves IRENA selecting and recommending promising renewable energy projects in developing countries. ADFD then offers soft (concessional) loans to these projects worth USD 350 million over seven annual cycles. Project eligibility includes membership in IRENA or similar agreements, renewable energy projects as defined by IRENA, supported by the host nation government, advanced past the feasibility stage, and provide socioeconomic and environmental benefits.

The first project selection cycle commenced in November 2012. Since January 2014, USD 189 million of ADFD loans have already been allocated to 19 renewable energy projects recommended by IRENA. Over USD 387 million has been leveraged through other funding sources to cover the rest of the project costs.

EXAMPLES
Ecuador, Tigrero Small Hydropower Project:
Small hydro project will bring clean energy to schools and medical facilities for Tigrero's rural community and reduce emissions by 4,213 tonnes per year.

Republic of the Marshall Islands, Renewable/Hybrid Microgrid Portfolio:
A transformative and potentially replicable 4.6 MW project will implement solar PV microgrids with advanced lithium-ion battery storage on four islands mitigation 5,000 tonnes of CO_2 emissions per year.

Other relevant projects are presented at: adfd.irena.org/Projectselected.aspx

XX. PACIFIC ENVIRONMENT COMMUNITY (PEC) FUND

ADMINISTERED THE PACIFIC ISLAND FORUM SECRETARIAT

PURPOSE

To install renewable energy and sea water desalination projects to solve energy and drinking water problems.

FUNDING TYPES

Grants for solar power generation systems and sea water desalination plants or a combination of both.

WEBSITE

www.forumsec.org/pages.cfm/strategic-partnerships-coordination/pacific-environment-community-pec-fund

SUMMARY

In May 2009 at the 5th Pacific Islands Leaders Meeting Forum, summit leaders launched of the Pacific Environment Community (PEC) Fund. Japan agreed to provide approximately USD 66 million to Forum Island Countries (FIC) to tackle environmental issues. Each FIC is provided with an indicative allocation of USD 4 million to support projects with a focus on the provision of solar power generation systems and sea water desalination plants, or a combination of both.

The Pacific Islands Forum Secretariat manages and administers the PEC Fund in accordance with the agreed PEC Fund Guidelines and Project Procedures. The PEC Fund has an established governance structure comprising a Joint Committee (JC), Project Management Unit and Technical Advisory Group. Access to the PEC Fund is a country-led process. Each FIC refers to the PEC Fund Project Procedures to guide the development of their proposal submissions. If a detailed project proposal is approved by the JC, the Pacific Islands Forum Secretariat then enters into a Financing Agreement with the recipient FIC to enable project implementation.

EXAMPLES

Nauru Sea Water Desalination and Solar Energy System

The project involves the supply and installation of a 131 kWp solar PV system (131.94 kWp grid-tie solar power generation system) and a desalination plant that will produce 100 m3/day of safe water. It is expected that the solar power generation system can meet 1.3 per cent of the energy demand in Nauru, doubling the existing energy production from solar energy. The lead time for RO water delivery is expected to reduce to three weeks with the addition of the proposed RO plant. The solar RO plant will be handed over to Nauru Utilities Authority (NUA) for continued operation and maintenance of the solar RO plant once installed. Nauru has identified Hitachi Plant Technologies Ltd as the Japanese Company. The project is expected to benefit the entire population of approximately 10,000 residents in Nauru by improving the energy and water supply. Installation of the solar power system and sea water desalination plant was completed in 2013 and the system is currently in use.

XXI. UAE-CARIBBEAN RENEWABLE ENERGY FUND

ADMINISTERED THE ABU DHABI FUND FOR DEVELOPMENT AND FINANCED BY THE GOVERNMENT OF THE UNITED ARAB EMIRATES

PURPOSE
To diversify energy mix and advance sustainability.

FUNDING TYPES
Grants and technical assistance.

WEBSITE
http://www.masdar.ae

SUMMARY
The UAE-Caribbean Renewable Energy Fund (UAE-CREF) is a USD 50 million initiative delivering grant-funded renewable energy projects to Caribbean Island nations. The fund was created in January 2017 and announced its first six projects in September 2017. The projects are deployed by Masdar's Special Projects unit in cooperation with the UAE Ministry of Foreign Affairs and International Cooperation and each nation's government, with funding provided by the Abu Dhabi Fund for Development (ADFD).

As with its complementary program to Pacific Island nations, the fund is designed to drive economic growth and sustainable development, following the identification of renewable energy as a key growth enabler for the region. The projects support the participating island countries to increase their energy resilience, bolster job creation and capacity building efforts, and contribute to renewable energy targets.

EXAMPLES
Six projects have been announced for funding, but details of the projects are not yet available. The projects are located in Antigua and Barbuda, Bahamas, Barbados, Dominica, and St. Vincent and the Grenadines. Through these projects, the fund seeks to significantly reduce energy costs in the region, as well as improve resilience to natural disasters such as Hurricane Irma.

SUSTAINABLE DEVELOPMENT GOALS

ICAO's work on environment contributes to **14 out of the 17** United Nations SDGs

WEBSITE: www.icao.int/environmental-protection/Pages/ICAO_UNDP.aspx
EMAIL: officeenv@icao.int

For more information on ICAO's environmental programme, please visit: **www.icao.int/environmental-protection/Pages/default.aspx**