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Blending in the energy sector

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Preface

Blending is an instrument for achieving European Union (EU) external policy objectives, complementary to other aid modalities and pursuing the relevant regional, national and overarching policy priorities. Blending is the combination of EU grants with loans, risk capital or guarantees from public and private financiers. The idea behind the instrument is that the EU grant element can be used strategically to attract additional financing for important investments for development in EU partner countries.

This and three other sector reference documents provide basic information on the main supported sectors in EU partner countries and on how potential support can be provided by EU blending operations in:

- energy;
- transport;
- water and sanitation;
- private sector development.

The four sector reference documents complement the *Guidelines on EU blending operations*, which is the central guidance document on blending operations and which summarises the key features, modalities and operational aspects of blending applicable to all sectors.

The main audience for these documents is the staff of the EU Delegations and of the Directorate-General for International Cooperation and Development (DG DEVCO) and the Directorate-General for Neighbourhood and Enlargement Negotiations (DG NEAR).

Abbreviations and acronyms

AfDB	African Development Bank
CABEI	Central American Bank for Economic Integration
CLSG	Côte d'Ivoire, Liberia, Sierra Leone and Guinea
EIB	European Investment Bank
ESCO	energy service company
EU	European Union
GHG	greenhouse gas
IFI	international financing institute
ITF	Infrastructure Trust Fund
LAIF	Latin America Investment Fund
MASEN	Moroccan Agency for Solar Energy
MSME	micro, small and medium enterprise
NIF	Neighbourhood Investment Facility
PPA	power purchase agreement
PPP	public-private partnership
SME	small and medium-sized enterprise
SOE	state-owned enterprise
SPC	special-purpose company

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CHAPTER 1

Sector overview

Energy is a crucial resource for economic and social activities, and the energy sector is often the largest economic sector in many developing countries. The energy sector is complex and has many dimensions. It comprises the production of **electricity** in large- and smaller-scale power plants; the power transport and distribution infrastructure; and the use of electricity in machinery, lighting, cooking and many other services. Electricity can be generated from renewable resources (e.g. hydro, wind, solar, biomass, geothermal and other power sources), fossil fuels (such as coal and gas) or nuclear power. End users include industry, small and medium-sized enterprises (SMEs), commercial and public sectors, and households. Another important energy need is heat for industrial, household and other uses. Heat can be produced from fossil fuels, electricity, firewood, and other sources, including renewable technologies.

1.1 Sub-sectors

The energy sector is covered in all blending facilities, with a focus on the following sub-sectors:

- **power transmission and distribution,** with the objective of obtaining access to secure electricity sources and connectivity within the region, and to increase transport and distribution efficiency;
- **renewable energy,** primarily grid-connected renewable electricity production (hydro, wind, geothermal, biomass/waste to energy), but also including off-grid solutions;
- **energy efficiency in end-use sectors —** including combined heat and power production, industrial energy efficiency, SMEs, and the public and residential sectors — with an emphasis on supporting financing facilities and programmes, given the small scale of specific individual investments.

In addition, projects supported by the blending facilities in other sectors often have an energy component. For example, investment in water and wastewater infrastructure should also consider energy efficiency improvement such as in pumping, as well as the application of waste to energy. Projects supporting SMEs often also incorporate an energy efficiency objective.

1.2 Regional overview

The key issues in the energy sector differ by region. In the **Asia and Pacific** region, energy demand is projected to almost double by 2030 because of economic development and population growth. Compounding the region's energy demand is widespread energy poverty across Asia. According to the Asian Development Bank, almost a billion people in the region are without access to electricity. In European Union (EU)–Asia cooperation, investments will focus on continued support for regional interventions to promote green growth in Asia by financing projects that encourage sustainable consumption and production, and supporting the fight against climate change. In this region, as in all other regions, the potential for energy efficiency remains large.

In **Sub-Saharan Africa**, energy use and development varies widely, with some African countries exporting energy to neighbours or the global market while others lack even basic energy infrastructure. Although Africa is well endowed both with fossil fuels and renewable resources, these are not evenly distributed. Many countries in Sub-Saharan Africa suffer severe regular blackouts (World Bank, 2013).

Latin America and the Caribbean are rich in energy resources, including hydrocarbons, hydroelectricity and biofuels. But this wealth is unevenly distributed. A large part of the population lacks access to modern electricity services, and fuel imports consume a growing percentage of the smaller countries' budgets.

In the EU's **Eastern Neighbourhood** partner countries, the regional integration of energy networks, energy concerns related to environmental protection, as well as security of the energy supply are key issues. Cooperation in the energy field plays an important role in the sustainable economic and social development of an increasingly integrated Euro-Mediterranean region. This includes the deployment of modern technologies in the **Southern Neighbourhood** region and achieving interconnected energy markets.

1.3 Objectives

DEVELOPMENT OBJECTIVES

The 2030 Agenda for Sustainable Development includes a specific goal on ensuring access to affordable, reliable, sustainable and modern energy for all. Access to modern and sustainable energy services is considered vital for satisfying these basic human needs and is a prerequisite for growing prosperity in a green economy.

The Agenda for Change specifies the need to focus on helping reduce developing countries' exposure to global shocks such as climate change, ecosystem and resource degradation, and volatile and escalating energy and agricultural prices by concentrating investment in sustainable agriculture and energy (EC, 2011). Also, EU development support should promote a green economy; this includes through supporting market opportunities for cleaner technologies, energy and resource efficiency, and low-carbon development while stimulating innovation, the use of information and communications technology, and reducing the unsustainable use of natural resources. The Agenda for Change also states that the EU should tackle inequalities, in particular to give poor people better access to land, food, water and energy without harming the environment.

Energy is among the key target areas of EU assistance. The Agenda for Change calls for the following actions in energy:

> the EU should offer technology and expertise as well as development funding, and should focus on three main challenges: price volatility and energy security; climate change, including access to low carbon technologies; and access to secure, affordable, clean and sustainable energy services... [T]he EU should support capacity development and technology transfer, including in climate adaptation and mitigation strategies (EC, 2011: 9).

In line with the Agenda for Change, the Sustainable Energy for All (SE4All) initiative aims to achieve the following three objectives by 2030:

- ensure universal access to modern energy services;
- double the rate of improvement in energy efficiency;
- double the share of renewable energy in the global energy mix.

Besides the blending facilities, other EU blending mechanisms target the energy sector as well. The Global Energy Efficiency and Renewable Fund is a 'fund of funds' and invests in private equity funds. It provides global risk capital through private investment for energy efficiency and renewable energy projects in developing countries and economies in transition.

OBJECTIVES OF BLENDING FACILITIES

The overall objective of EU support to projects in the energy sector is to attract additional financing to support investment in sustainable energy in the regions — encouraging essential investment in energy projects and programmes that could not be otherwise financed either by the market or international financing institutes (IFIs) alone. This overall objective can be further specified depending on the sector/project and partner countries involved, and on the particular barriers addressed with the EU support:

- support the development/roll-out of energy technologies that are still new in the specific markets;
- secure the availability of investment capital for sustainable energy that is not available or is expensive in the current local markets;
- reduce the cost of renewable energy to mitigate the impact on energy prices;
- mitigate the (perceived) risk associated with investment in sustainable energy as perceived by financiers and project promoters;
- provide knowledge and experience in the development and implementation of sustainable energy technologies;
- promote, through investment projects, the establishment of the enabling market, regulatory and political framework for deployment of sustainable energy technologies;
- build local capacities in project development in sustainable energy.

In addition, climate change objectives have been adopted in all blending facilities, supporting climate change mitigation as well as adaptation to climate change and improving the climate resilience of projects. As renewable energy and energy efficiency are key areas for mitigating climate change, these objectives are relevant for a large share of the projects in the energy sector.

1.4 Main actors

A large number and wide diversity of actors are involved in the identification, development, approval, financing, construction and operation of sustainable energy projects. For example, different categories of actors are involved in, on the one hand, small-scale energy efficiency in the residential sector, and, on the other hand, large-scale investment in power transport infrastructure.

NATIONAL GOVERNMENTS IN THE PARTNER COUNTRIES

The national or sub-national (regional) governments are key actors in many projects, filling a variety of different roles:

- **policymaker and regulator of the energy sector** (energy policy, energy legislation), e.g. in establishing feed-in tariff policy;
- **executive role,** e.g. in implementing local subsidy schemes for sustainable energy — in some cases, regulatory and executive authority is delegated to executive agencies, e.g. for energy efficiency and renewable energy;
- **project owner,** in cases where the energy industry (national electricity company, national grid company) is under state ownership, the national government is the project owner of the projects developed by these companies;
- **project sponsor,** in cases where the project is co-financed through national public resources;
- **facilitator/intermediary,** in cases where a national government is not directly involved but supports and facilitates the project.

The following departments within national governments could be involved: the ministry responsible for energy, the ministry of finance, the ministry responsible for planning, the ministry responsible for sector policy (building, industry, SMEs, economy), and the ministry responsible for the environment.

REGIONAL (SUB-NATIONAL) AND LOCAL GOVERNMENT/ADMINISTRATION

Regional and local energy production and distribution companies and facilities are partly owned by regional/local governments. As such, these administrations could assume the following roles: project owner, project sponsor and facilitator/intermediary.

PROJECT PROMOTERS

Project promoters take the initiative and assume the risks in identifying and developing projects in the energy sector. Promoters can be public entities (governments, national energy companies) or private (e.g. renewable energy developers or fund managers). In most cases, the promoters/beneficiaries are also responsible for implementation of the project, e.g. for developing and constructing a renewable energy project. Project promoters and beneficiaries could be public or private entities, or could have a mixed structure. For example, renewable energy project developers could be public (e.g. publicly owned energy distribution companies or have a private owner.

In the case of energy efficiency programmes, project promoters include private homeowners, industry companies and SMEs. For renewable energy investments, project promoters could be, depending on sector and size, national or sub-national energy (distribution) companies, project developers, industry and SMEs.

PRIVATE SECTOR IN THE HOST COUNTRY

The private sector in the host country can play different roles in blended projects in the energy sector:

- direct beneficiary of the project, e.g. in a programme providing loans to SMEs for investment in SME energy efficiency, or as a partner in a public-private partnership (PPP)[1];
- stakeholder, e.g. in projects that improve the reliability of the electricity supply, from which the private sector will benefit.

NON-GOVERNMENTAL ORGANISATIONS

Non-governmental organisations — whether international, national, regional or local — play an important role in supporting the public sector in adopting and implementing energy and environmental policies, as well as in safeguarding the development impact of energy investments.

[1] http://www.un.org/sustainabledevelopment/energy/.

1.5 Enabling environment

The energy sector plays a central role in most economies, and is subject to both market forces and public policy and legislation in many different areas. Thus, investments in the energy sector are driven by a range of factors and face a range of barriers.

DRIVERS FOR INVESTMENT

- In many developing countries, the **demand for energy services is growing** as a result of economic growth. This demand includes the economic and social need to improve the reliability of supply, as well as meet growing energy demand. For example, developing countries raised their share of total global renewable energy investment to a record 46% in 2012, up from 34% the previous year (FS-UNEP, 2013).
- **Security of supply** (decreasing dependence on imported fossil fuels) is a strong political concern in many countries. Security of supply can be improved by using domestic resources, such as renewable energy, and increasing energy efficiency.
- **Environmental and climate change** concerns and commitments are increasingly reflected in partner country energy strategies, with the aim of transforming to a low-carbon energy system.
- The **traditional fossil fuel–based energy systems**, often monopolies, in developing countries, are increasingly deemed unsustainable, due to inherent inefficiencies in technical, financial (subsidies) and governance terms. A shift to more flexible (renewable) energy sources could help bring about necessary reforms in the energy sector.
- In many developing countries, the **lack of access to sustainable energy services** cannot be addressed in the current centralised fossil fuel energy systems and requires alternative systems based in decentralised (renewable) energy systems.
- In several markets in developing countries, the **business case** for renewable energy and energy efficiency is already feasible and results

in bankable investment plans. Some sustainable energy technologies have already shown substantial cost reduction, improving the business case, e.g. solar photovoltaic power[2].

- Many international and national **financial support schemes** exist for sustainable energy investments.

- Adequate/appropriate **tariff systems** ensure that investment in new technologies (renewable energy and energy efficiency) can produce sustainable income on the basis of their real economic value in competition with conventional systems.

- **Pricing of greenhouse gas (GHG) emission reduction** through (emerging) carbon markets, including emission trading schemes, and project mechanisms applicable to developing countries, can secure an additional revenue for energy efficiency and renewable energy projects.

BARRIERS TO INVESTMENT[3]

Political and regulatory environment

- **Unstable policy regime:** Instability in the policy regime for renewable energy can result in a lack of investor confidence. Governments often do not have a clear view of an overall renewable energy and energy efficiency strategy to adopt. They do not agree on best practices, e.g. regulation versus incentives, and subsidies versus market-based schemes.

- **Vested interests:** Vested political and financial interests in conventional monopolies can create opposition to alternative suppliers.

- **International and interregional political barriers:** Such barriers can hamper decision-making on large-scale hydropower and transmission projects.

- **Lack of enabling environment:** An enabling environment that supports PPPs may be lacking.

- **Tariff-setting regulation:** In particular, there could be a lack of cost-based tariff setting.

Institutional environment

- **Institutional fragility:** Investors fear sudden regulatory changes in emerging economies that do not yet have a clear institutional framework for their energy policies.

- **Lack of capacity:** Actors in renewable energy projects — including off-takers, distributors, grid operators, project developers and project hosts (energy users) — often lack the skills and capacity to identify, develop, assess, finance and implement projects. Similarly, they may lack the technical capacity to maintain and operate (renewable) energy systems such as wind parks.

- **Information awareness and communication gaps:** Financiers often do not have sufficient knowledge of energy efficiency technologies and their potential to save energy, which makes it difficult for them to assess or understand their value. This information gap leads to the perception that energy efficiency projects are more complex, costly, risky and difficult to implement.

- **Lack of data and of harmonised international monitoring and verification protocols:** There are no internationally recognised indicators to compare countries' relative energy efficiency levels and related financial flows. Private investors and financial institutions are less likely to provide funds if they do not have reliable data to compare projects in different countries and their relative energy efficiency potentials, and may require performance risk guarantees when data are lacking.

Market barriers

- **Energy subsidies:** Consumer energy prices, including electricity, are often subsidised, either

[2] For example, the levelised cost of generating a megawatt hour of electricity from photovoltaic power was around one-third lower in 2012 than the 2011 average. This improvement made small-scale residential photovoltaic power, in particular, much closer to being competitive (FS-UNEP, 2013).

[3] The information in this section is taken from FS-UNEP (2013) and OECD/IEA (2012).

indirectly through (hidden) subsidies to the fossil fuel energy sector, or directly.

- **Manufacturing supply chain:** Over-capacity and investor unease about future market prospects caused problems for both wind and solar power (FS-UNEP, 2013).

- **Small markets and lack of sufficient demand:** Demand for energy-efficient goods and services is smaller in developing countries than in developed countries, because incomes are lower and awareness among consumers is strongly lacking. Many challenges to adopting energy efficiency measures are non-financial[4].

- **Higher perceived national/policy risk:** Financiers consider risks associated with a country before investing. Sovereignty risk is more prevalent in developing countries.

- **Small size of projects and high transaction costs:** Energy efficiency projects are often fragmented and too small to be attractive to lenders. Consequently, project development and implementation costs represent a larger share of an energy efficiency project than of a traditional project in the energy sector.

- **Weak or incomplete domestic capital markets:** Upper-middle-income countries, on the one hand, have a reliable banking system and rapidly developing equity and debt markets, but capital may not be available for all types of investments, particularly energy efficiency investments. Lower-income countries, on the other hand, lack both effective banking systems and equity and debt markets.

- **Intangibility:** For a typical loan, financial institutions will require information about the borrower's income capacity. To secure their loans, financial institutions often base them on assets listed in the balance sheet, provided as security. The interest rate proposed depends on the security of the asset.

[4] See e.g. Case Study 3 in the Annex on the energy efficiency and renewable energy programme for SMEs in Central America. EU support is used to address this barrier by financing feasibility studies and energy audits.

KEY ISSUES FOR INVESTMENT

To mobilise the necessary investment flows in the energy sector, several obstacles need to be addressed, resulting from market and government failures — including fossil fuel subsidies, lack of supportive policies, and outstanding barriers to international trade and investment. Host governments need to design and establish an enabling environment. The key issues are as follows (OECD, 2013).

Investment policy

The core of an enabling investment environment, whether in clean energy or in any other sector, is the promotion of investment policy principles such as non-discrimination, investor protection and transparency. This includes:

- equal treatment of foreign and domestic investors in clean energy;

- intellectual property rights;

- contract enforcement and land rights.

Investment promotion and facilitation

Domestic and international investment in renewable energy is constrained by market and government failures, including a weak environmental policy framework that fails to sufficiently price fossil fuel externalities, such as GHG emissions and local air pollution. A strong policy environment could favour investment in carbon-intensive energy infrastructure projects vis-à-vis clean energy projects; this would include:

- reform of fossil fuel subsidy systems/regimes;

- introduction of a system for carbon pricing to provide a financial incentive for clean energy;

- long-term policy goals (for climate change mitigation, renewable energy, energy efficiency);

- introduction of policy incentives for investment in sustainable energy (financial and regulatory);
- policy coherence and coordination (integration of sustainable energy objectives in energy strategies, infrastructure investment plans and sector policies).

Competition policy

Clean energy infrastructure investments often take place in a situation of imperfect competition where a state-owned enterprise (SOE) is the incumbent. Policymakers aiming to increase investment in clean energy infrastructure will therefore have to consider ways of creating a level playing field for independent power producers and SOEs, as well as for SOEs and other network operators. This would include:

- promoting the effective separation of the electricity market structure/power sector;
- creating a level playing field for public and private investors in clean energy infrastructure (access to finance, procurement and connection to the grid);
- establishing a competition authority provided with sufficient resources and technological knowledge to appropriately address the challenges of competition in the electricity sector.

Financial sector development

To deliver clean energy infrastructure, developers need access to affordable long-term finance. In some countries, however, access to long-term finance is constrained by shallow and illiquid financial markets. Accessing international capital markets can also be difficult for many developing countries. These challenges are particularly relevant for clean energy infrastructure projects, as financial institutions may be reluctant to lend due to insufficient knowledge of local markets and a higher technology risk. Measures to address these challenges include:

- facilitating access to finance;
- targeted incentives (feed-in tariffs);
- strengthening domestic financial markets.

Public governance

Given the number of policy areas and public authorities potentially involved in the effort to effectively leverage investment in clean energy infrastructure, good public governance is an essential enabling factor; this includes:

- governance and regulatory quality of the electricity market;
- electricity network planning and deployment;
- coordination between different levels of governance (national and sub-national).

Other policies and cross-cutting issues

- **Regional cross-country cooperation:** Some blended projects with EU support require cross-border investments and/or entail cross-border impacts[5].
- **PPPs (corporate governance):** Making and implementing the choice between public and private provision for clean energy infrastructure. Engaging in international discussions and negotiations around trade and clean energy technologies.

[5] See e.g. Case Study 1 in the Annex on the Côte d'Ivoire, Liberia, Sierra Leone and Guinea Interconnection Project.

CHAPTER 2

Project financing structures

This chapter provides a short description of project financing structures used in the energy sector. Financing structures are discussed (in a simplified way) underlying the three main types of projects in the energy sector. This short description can only roughly summarise the wide range of different financing structures that are applied, and indicate the differences between project categories.

2.1 Main project types

POWER TRANSMISSION AND DISTRIBUTION INFRASTRUCTURE

Energy infrastructure projects tend to be large and capital intensive and create not only commercial but also public benefits. Business models for large-scale power infrastructure, including high-voltage transport lines, are often a mixed commercial-public enterprise (UNESCAP, 2008: Chapter 3).

The project beneficiary and owner of the infrastructure is often a public entity owned by the national government (the national power or grid company). As such, investment in and management of the power infrastructure should primarily serve the public interest (access to sustainable energy for the entire population), under specific financial and economic conditions (regulated profit).

The costs and benefits of infrastructure projects are therefore assessed on a macro level (in most cases, the national level). Where a project affects more than one country — e.g. in the case of international connections[1] — these costs and benefits are assessed and balanced for each country. Taking as an example the Black Sea Energy Transmission System which links the Georgian grid with Turkey, the economic and financial benefits of infrastructure investment could include the following (ENPI Info Centre, 2010):

- Turkey is facing a demand-supply mismatch, which could be supplied with Georgian (hydropower) imports.
- In Georgia, seasonal electricity losses could be reduced and exports increased.
- The Georgian electricity grid will become more stable, and sudden disruptions will decrease in frequency, thus reducing economic losses, in particular in industry.

GRID-CONNECTED RENEWABLE ELECTRICITY PRODUCTION

This set of projects addresses mid- to large-scale renewable electricity production facilities (hydro, wind, geothermal and solar power). These facilities supply electricity to the national or regional grid. In case the renewable energy production facility has an owner other than the electricity distribution company that owns the grid (independent power producer), the business model is based on the following cost and revenue flows.

- Costs include the cost of capital for initial investment (including debt servicing and dividends), operation and maintenance, and other costs (insurance, licencing, etc.).

[1] See e.g. Case Study 1 in the Annex on the Côte d'Ivoire, Liberia, Sierra Leone and Guinea Interconnection Project.

- The most significant revenue stream comes from selling electricity to the grid, either at a fixed price (guaranteed feed-in tariff) or at market price, in the context of a power purchase agreement (PPA).
- In case the renewable capacity can be dispatched, revenues from providing capacity to the distribution company may be available in some countries.
- An additional income stream could come from tax benefits.
- The project may be able to generate and sell renewable energy certificates or carbon emission reduction certificates, depending on the country.

The cost of capital versus the feed-in tariff is a key factor. The costs of capital result from the net volume of investments (minus subsidies) and the conditions of the capital (concessional or commercial loans). The investment depends on the technology used, the scale and the costs of connection to the grid[2].

END-USE ENERGY EFFICIENCY AND RENEWABLE ENERGY THROUGH INTERMEDIATE FINANCING FACILITIES

A variety of financing structures exist in the context of providing renewable energy and energy efficiency services and products across the residential, commercial, SME and industrial sectors[3]. Each of these structures is present to varying degrees in each sector, depending on the geographical location and regulatory environment, as well as the scale of investment and the actors involved. Two different perspectives are discussed here:

- energy end user as economic agent;
- energy (efficiency) service provider, in particular an energy service company (ESCO).

The primary economic decision to invest in energy efficiency is made by the end user. This could be a large industrial company, for which energy is a main economic resource and energy costs are to be managed as a core business, or an individual homeowner. For small-scale investment in energy efficiency, such as in residential housing, energy efficiency is seldom the primary reason for investment. Often, energy efficiency measures — such as insulation of the building envelop, window replacement or replacement of the heating system — are only part of a broader range of integrated measures to renovate and upgrade the dwelling for reasons of increased living area, comfort level and property value.

An ESCO represents a prominent business model in the context of energy efficiency. Definitions vary from country to country, but ESCOs are generally differentiated from other firms offering energy services by the concept of performance-based contracting, whereby the ESCO's payment is directly linked to the amount of energy saved. Contracts allow facility owners to upgrade their buildings with efficient equipment, with no need for upfront capital. Services provided by an ESCO include energy audits, energy management, supply of equipment or energy and energy services (process or space heat, lighting, etc.)[4].

2.2 Main financial instruments

Following are the main financial instruments used for investments in the energy sector[5].

- **Concessional finance:** This is the main instrument (in terms of volume) for development projects in the energy sector. A concessional loan, sometimes called a soft loan, is granted on terms

[2] See e.g. Case Study 2 in the Annex on the Ouarzazate Solar Plant in Morocco.

[3] See e.g. Case Study 3 in the Annex on energy efficiency and renewable energy programme for SMEs in Central America.

[4] Source: Syntropolis energy forum website, http://www.syntropolis.net/knowledgehub/encyclopedia/energy-efficiency-business-models/.

[5] Developing countries comprise a heterogeneous group of countries. A distinction can be made between upper-middle-income countries (or emerging economies), such as China and India, and low-income countries, such as many countries in Sub-Saharan Africa. Low-income countries depend heavily on international public support for development, including for energy investments; while for emerging economies, the share of private investment is much larger.

substantially more generous than market loans, either through below-market interest rates, grace periods or a combination of both.

- **National public finance sources:** Over the longer term, domestic revenue mobilisation — in particular through better tax policies and strengthening of tax administration — is the most viable financing basis for development expenditures, including those for sustainable energy.

- **Investment grants:** Investment grants, or interest rate subsidies, are widely used in the energy sector, complementing concessional loans. Investment grants could be provided by host governments, bilateral/multilateral development organisations and the EU.

- **Private sector finance:** Governments are increasingly looking to the private sector to provide the incremental investments required in the energy sector. But there remain substantial obstacles to drawing in the private sector in infrastructure. Lack of political commitment, slow decision-making processes, etc., are all factors that keep the private sector from taking a more active role. Even where political commitment exists, substantial risks remain for the private sector, resulting in a wait-and-see attitude.

- **Equity:** An equity investment generally refers to the buying and holding of shares of stock in a company, project vehicle or fund. For example, in renewable energy projects, financiers could invest in the company developing the project and take a share in the sales of the project, or in the company operating the project.

- **Guarantees and other risk-sharing instruments:** Guarantees aim to mobilise finance for projects, e.g. as a first-loss guarantee to an entrusted entity to cover a portfolio of loans (or mezzanine finance or equity) concerned for certain types of infrastructure projects. Guarantees and risk-sharing products are often more effective when combined with technical assistance to support the financial institution's expansion into new business oriented to micro, small and medium-sized enterprises (MSMEs), specific loans such as loans for energy efficiency and renewable energy, or in fragile political and economic contexts. Guarantees could cover risks relevant to a certain sector, such as to cover feed-in tariffs and PPAs with a state or an SOE, lack of sun or wind, geothermal risk, hydrological and geological risk; they could also be technology guarantees, covering the performance risk of new and innovative technologies (EUBEC Technical Group 4, 2013).

- **Project bonds:** Project bonds aim to widen the source of financing, mainly from institutional investors, for commercially viable energy infrastructure projects. By providing a mezzanine tranche or a contingent credit line that can be called upon if the revenues generated by the project are insufficient to service the debt, project bonds can increase credit ratings to the levels needed to attract conservative investors such as pension funds. As energy projects contribute, in most cases, to climate mitigation, climate impact bonds also apply to the energy sector.

- **Tax relief:** Individual governments may offer tax incentives to projects that serve public benefits. These incentives include tax credits, tax holidays and duty exemption[6]. The various project components are subject to different tax regimes, with tax exemptions not applicable to EU grants.

- **Carbon markets and mechanisms:** Most energy projects contribute to mitigation of climate change. Initiatives are ongoing to establish international carbon markets and carbon mechanisms that could create a market for GHG emissions reductions that are additional to business-as-usual. This development could lead to additional revenue streams for energy projects in developing countries.

[6] See e.g. Case Study 2 in the Annex on the Ouarzazate Solar Plant, where the tax incentives provided by Morocco are an essential component of the business case.

CHAPTER 3

Types of blending projects

3.1 Sector blending portfolio

The energy sector is covered by all blending facilities. In the 2007–2013 portfolio, 100 projects in the energy sector were supported/approved. Key features of the main project types supported are noted in Table 3.1 and summarised below.

POWER TRANSMISSION AND DISTRIBUTION

Projects in power transmission and distribution comprise a large share of the EU blending portfolio in terms of both number of projects and share of grant volume. These projects aim at improving the reliability of the electricity supply, increasing the share of renewable energy and improving access to sustainable energy. These projects comprise:

- upgrading/new construction of high-voltage (internal or cross-border) power transmission lines, including new lines connecting upgraded hydropower plants to the grid;
- extension/new construction of high-voltage substations;
- distribution systems for (rural) electrification.

GRID-CONNECTED RENEWABLE ELECTRICITY PRODUCTION

About one-third of all projects supported by the EU in the energy sector address renewable electricity production — i.e. renewable power plants providing electricity to the grid. The majority of these projects entail rehabilitation of hydropower plants in Africa. Other

TABLE 3.1 Energy sector portfolio

TYPE	PROJECT/CLIENT	# PROJECTS	GRANT SIZE
		% SHARE	
Power transmission and distribution	Power infrastructure/transmission new construction and rehabilitation, including rural electrification	45	47
Grid-connected renewable electricity production	Hydropower plant rehabilitation	20	12
	Wind plants	4	8
	Solar electricity production (thermal and photovoltaic)	6	11
	Other (including geothermal)	2	5
End-use energy efficiency and renewable energy through intermediate financing facilities	Renewable energy, energy efficiency in end-use sectors (industry, SMEs, residential)	22	16
Other	Gas infrastructure, clean cooking programme, etc.	1	1

projects include wind parks, solar thermal or photovoltaic power production and geothermal power.

END-USE ENERGY EFFICIENCY AND RENEWABLE ENERGY THROUGH INTERMEDIATE FINANCING FACILITIES

In supporting smaller-scale energy efficiency and renewable energy investments, EU support is channelled through the following types of intermediate financing facilities.

- **Credit facilities:** EU support includes either technical assistance for project preparation and investment grants complementing the loans, or guarantees complementing the (re-financing) credit line provided by financial institutions to local financial institutions[1].
- **Investment funds:** EU support includes risk capital as well as technical assistance.

These facilities target specific sectors (industry, SMEs, residential) and/or a specific category of investment. Some facilities specifically target the private sector; some are regional and cover several partner countries.

The credit facilities are managed by local public or private financial institutions. The main aim is to provide affordable access to finance for smaller-scale investments. An additional aim is to build awareness and capacity among local financial institutions on financing energy efficiency and renewable energy projects. The investment funds are managed by dedicated fund managers, often with a combination of public and private stakeholders.

3.2 Uses of EU grants to support energy projects

The blending facilities apply three main types of financial instruments: technical assistance; grants (investment grants or interest rate subsidies); and risk mitigation capital, including risk capital and guarantees.

[1] See e.g. Case Study 3 in the Annex.

TECHNICAL ASSISTANCE

Technical assistance is a widely used instrument, supporting energy projects in all phases of project identification, preparation and implementation; see Box 3.1 for practical examples. Types of support provided through technical assistance are listed below.

- Support to the **early stage** of project origination and development, when no other source of finance is available. In this phase, investment projects are either not yet identified or are at a very early stage of development.
- **International expertise** is needed to carry out assignments which are large and complex and require expertise in state-of-the-art engineering for project preparation and implementation. Such expertise is frequently needed in energy projects.
- Project owners/beneficiaries cannot **mobilise financing upfront** for technical assistance, or it is too expensive and cannot be included in the loan.

The following types of technical assistance could be provided, listed in order of the project cycle:

- master plan/framework for renewable energy or e.g. solar energy, which could form the basis for future investments;

BOX 3.1 Practical examples of technical assistance

- Dominica intends to extend its geothermal capacity for domestic supply and export of electricity. The EU supports further development of the geothermal power with a grant for technical assistance for planning and feasibility studies and capacity building/training.
- The Muchinga hydropower plant in Zambia will provide new hydropower capacity for the Southern Africa Power Pool. The EU grant has been used for geotechnical, hydrological and technical work; marketing studies; and the project's contractual and procurement work.

- feasibility studies;
- specific studies and assessments necessary for project assessment and design, such as technical studies, social and environmental impact assessments, energy audits or climate change vulnerability assessments;
- support to project implementation (preparation of tender documentation, procurement support, etc.);
- management and monitoring support to credit programmes, and capacity building of partner financial institutions.

INVESTMENT GRANTS OR INTEREST RATE SUBSIDIES

Investment grants or interest rate subsidies could be applied for the following purposes:

- supporting higher-risk activities for which access to finance is limited, such as energy savings, energy efficiency, increasing renewable forms of energy production and broadening access to energy services;
- improving the financing conditions of the loan package and reducing the financial burden (co-financing) to be assumed by national governments, in cases where they provide substantial public co-financing;
- reducing the additional investment related to the energy efficiency measures taken by a client (borrower);
- reducing the overall cost of producing electricity from renewable energy as compared to competing with conventional sources;
- providing for carbon-linked performance-based incentive payments to participating SMEs in a renewable energy or energy efficiency financing scheme.

In these cases, projects would not bankable without the EU grant. The grant therefore leverages the long-term loan financing provided by financial institutions; see Box 3.2 for practical examples.

BOX 3.2 Practical examples of investment grants

- The development and construction of the Akarit concentrated solar power plant in Tunisia was supported by the EU with an investment grant. The grant was needed because the national government could not close the gap between the bankable investment volume and the required investment for this relatively expensive innovative technology.
- The Sustainable Electrification and Renewable Energy Programme in Nicaragua supports government efforts to reduce poverty by promoting access to an efficient and sustainable electricity service to an important portion of the population. An EU investment grant will support strengthening of the transmission system in rural areas and its connection to renewable generation.

RISK CAPITAL INCLUDING GUARANTEES AND EQUITY

Risk capital can consist of **equity**, on an equal (*pari passu*) or subordinated basis (junior or first loss, which absorbs first losses up to a certain percentage), or **guarantees**. Grants in the form of subordinated (in particular first-loss) equity are the risk cushion of a fund with different risk classes; they are necessary to mobilise additional capital from public sources and, ideally, from the private sector. EU grants contribute to the leveraging of additional funds and increase the total volume of funds available for financing energy efficiency and renewable energy measures. The use of risk capital (including guarantees) in blending is still in its early phases, but is growing: see Box 3.3 for practical examples.

BOX 3.3 Practical examples of risk capital

- The Africa Sustainable Energy Facility aims to increase the role of the private sector in financing renewable energy and energy efficiency activities. It assists in the financing of such projects through local financial intermediaries in order to enhance their role in the financing of smaller renewable energy and energy efficiency projects. The EU-Africa Sustainable Energy Facility provided a grant to be used as a first-loss guarantee.
- Through the Caucasus Energy Efficiency Programme, the European Bank for Reconstruction and Development (EBRD) extends credit lines to local partner financial institutions in the region which then on-lend them to their clients. These clients — small business, corporate and residential borrowers — use this financing to invest in energy-efficient equipment and services. The EU has provided risk capital to the programme.

The EU has become a shareholder in a number of funds aimed at supporting renewable energy and clean technology projects. These include a fund of funds called the Global Energy Efficiency and Renewable Fund, designed to invest equity in a number of private equity funds investing in renewable energy and clean technology. In these cases, the EU has invested into subordinated equity, which absorbs initial losses from bad loans and has very low upside potential. This investment provides a buffer (and more attractive returns than does the underlying business) to mezzanine investors (which will typically provide a second layer of buffer for a higher return) and, potentially, private sector and other investors funding the senior equity or lending money to the funds.

CHAPTER 4

Key issues in project development

This chapter discusses specific issues that need to be addressed in developing a project in the energy sector and in assessing the project's potential for blended finance and EU support:

- ensuring the development impact of the project;
- avoiding market distortions, assuming that the supported project could compete with both traditional and other sustainable energy development;
- considering climate aspects in project development and assessment, as most energy projects have a large impact on GHG emissions and some — e.g. hydropower — are vulnerable to climate change impacts, requiring ex ante vulnerability assessments;
- ensuring the sustainability of energy projects and the intended results.

4.1 Ensuring development impact

Development impact refers to the long-term effects produced by a blended project. It is the broader, longer-term change which a blended project can bring about directly or indirectly. Projects in the energy sector supported by blending facilities should address at least several of these issues to secure the necessary development impact. One key impact expected is on poverty alleviation. The project should directly or indirectly promote substantial social returns or global public goods and have a poverty alleviation impact.

In project identification and design, the development impact is explicitly considered. The project application form for EU support requires extensive information on the expected impact of the proposed project[1].

Table 4.1 provides an overview of impact indicators for energy sector projects as well as cross-sector indicators. In addition to the sector-specific indicators, development impact indicators could be used. They may not apply to all blended projects in the energy sector.

4.2 Avoiding market distortions

Market distortions occur when the support given to an energy project (grants, concessional finance) provides the beneficiary with a competitive advantage in the local market. An example of such a distortion would be where a wind project supported by the EU is competing for a specific licence with wind developers which have had to attract capital at commercial rates and did not receive any grants, e.g. for feasibility studies (CIF, 2011).

JUSTIFICATION FOR SUBSIDIES

Justification of subsidies in sustainable energy investment plans could include the following.

- The most solid justification for subsidising renewable energy above current market price is **support for nascent industry** with the potential for a significant cost reduction in the future (learning effect).

[1] See annex 3 of the *Guidelines on EU blending operations* (guidance notes to the project application form).

TABLE 4.1 Impact indicators for the energy sector

INDICATOR	UNIT	DEFINITION
OUTPUT INDICATORS		
Transmission and distribution lines installed or upgraded	Kilometres	The indicator covers power transmission and distribution lines. It is the measure of the ground distance traversed in kilometres.
New connections to electricity	Number	Number of new connections to the grid. Only new connections resulting from a project are counted; those already connected to the grid and receiving improved services through a project are not counted.
Additional capacity from conventional electricity production	Megawatts	Gross generating capacity of a power generation project from conventional energy sources. A project may involve construction of a new power plant or refurbishment of an existing plant.
Additional capacity from renewable energy sources	Megawatts	Gross generating capacity of a power generation project from renewable energy sources. A project may involve construction of a new power plant or refurbishment of an existing plant.
OUTCOME INDICATORS		
Population benefiting from electricity production	Number of households	The number of households which are estimated to benefit from new electricity supply from the project.
Power production	Gigawatt hour/year	Total net annual average electricity generated by project, independent of its maximum capacity.
Energy efficiency	Gigawatt hour/year	Energy savings as a result of the project as compared to no project or the most likely alternative (e.g. loss reduction in generation, distribution, etc.).
Power production from renewable sources	Gigawatt hour/year	Total net annual average electricity generated by renewable energy project, independent of its maximum capacity.
CROSS-SECTOR INDICATORS		
Total number of beneficiaries		Estimated number of people with improved access to sustainable energy services.
Number of beneficiaries living below the poverty line (i.e. whose living conditions are improved by the project)		This indicator is intended to demonstrate the project's contribution to poverty alleviation. Its aim is to report on the poverty level of beneficiaries, and it therefore reflects the socioeconomic benefits achieved through blending.
Relative (net) GHG emissions impact		The GHG emissions impact a project is expected to achieve on an annual basis: the average amount of GHG emissions induced, avoided, reduced or sequestered per year by a project during its lifetime, or alternatively for a representative year once it is completed and operating at normal capacity. To estimate the GHG emissions impact, the financial institution calculates the expected change in GHG emissions relative to a baseline scenario.
Direct employment — construction phase		Number of full-time-equivalent construction workers employed for the construction of the company's or project's hard assets during the construction phase.
Direct employment — operations and maintenance		Number of full-time-equivalent employees as per the local definition working for the client company or project during the project's operations phase.

- Subsidies can also be instrumental for the **development of innovative business** lines and financial products by financial institutions, especially in riskier environments.

- Subsidies could be **temporary substitutes for policy failures** (e.g. failure to price the full cost of conventional energy), but preferably subsidies are linked to concrete steps to phase out existing countervailing subsidies to fossil fuels.

- Subsidies can support **less mature technologies** on the grounds of development of the domestic manufacturing or assembly base.

AVOIDING MARKET DISTORTIONS

Market distortions in the energy sector can be avoided in the following ways, depending on the type of project and market characteristics:

- Subsidies for technical assistance and capacity building should support sustainable policy and market reforms and the creation of an enabling institutional framework for commercially driven renewable investments.

- Subsidies should be precisely targeted at the specific market failure or barrier which cannot be removed by market-conforming interventions alone (e.g. removal of fossil fuel subsidies, providing information, reducing investment risk).

- Because the main focus is on mature sustainable energy technologies, subsidies for less mature/more costly technologies should be carefully assessed on a case-by-case basis, including the impact on consumer prices and fiscal space.

- Subsidies should be focused on independent private producers in a competitive, non-discriminatory manner.

- The wider economic risks of subsidising renewable energy should be considered, e.g. impact on grid stability, affordability to consumers, and fiscal capacity to provide investment and operational subsidies in order to mitigate regulatory risks associated with unsustainable support measures.

The long-term aim is that the full running cost of generation, including the costs of support for renewable energy (net of donor grants) and relevant externalities, should be borne by the final consumers.

4.3 Climate aspects

CLIMATE CHANGE MAINSTREAMING IN THE BLENDING FACILITIES

In the blending facilities, EU climate change and development policies and EU objectives in climate finance come together and are integrated. A climate change window for all blending facilities was announced in 2010. The overall aim of these windows is to improve the tracking and overall visibility of climate actions within the facilities. They also aim to improve project design, so that climate change considerations are incorporated in strategic infrastructure areas such as the transport, environment and energy sectors.

The provision of blended finance through blending facilities has driven additional EU grant funds into climate-related projects — the majority in the energy sector — and has strengthened the EU's role in the relevant policy dialogue and increased visibility of the EU contribution to climate finance. A large demand and many opportunities exist for blended finance to support climate-relevant projects.

The blending facilities have increasingly contributed to EU climate finance. In the aggregate, the cumulative facilities (taken as a whole) are already a significant player in the climate finance landscape in terms of the overall volume of climate-relevant investment leveraged by the EU contribution. The facilities finance, and sometimes co-finance, climate-relevant projects similar to those supported by dedicated climate finance funds.

CONTRIBUTION OF ENERGY PROJECTS TO CLIMATE CHANGE MITIGATION

The energy sector is highly relevant in achieving climate change objectives and in supporting the transition to a low-carbon economy. Increasing the share of renewable energy to replace fossil fuel energy production is an important measure in reducing GHG

emissions. The same applies to increasing energy efficiency, both in energy production, transmission and distribution, as well as in end-use sectors.

IMPROVING CLIMATE RESILIENCE OF ENERGY PROJECTS

The performance of energy projects can be vulnerable to climate change. Changes in precipitation can influence water resources for hydropower; changes in climate can influence wind and solar projects. To this end, for potentially vulnerable energy projects, climate vulnerability assessments could be carried out to improve project resilience to climate change impacts[2].

4.4 Sustainability of projects and results

Sustainability should be addressed at two levels: sustainability of the project, and sustainability of the project results contributing to development objectives. For example, the EU supports a wind power facility with the objective of decreasing market barriers to sustainable energy. After 10 years, the supported wind park is still being operated successfully, although no additional investments in wind power have been made in the country concerned. In this case, the project itself has proven sustainable; the project results (in terms of decreased market barriers and increased share of renewable energy), however, have not.

SUSTAINABILITY OF THE PROJECT

The following questions could be asked in assessing project sustainability.

- Under which conditions will the project be sustainable when the grant support expires? Sustainability considerations and criteria differ for project types and type of financial support provided by the blending facilities (technical assistance, investment grant, risk mitigation). For example, in case of grid-connected renewable electricity production, long-term certainty in feed-in tariffs is key.
- Which other incentives are necessary to enhance the sustainability of the project?
- In cases of technical assistance for project origination and market studies, how does the project lead to investments?
- How are the environmental and social aspects considered in the project?
- How is the maintenance of the project ensured during project implementation and operation (if relevant)?

SUSTAINABILITY OF PROJECT RESULTS SUPPORTING DEVELOPMENT IMPACTS

EU support to investment projects aim for development impact that is broader and longer term than that of the investment project itself; this is referred to as sustainability of project results. It is addressed by the following questions, among others.

- Does the grant funding help support further or parallel activities to ensure that benefits continue beyond the lifetime of the project?
- Does the project lead to follow-up investments, and if so, under what conditions?
- Could the project results be transferred to other sectors or geographical areas?
- Does the grant funding contribute to structural reforms and/or support changes to legislation, regulation or policy?
- Does the grant finance enable demonstration effects for other participants in the marketplace?

[2] More information on appraisal of climate aspects can be found in the *Guidelines on EU blending operations*.

CHAPTER 5

Risks and risk mitigation

This chapter describes the various risks associated with investments in the energy sector; these are detailed below.

- **Political/country risk:** Political risks arise from operating in a foreign country. For larger infrastructure projects, in particular, national governments play a large role. The regional (multi-country) character of large infrastructure projects also contributes to political risks. These projects therefore often require long-term (international) agreements, addressing political commitments[1].

- **Policy and regulatory risk:** The risk of a change in public policy, e.g. a subsidy policy, can affect plant profitability. Such risks could be addressed by long-term agreements, such as power purchase agreements, and sovereign guarantees for international loans by the governments concerned, among other methods.

- **Partner risk:** Many local partners (public and private) play a role in developing and implementing energy projects. Often the business and activity is new to these partners. The technical assistance provided frequently plays an important role in securing local partner commitment and capacity. For instance, small-scale credit facilities require motivated and competent local financial institutions[2].

- **Business/strategic risk:** This refers to risk affecting the viability of the business — e.g. the risk of technological obsolescence. Renewable energy projects sometimes apply a technology which is innovative in the country concerned. The extensive project and business development experience that financial institutions bring, as well as the technical assistance support provided, helps manage these risks.

- **Financial risk:** Financial risk includes, among others, access to capital and interest rate/exchange rate changes. Reducing these risks is a main objective of EU support to blended projects, e.g. by providing guarantees.

- **Construction risk:** Construction risk is related to the timing, costs and performance of the project. These risks could be managed through insurance, warranties and the engineering/procurement/construction contracts.

- **Building and testing risk:** This type of risk refers to property damage or third-party liability arising from mishaps during building or testing of new plants. These risks could be addressed through insurance.

- **Operational (technical) risk:** Unplanned plant closure — e.g. owing to unavailability of resources, plant damage or component failure — is an operational risk. Such risks could be addressed through insurance and performance warranties by the plant operator/sponsor.

- **Market risk:** Market risk refers to an increase in the price of commodities and other inputs, such as fuel, or a decrease in the price of the electricity

[1] See e.g. Case Study 1 in the Annex on the Côte d'Ivoire, Liberia, Sierra Leone and Guinea Interconnection Project. This project is exposed to political risk, as the political situation in these countries is still unstable.

[2] See e.g. Case Study 3 in the Annex.

sold. These risks can partly be addressed by longer-term supply and purchase agreements.

- **Demand risk:** A specific risk for credit lines/equity funds is a demand for credit or small-scale investments in energy efficiency and renewable energy that is lower than expected. The target group could be unfamiliar with the benefits of these investments. Also, in some sectors, decision-making can be complex (e.g. in multi apartment buildings. In addition, these investments are small scale, and transaction costs could be relatively high. Demand risk could be mitigated by ex ante market assessments, information and awareness campaigns, and co-financing of energy audits and feasibility studies.

- **Environmental risk, including climate change:** This could refer to the risk of damage to the environment caused by the power plant and the liability arising from such damage, and includes vulnerability to weather-related impacts, including those caused by climate change. Examples of environmental risk include risk of a fall in the volume of electricity produced due to a lack of wind or sunshine, or the effect of decreased water levels on hydropower plants. Environmental impact assessments, including vulnerability assessments, serve to identify these risks and mitigation options.

- **Social risk:** Large-scale infrastructure projects in particular could have negative social impacts, e.g. displacement. Social impact assessments should identify these risks.

ANNEX

Case studies

The following case studies illustrate the scope of projects in the energy sector that could be supported by the blending facilities. They show how the EU contribution could be designed to meet the specific needs of the project and development objectives in the sector.

- **Côte d'Ivoire, Liberia, Sierra Leone and Guinea (CLSG) Interconnection Project, support by the EU-Africa Infrastructure Trust Fund (ITF).** This project integrates regional power transmission with rural electrification in Sierra Leone.

- **Ouarzazate Solar Plant, Morocco, support by Neighbourhood Investment Facility (NIF) South.** This project promotes market opening for large-scale grid-connected renewable energy technology with high potential, serving the energy-related development objectives of Morocco and the EU.

- **Energy Efficiency and Renewable Energy Programme for SMEs in Central America, support by Latin America Investment Fund (LAIF).** This project facilitates financing to SMEs for investments in energy efficiency and renewable energy.

Case Study 1: CLSG Interconnection Project

BACKGROUND

Côte d'Ivoire, Liberia, Sierra Leone and Guinea have been affected by civil war or civil disorder, resulting in the destruction of infrastructure and a severely limited — and in some cases even non-existent — public electricity service. The aim of the project is to interconnect the four countries into the West African Power Pool regional electricity market. By enabling power exchanges between the four countries and providing a reliable electricity supply, the project will help foster economic growth and thus improve the standard of living, which is essential for continued stability in these countries.

The rural electrification project in Sierra Leone is an integral part of the overall CLSG project and will provide social benefits to the population living close to the power transmission line. It is estimated that roughly 370 000 people in over 1 000 local communities will benefit from the rural electrification component. Also schools, health centres and administrative buildings will obtain access to electricity. The project will have an overall positive effect on poverty reduction and will include the following socioeconomic benefits: improved health, better water supply, better learning conditions for children and empowerment of women[1].

PROJECT DESCRIPTION

The project consists of two components.

- Construction of approximately 1 350 kilometres of high-voltage transmission lines through Côte d'Ivoire, Liberia, Sierra Leone and Guinea, as well as the extension of existing or the construction of new high-voltage substations, and the electrification of rural communities along the line route

[1] CLSG Power Interconnector Project Fiche.

- Construction of direct connections from the five substations in Sierra Leone as well as use of shield wire systems and low-cost solar energy for remote and small villages that would otherwise be uneconomical to connect to the grid

The project is currently in the planning phase. Environmental and social impact assessments have been carried out. Construction is expected in 2014–2017 (see Figure A.1).

OBJECTIVES AND DEVELOPMENT GOALS

The project objectives are to:

- facilitate power exchanges among the countries in the West African sub-region and encourage a regional power market;
- promote hydropower capacity in the region by enabling implementation of hydropower plants in areas with unfulfiled generation potential to replace inefficient fossil fuel production elsewhere;
- improve reliability of the electricity supply;
- increase access to electricity in rural areas.

FIGURE A.1 Proposed transmission line route

Source: Consolidated English Executive Summary on the CLSG Interconnection Project.

The development objectives are to:

- foster economic development in the region;
- improve the standard of living and poverty reduction through improved access to reliable energy services, which is essential for continued stability in these countries;
- mitigate climate change by promoting renewable energy (hydropower).

ACTORS AND STAKEHOLDERS

- The West African Power Pool, established as a mechanism and institutional framework for integrating the national power systems of Economic Community of West African States member countries
- Authorised ministries and state-owned grid company companies in the four countries
- A special-purpose company (SPC), to be contractually and legally responsible for project implementation, established by the four state-owned power utilities in accordance with an international treaty to ensure construction, ownership, exploitation and development of power transport infrastructure for the CLSG project

FINANCIAL PLAN AND ADDITIONALLY OF EU CONTRIBUTION[2]

The CLSG Interconnection Project is jointly financed by the World Bank/International Development Association, the African Development Bank (AfDB), the KfW Development Bank and the European Investment Bank (EIB) as lead financial institutions. All loans are concessional sovereign loans, thereby shifting the financial risk of the project to the governments that will ultimately be in charge of repaying these loans (see Table A.1).

The EU contribution from the ITF (approved 19 September 2012) consists of three main components.

[2] CLSG Power Interconnector Project Fiche.

TABLE A.1 Financial plan including EU contribution for the CLSG Interconnection Project

FINANCIAL INSTITUTION	AMOUNT (EUR MILLION)	SHARE (%)	DESCRIPTION
EIB	75	19	Loan
KfW	31	8	Grant
AfDB	149	37	Loan and grant
World Bank/International Development Association	104	26	Loan (zero interest)
CLSG utilities	16	4	
EU contribution (ITF)	27.5	7	EUR 12.5 million interest rate subsidy + EUR 10 million direct grant + EUR 5 million technical assistance grant
Total finance	402.5		

- Technical assistance (total of EUR 5 million) is provided for pre-investment studies and project preparation (including tender preparation).

- A grant of EUR 12.5 million is provided as an interest rate subsidy for investment in the transmission line and substations. This subsidy reduces the debt service payable on the financier loans, without which the project's financial benefit would have been much smaller and the project possibly not have been viable. The subsidy also allows the Government of Sierra Leone to borrow on concessional terms (beyond 35 % of grant element).

- A direct grant of EUR 10 million is provided as an investment grant for rural electrification in Sierra Leone. The grant will fund the management, physical implementation, meters and supply connections for both households and government/social facilities in 26 identified communities in Sierra Leone.

The upfront subsidy for an amount of up to EUR 12.5 million will be used to make the EIB loan to Sierra Leone more concessional. During the first three years following the end of the grace period of the EIB loan, the grant will be used to cover repayments of the loan that will be due from the SPC under the EIB loan. This ITF support will extend the grace period of the EIB loan to 10 years in line with the terms of the loans of other co-financiers and help limit the financial risk of the project in the early years of operation by reducing the costs the SPC will have to face at a time when trading through the line is expected to pick up gradually.

The EUR 10 million grant from the ITF will, in particular, fund the physical implementation of the distribution network and provide meters and supply connections for the first customers. The grant will cover a shortfall in funding for rural electrification in Sierra Leone; by so doing, it will ensure that all the countries will benefit equally from the CLSG project.

CLIMATE CHANGE ASPECTS

Construction of power transmission and distribution systems does not directly influence GHG emissions. However, the project is expected to have a positive indirect impact.

- Improved access to electricity and rural electrification will increase electricity consumption, leading to an increase of GHG emissions from central electricity production. However, the primary development objective is to provide essential energy services to the population.

- To some extent, the improved electricity supply will replace other more carbon-intensive energy sources used locally (e.g. fuels for lighting).

- The project will promote future hydropower production, leading to a reduction of GHG emissions, replacing fossil fuels.

RISKS AND RISK MITIGATION

The project involves four fragile post-conflict countries, resulting in significant political risk. A treaty between the four states will therefore be signed; and an international project agreement will be signed between the SPC and the four states, listing the obligations of all parties.

Significant risks exist in the early years due to low utilisation of the line, and in setting up and maintaining the financial stability of the SPC transmission company. A financial model has been prepared by the World Bank for the project, with financial forecasts for the SPC, showing the project's feasibility. The EU contribution aims at securing financial stability in the initial phase.

SUSTAINABILITY

The sustainability of the project results is highly dependent on the financial stability of the transmission company. The development impact (economic development in the region, poverty reduction, climate mitigation) will be achieved only if the planned level of trading is realised, the project results on electrification are achieved, and an increase in hydropower in the region occurs. These also depend on economic and political factors outside the scope of the project itself.

INFORMATION SOURCES

- Grant application form submitted to ITF presented to Executive Meeting 29/9/2012
- EIB, CLSG Power Interconnector Project Fiche, December 2013
- ITF website, www.eu-africa-infrastructure-tf.net
- EU-Africa ITF Annual Report 2012
- West African Power Pool, Consolidated English Executive Summary on the CLSG Interconnection Project Environmental and Social Impact Assessments, 2011, http://www.eib.org/attachments/pipeline/20090712_esia_en.pdf

Case Study 2: Ouarzazate Solar Plant, Morocco

BACKGROUND

Morocco's electricity demand is increasing rapidly as a result of economic development and a growing population. Power shortages and a desire to control public spending have led the Moroccan government to make more use of the private sector to meet the country's energy needs.

Solar power in Africa has the potential to provide all of the world's energy, by using only a small portion of the Sahara Desert. Morocco has one of the highest rates of solar insolation — about 3 000 hours per year of sunshine. Nevertheless, the rate of investment in solar power in Africa has been slow, due to a lack of financing.

Morocco has therefore launched the Moroccan Solar Plan as part of the Mediterranean Solar Plan. The latter is one of the EU's priority projects for the Mediterranean, and was launched by the Euro-Mediterranean heads of state and government during the Paris Summit of 2008. The aim of the Moroccan Solar Plan is to construct 2 000 megawatts of solar generation capacity by 2020, costing an estimated USD 9 billion in total. Morocco is the only African country with a power cable link to Europe, allowing future export of solar power to the EU.

PROJECT DESCRIPTION

The Moroccan Solar Plan identifies different locations; the first to be developed is near the city of Ouarzazate. The EU supports the following three phases of the project (a total of 560 megawatts).

- **Noor I:** First phase of the project; development of the first unit at this location, using the concentrated solar parabolic trough technology of 160 megawatts

- **Noor II:** Second phase of the project, also using concentrated solar parabolic trough technology of 150–200 megawatts

- **Noor III:** Thermal solar power plant with a capacity between 100 and 150 megawatts using concentrated solar power tower technology (with storage)

OBJECTIVES AND DEVELOPMENT GOALS

The project objectives are to:

- build a renewable energy production facility that will reduce both dependence on imported fossil fuels and their negative impacts on the natural environment (including reducing GHG emissions);

- secure Morocco's national electricity supply by diversifying sources of energy;

- develop the solar industry in Morocco, including job creation;

- support further development of solar power on a large scale in the Middle East and North Africa region;

- create a strong precedent for the use of the PPP business model to develop concentrated solar power plants in Morocco and elsewhere.

The EU pursues the following specific development objectives in the energy sector, to which the project contributes. The support is intended to foster implementation of the full Moroccan Solar Plan (2 000 megawatts by 2020). The development impact is therefore assessed for the full solar plan as follows.

- **Achieving universal access to modern and sustainable energy service:** The new renewable energy production would significantly increase the reliability of Morocco's electricity supply to the benefit of the economy and individual citizens.

- **Increasing the share of renewable energy in the global mix:** The 2 000 megawatts of solar power would increase the share of renewable energy in Morocco significantly.

- **Mitigate climate change:** This will be accomplished by reducing relative GHG emissions.

In addition, it is envisaged that the solar energy produced in Morocco would be partly exported to the EU, contributing to the EU's internal energy objectives including security of supply.

The social impact of the project is generally considered positive as it is creating temporary employment, stimulating local investment and supporting economic growth. With the implementation of measures identified in the social and environmental impact assessment, overall residual environmental impacts of the project are expected to be minor and/or acceptable.

ACTORS AND STAKEHOLDERS

The EIB and the KfW Development Bank are the lead IFIs for the three specific project phases supported by the EU, with the involvement of other financiers. The Moroccan Agency for Solar Energy (MASEN) is a public entity entrusted with developing and implementing the Moroccan Plan for Solar Energy. The state-owned Office National de l'Électricité, the grid operator, is another key partner, as the electricity will be supplied to the grid. A private partner will be responsible for construction and operation of the plant.

A special-purpose vehicle has been established for the project to structure the PPP. The majority of its shares belong to the winner(s) of the tender, i.e. private companies/consortium, which is responsible for the construction and operation of the power plant. This structure enables transfer of project implementation and operational risk from MASEN to the SPC. MASEN and other public Moroccan institutions could become minority stakeholders of the SPC.

FINANCIAL PLAN AND ADDITIONALLY OF EU CONTRIBUTION

Overall loan financing for project implementation of the Ouarzazate solar complex is about EUR 2 billion. Loans granted by European financial institutions will be secured by guarantees issued by the Kingdom of Morocco. The total EU contribution to these three

phases is one of the largest in the current portfolio of the blending facilities (see Figure A.2 and Table A.2).

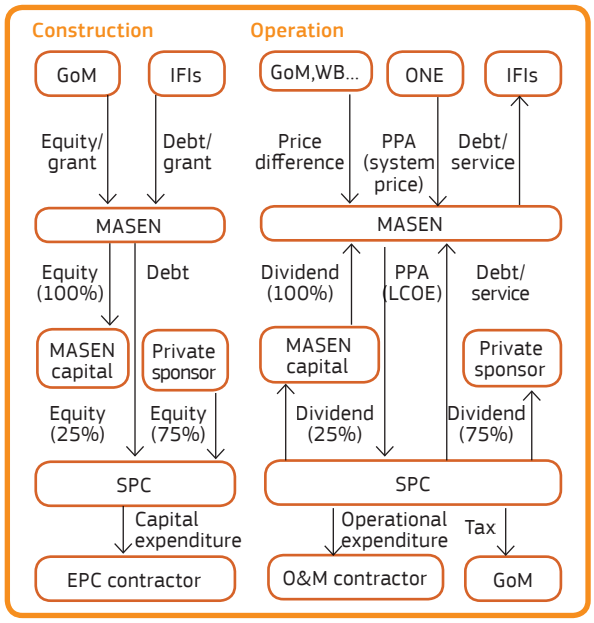
The NIF contribution consists of an investment grant and will co-finance investments needed for preparation of the site and construction of the solar plant. The investment grant will do the following.

- **Help decrease the cost of electricity produced by the solar plant(s).** The price of electricity produced by thermal solar power plants is for the moment significantly higher than the production costs of conventional power plants. The grant will help offset the higher cost of electricity produced by the Ouarzazate Project and mitigate the impact on electricity prices.

- **Soften the financing conditions of the loan package provided by the IFIs.** In this way, the grant will reduce the financial costs to be borne by the Government of Morocco.

- **Support the first phase of implementation of the Morocco Solar Plan.** Concentrated solar power has been commercially employed in other countries, such as Spain and the United States, but its employment in Morocco is new.

FIGURE A.2 Organisation of project implementation and finance during construction and operation



Source: Project information submitted for provisional approval. Meeting 7 May 2014. NIF_S/50.

- **Help in attracting finance for follow-up investments required for the Morocco Solar Plan.** Successful development and operation of the first phase of the Ouarzazate project will

TABLE A.2 Financial plan including EU contribution for Ouarzazate Solar Plant

FINANCIAL INSTITUTION/DONOR	NOOR 1	NOOR 2	NOOR 3	DESCRIPTION
	AMOUNT (MILLION EUR)			
Lead financial institution	250 (EIB)	330 (KfW)	150 (EIB)	Loan (concessional)
Other financial institutions: EIB, AFD, KfW, AfDB, World Bank	350	250	374	Loan (concessional)
Clean Technology Fund	150			Grant
NIF grant	30	40	50	Investment grant
Beneficiary	27	22	11	
Other public financiers		210	140	Loan/grant
Other private financiers		148	125	Loan/grant
Total investment	807	1 000	850	

Note: AFD = Agence Française de Développement. NOOR 2: Tentative budget; project information submitted for final approval. Meeting 7 May 2014. NIF_S/46. NOOR 3: Tentative budget. Project information submitted for provisional approval. Meeting 7 May 2014. NIF_S/50. Totals for both phases are indicative.

increase confidence and reduce risks perceived by potential financiers.

- **Support strengthening of national institutional, policy and regulatory conditions for implementation of the full solar plan.**

CLIMATE CHANGE ASPECTS

The project is in line with Morocco's and the EU's strategy to promote solar power, which should also contribute to climate change objectives. The project will avoid the construction of new fossil fuel power production capacity. It will also replace the peak power production of existing diesel- and gas-fired power stations. The project will thus avoid GHG emissions by producing electricity from a renewable solar resource. Both the project finance and the EU contribution to the project is marked with Rio Marker for Mitigation 2 (100% climate finance).

Considering its vulnerability to climate change, the project will rely on water availability in order to produce electricity, i.e. for its cooling needs. Water availability may be affected by climate change. A dry cooling and water recycling system will be used.

RISKS AND RISK MITIGATION

The main risks associated with the Ouarzazate project are as follows.

- **Political risk:**. Despite its very strong commitment to the Moroccan Solar Plan so far, the risk is that the Government of Morocco may discontinue its support for renewable energy and, in particular, not provide the necessary subsidies for the project. The financing IFIs will therefore require an agreement between the Government of Morocco and MASEN regarding the government's requisite support. Furthermore, the government will provide state guarantees for the financial institution loans.

- **Economic risk:** The Moroccan Solar Plan might not have the expected positive pull effect on development of a national solar industry — and therefore might not result in the expected long-term positive employment impact. A decrease in fossil fuel prices could deteriorate the economic situation/assessment of the project. MASEN is therefore encouraging and assisting Moroccan companies in the solar sector.

- **Remuneration risk:** The project will enjoy a 25-year PPA with the promoter, which will sell the electricity to the Office National de l'Électricité, through another PPA, although at a lower price. If economic growth and employment in Morocco are not forthcoming over the medium to long term, high electricity prices could take on a political dimension. The preliminary terms of the PPAs and of the government support agreement should adequately mitigate the off-take risk.

- **Technological risk:** Technological risk is associated with the large-scale application of solar concentrated power technology. The risk is mitigated by the financial institutions' extensive experience with these technologies. In addition, MASEN has contracted for technical expertise.

- **Project implementation risk:** MASEN is a new organisation with no previous experience in implementing and supervising large projects and no prior experience in working with private sector partners. MASEN will therefore be supported with technical assistance in management.

- **Operational risk:** There is risk related to the operation and maintenance of the plant. This risk could be mitigated by contracting with operators experienced in this technology.

- **Social and environmental risks:** These risks are mitigated by the preparation of the environmental and social impact assessment studies and consideration of the respective environmental management plans (EIB, KfW, Agence Française de Développement and World Bank).

SUSTAINABILITY

Key to achieving development impact is the sustainability of the concentrated solar power technology and completion of the full Moroccan Solar Plan. This requires that:

- investment costs of developing large-scale solar plants would significantly decrease in the coming years, including through cost reductions through economies of scale and learning by doing;
- part of the electricity produced by the solar plants would be exported to the EU;
- national incentives (including fiscal) are created to support solar power in Morocco;
- the long-term structural commitment of the Morocco Government is secured, including financial (in particular in co-financing investment and providing adequate feed-in tariffs);
- profitability of solar plants could be improved in the future.

INFORMATION SOURCES

- European Commission, 'Increasing the impact of EU development policy: an agenda for change', Communication, COM(2011) 637 final, http://ec.europa.eu/europeaid/news/agenda_for_change_en.htm
- EC Development and Cooperation EuropeAid — Energy Cooperation with the Southern Neighbourhood, http://ec.europa.eu/europeaid/where/neighbourhood/regional-cooperation/enpi-south/energy_en.htm
- NIF Annual Report 2012, http://ec.europa.eu/europeaid/where/neighbourhood/regional-cooperation/irc/documents/annual_report_2012_nif_en.pdf
- Moroccan Agency for Solar Energy MASEN website, www.masen.org.ma
- Social and Environmental Impact Assessments (Noor I), http://www.masen.org.ma/upload/environnement/OZZ1_SESIA_Volume_1_(SESIA).pdf
- General information on concentrated solar power, http://en.wikipedia.org/wiki/Concentrated_solar_power

Case Study 3: Energy Efficiency and Renewable Energy Programme for SMEs in Central America

BACKGROUND

After high economic growth rates, Central America was hit hard in 2008 and 2009 by the financial and economic crises through the restriction of liquidity, lower aggregate demand and a drop in the international prices of commodities; this has had a deep impact on the economic growth of all Central American countries.

The region has a deep dependence on oil, which in recent years has affected various sectors of the economy due to high and volatile prices. In addition, countries including Honduras and Nicaragua have been severely affected by power outages caused by an electricity supply insufficient to meet demand.

In general, SMEs play an important role in Central American countries, accounting for up to 95 % of all private enterprises and providing jobs for up to 45 % of the labour force.

The incentives for investment in energy efficiency and renewable energy are manifold: high and volatile energy prices (oil), and thus high pressure for energy savings or alternative energy sources; increased pressure on competitiveness through stronger export-oriented economies/regional and international agreements; and environmental legislation.

PROJECT DESCRIPTION

The Green MSME Initiative, as the project is known locally, covers Guatemala, El Salvador, Honduras, Nicaragua and Costa Rica. The project supports MSMEs and has two main components:

- Financing environmental investments (KfW Development Bank, Central American Bank for Economic Integration [CABEI])

- Reducing energy consumption through replacement of efficient lighting, boilers, motors, air conditioners, etc.
- Promoting energy generation through renewable energy technologies such as mini-hydro, solar photovoltaic, etc.

- Technical assistance/studies (CABEI, LAIF)
  - Technical assistance for financial intermediaries to help introduce new loan product, adapt credit procedures, train staff, marketing, monitoring
  - Co-financing energy audits and feasibility studies for small renewable energy projects
  - Promotion and awareness building

The co-financing of energy audits will help determine the potential for energy savings and the necessary investments required to achieve this potential. In addition, the feasibility studies for small renewable energy projects will provide a complementary incentive for project developers to invest in these projects and promote investments on more complex and innovative technologies.

As of April 2014, the majority of financed projects are micro-hydropower plants with only a few energy efficiency projects.

OBJECTIVES AND DEVELOPMENT GOALS

The project objectives are to:

- promote private sector development by contributing to additional investments at the SME level with positive energy and environmental impacts;
- support the growth, diversification and sustainability of the SME sector;
- mitigate climate change.

The project contributes to the LAIF strategic orientation and objectives: SME development, investment in renewable energy and regional integration. It also contributes to the EU development objectives. In accordance with the Agenda for Change, EU development cooperation in energy should focus on three main challenges: price volatility and energy security; climate change, including access to low-carbon technologies; and access to secure, affordable, clean and sustainable energy services. The latter is vital for satisfying basic human needs, in particular, sustainable development and poverty reduction.

ACTORS AND STAKEHOLDERS

See Figure A.3.

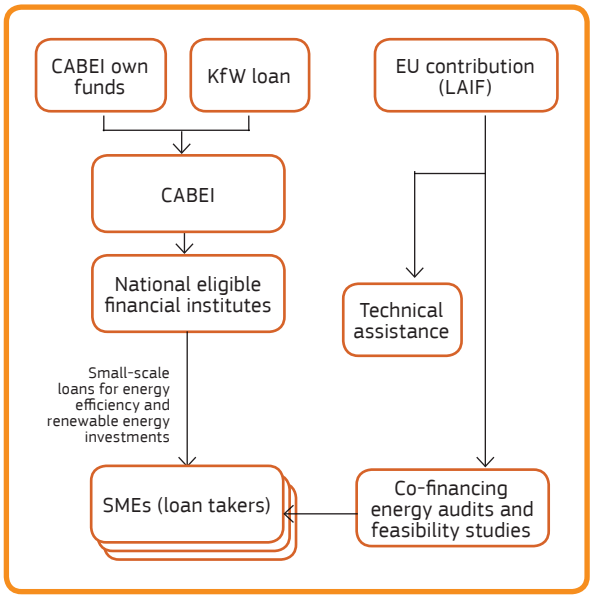
FINANCIAL PLAN AND ADDITIONALLY OF EU CONTRIBUTION

The programme will be financed by KfW funds as well as own funds from the CABEI. Both sources of funds will be channelled through the CABEI, which in turn will provide direct financing to any of the more than 130 eligible financial institutions in Central America under its risk rating system (see Table A.3).

The LAIF grant will be used for the following three components:

- technical assistance for financial intermediaries;

FIGURE A.3 Organisation and main actors



- co-financing of energy audits as well as feasibility studies for small energy efficiency and renewable energy projects to promote additional investments;
- information material and events for awareness building at the financial institution level and, in particular, at the SME level.

The EU contribution is needed to:

- ensure a faster and more efficient introduction and implementation of the programme at the level of financial intermediaries;
- secure sustainable planning and implementation of financed projects at SME level;
- allow for financing of more innovative concepts and technologies at the SME level;
- support growth, diversification and sustainability of SMEs by contributing to the provisioning of a new financial product supporting environmental investments.

CLIMATE CHANGE ASPECTS

The project supports energy efficiency and renewable energy, which results in reduced GHG emissions from avoided centralised electricity production. Climate change mitigation is one of the main objectives of the project. Both the project finance and the EU contribution to the project is marked with Rio Marker for Mitigation 2 (100% climate finance).

The actual emissions that the project will achieve depend on the actual projects (energy saved and renewable energy produced) and the carbon emissions factor of the electricity grid of the specific country. This factor differs widely in the region. For example, the power sector in Costa Rica already has a large share of renewable energy, resulting in a relatively low carbon emission factor.

RISKS AND RISK MITIGATION

- Insufficient demand for loans for environmental investments from SMEs due to the economic situation, and lack of experience in developing bankable proposals; this risk is addressed by providing technical support to SMEs in developing proposals.
- Challenging macroeconomic conditions due to the global crisis and therefore difficult circumstances for the investment climate and market-determined credit conditions; this risk is reduced by the participation of the CABEI as a development bank.
- Lack of experience in and awareness on energy efficiency and renewable energy finance on the part of financial institutions; this risk is addressed by technical assistance and capacity building for the financial institutions.

SUSTAINABILITY

Successful implementation at the financial institution level of the new loan product allows financial institutions to offer this financial service of environmental investments in the future to its clients in an effective

TABLE A.3 Financial plan including EU contribution for Energy Efficiency and Renewable Energy Programme for SMEs in Central America

SOURCE	AMOUNT (MILLION EUR)	APPROXIMATE SHARE (%)	DESCRIPTION
KfW	30	83	Loan
CABEI	3.3	9	Loan
EU contribution (LAIF)	3	8	Grants for technical assistance
Total	36		

and efficient manner. Spill-over effects to other financial institutions operating in the market are possible, thus establishing a widening of the financial sector in Central American countries.

Co-financing of energy audits and renewable energy projects and their positive outcome regarding, e.g. energy savings and thus lower costs, could serve as examples for other enterprises.

INFORMATION SOURCES

- EC Development and Cooperation EuropeAid — Energy Cooperation with Latin America, http://ec.europa.eu/europeaid/where/latin-america/regional-cooperation/energy_en.htm
- Programme website (in Spanish), http://mipymesverdes.org/
- KfW annual implementation report for Energy Efficiency and Renewable Energy Programme for SMEs in Central America, January 2014
- LAIF Annual Report 2012

References and further reading

CIF (Climate Investment Funds), 2011. 'Information note on subsidies for renewable energy technologies under SREP', SREP/SC.6/Inf.3. https://www-cif.climateinvestmentfunds.org/sites/default/files/meeting-documents/srep_inf_3_subsidy_paper_0.pdf

EC (European Commission), 2011. 'Increasing the impact of EU development policy: an agenda for change', Communication, COM(2011) 637 final. EC, Brussels. http://ec.europa.eu/europeaid/news/agenda_for_change_en.htm

ENPI Info Centre, 2010. 'South Caucasus united by common electricity grid', Feature no. 28. http://www.enpi-info.eu/files/features/FT28%20east%20Georgia%20EN.pdf

EUBEC Technical Group 4, 2013. 'Topic 3: Further development of financial instruments and application in practice', Final Report.

FS-UNEP (Frankfurt School–UNEP Collaborating Centre for Climate & Sustainable Energy Finance), 2013. *Global Trends in Renewable Energy Investment 2013*. http://www.unep.org/pdf/GTR-UNEP-FS-BNEF2.pdf

OECD (Organisation for Economic Co-operation and Development), 2013. 'Policy Guidance for Investment in Clean Energy Infrastructure. Expanding access to clean energy for green growth and development'. http://www.oecd.org/daf/inv/investment-policy/CleanEnergyInfrastructure.pdf

OECD/IEA (Organisation for Economic Co-operation and Development/International Energy Agency), 2012. 'Plugging the Energy Efficiency Gap with Climate Finance; The role of International Financial Institutions (IFIs) and the Green Climate Fund to realise the potential of energy efficiency in developing countries', IEA Insight Series. https://www.iea.org/publications/insights/insightpublications/PluggingEnergyEfficiencyGapwithClimateFinance.pdf

UNESCAP (United Nations Economic and Social Commission for Asia and the Pacific), 2008. 'Energy Security and Sustainable Development in Asia and the Pacific'. Bangkok. http://www.unescap.org/sites/default/files/energy-security-ap.pdf

World Bank, 2013. 'Fact Sheet: The World Bank and Energy in Africa'. http://go.worldbank.org/8VI6E7MRU0

Other resources

The following references provide further background information on energy projects in a development context (policy, technology, economics/markets).

Climatescope 2013 is a report and index that assesses the investment climate for climate-related investment, including clean energy, in Latin America and the Caribbean. A similar tool for Africa and Asia is in progress. http://www.fomin.org/climatescope/2013/overview.html

EU Development and Cooperation EuropeAid — Energy, https://ec.europa.eu/europeaid/sectors/energy/energy_en

Global Energy Efficiency and Renewable Fund, http://geeref.com/

Intergovernmental Panel on Climate Change, 2014. Climate Change 2014: Mitigation of Climate Change. Contribution of Working Group III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change. Chapter on energy systems. https://www.ipcc.ch/pdf/assessment-report/ar5/wg3/ipcc_wg3_ar5_full.pdf

International Energy Agency, 2014. 'Energy Technology Perspectives 2014'. Comprehensive, long-term analysis of trends in the energy sector — and of the technologies that are essential to achieving an affordable, secure and low-carbon energy system. http://www.iea.org/etp/

International Energy Agency, World Energy Outlook, http://www.worldenergyoutlook.org/

International Renewable Energy Agency, 2013. 'Renewable Power Generation Costs in 2012: An Overview'. http://costing.irena.org/media/2769/Overview_Renewable-Power-Generation-Costs-in-2012.pdf

Renewable Energy Policy Network for the 21st Century (REN21). Includes an interactive map to access country information. http://www.ren21.net/ or www.reegle.info/countries

Sustainable Energy for All (SE4ALL), http://www.se4all.org/

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