

UNLOCKING RENEWABLE ENERGY INVESTMENT:

THE ROLE OF RISK MITIGATION
AND STRUCTURED FINANCE



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About IRENA

The International Renewable Energy Agency (IRENA) is an intergovernmental organisation that supports countries in their transition to a sustainable energy future, and serves as the principal platform for international co-operation, a centre of excellence, and a repository of policy, technology, resource and financial knowledge on renewable energy. IRENA promotes the widespread adoption and sustainable use of all forms of renewable energy, including bioenergy, geothermal, hydropower, ocean, solar and wind energy, in the pursuit of sustainable development, energy access, energy security and low-carbon economic growth and prosperity.

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FOREWORD

Driven by a strong business case and falling costs, renewable energy has progressed remarkably over the past decade, to become the preferred power source for many countries. Renewables lie at the heart of a global energy transformation, which offers an economically attractive answer to energy security and climate concerns, and new opportunities for sustainable livelihoods for the millions of people who lack energy access today.



The Sustainable Development Goals and the landmark Paris Agreement, both concluded in 2015, have reinforced the momentum behind this energy transition. But to achieve the economic, social and environmental objectives set by the international community, a rapid scale-up of investments in renewable energy infrastructure is needed; especially in developing countries, where energy demand is set to grow exponentially.

Investments, which have already grown rapidly to reach a record level of USD 286 billion in 2015, will need to double before the end of this decade and grow further, to more than three times current levels in the 2020s. Private finance will have to supply the lion's share of new investment and institutional investors can play a crucial role. For that, sound policies and targeted financial instruments are needed, to enable markets worldwide to respond to the economic realities of renewables today and attract large-scale investors into the renewables sector.

Unlocking Renewable Energy Investment: The role of risk mitigation and structured finance sets out a global action agenda to scale up investment in renewables over the coming years. It offers policymakers, financial institutions and project developers a toolkit, which can enable them to contribute to that agenda. The report presents the financial instruments and policy tools available to overcome constraints that currently prevent investment from getting to scale.

If public finance institutions focus on risk mitigation rather than crowding out private investors; if public and private finance institutions join forces to standardise contract templates and other project documents to allow for an aggregation of smaller projects; if local financial institutions are engaged to leverage local networks and knowhow to build strong project pipelines; and if policy makers support these actions through dedicated financial risk-mitigation facilities, investment levels that may now sound unrealistic can be reached.

In this manner, even with limited public resources, capital-market dynamics can help achieve a climate-safe, sustainable energy future. I am confident that this study will inspire policy makers and public finance institutions worldwide to focus their commitments and actions to unlock renewable energy investment.

Adnan Z. Amin

Director-General
International Renewable Energy Agency

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ABBREVIATIONS

ADB	Asian Development Bank
AfDB	African Development Bank
BNEF	Bloomberg New Energy Finance
DFI	Development Finance Institution
EPC	Engineering, procurement and construction
EBRD	European Bank for Reconstruction and Development
EIB	European Investment Bank
GCF	Green Climate Fund
GEF	Global Environment Facility
GIB	Green Investment Bank
GW	Gigawatt
IFC	International Finance Corporation
IPP	Independent power producer
IRENA	International Renewable Energy Agency
JICA	Japan International Cooperation Agency
kWh	Kilowatt-hour
MIGA	Multilateral Investment Guarantee Agency
MW	Megawatt
NREL	National Renewable Energy Laboratory
OECD	Organisation for Economic Co-operation and Development
OPIC	Overseas Private Investment Corporation
OPW	Investment vehicle for Ampere Equity Fund and PGGM (Dutch pension group)
PIDG	Private Infrastructure Development Group
PPA	Power Purchase Agreement
ROC	Renewable Obligation Certificate
RSLF	Regional Liquidity Support Facility
SPV	Special purpose vehicle
TEDAP	Tanzania Energy Development and Access Project
UNEP	United Nations Environment Programme
UNSG	Unocal North Sumatera Geothermal
USAID	United States Agency for International Development

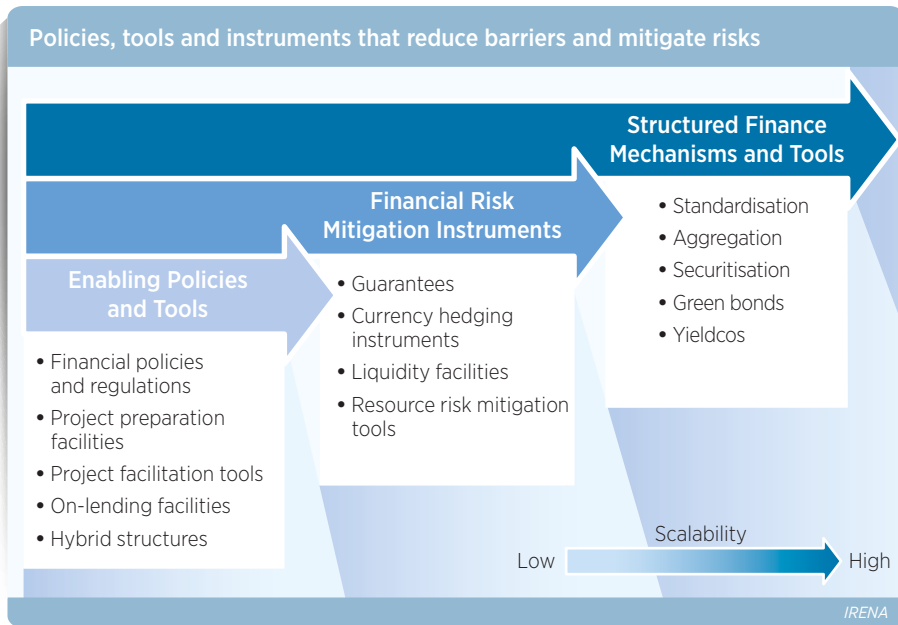
EXECUTIVE SUMMARY

Unlocking investment in renewable energy will open up substantial opportunities throughout the global economy. Not only will renewable energy play an ever more critical role in meeting the world's growing energy demand but renewable energy technologies are also increasingly cost-effective additions to the energy mix. As alternatives to fossil fuels, they can thereby address global climate concerns. Analysis by the International Renewable Energy Agency (IRENA) shows that the share of renewables in the global energy mix can be cost-effectively doubled by 2030 using existing technologies. Combined with improved energy efficiency, this would significantly reduce greenhouse gas emissions and put the world on track to limit global mean temperature rise to below 2° Celsius.

To achieve these benefits, renewable energy investment must double over the next few years and triple in the 2020s. This level of renewable energy deployment means scaling up current investment in renewables to 500 billion US dollars (USD) per year up to 2020. Global investment must then reach USD 900 billion each year up to 2030 (IRENA, 2015a). Almost two-thirds of this investment would be in the power sector, but renewables for heat and transport also need to grow significantly. Developing markets with fast-growing energy demand will require the largest increase in investment.

Most of the investment needed must come from the private sector. Since public funding in renewables is unlikely to increase above its current level of 15% (IRENA, 2015a), private finance will have to supply the lion's share of new investment in renewables. In particular, institutional investors can play a crucial role in scaling up renewable energy investment. They include pension funds, insurance companies, endowments and sovereign wealth funds – together the largest potential source of private capital, managing over USD 90 trillion in total assets in developed countries alone (Organisation for Economic Co-operation and Development, OECD, 2015). The OECD estimates that around USD 2.80 trillion per annum is potentially available from pension funds and insurance companies for new clean energy investment (Kaminker and Stewart, 2012).

Underlying market barriers and a perception of high risk constrain the development and financing of renewable energy projects. Although falling renewable energy technology costs have significantly lowered the capital needed to invest in new systems, financing renewable energy projects is still difficult in many parts of the world. This is due to the high cost of capital elevated by risks and to underlying market barriers. Identifying attractive projects and gaining access to capital often presents a key barrier to



renewable energy investments. Project risk can take multiple forms. These include political and regulatory risk; counterparty, grid and transmission link risk; currency, liquidity and refinancing risk; as well as resource risk, which is particularly significant for geothermal energy.

Policy makers, financial institutions and investors can draw from a strong toolkit that can help overcome these barriers, mitigate investment risk and improve access to capital for renewables projects. The following options constitute a portfolio of measures, instruments and tools to be used in combination:

Enabling policies create stable and predictable investment environments, help overcome barriers and ensure predictable project revenue streams. Technical assistance and grant funding can be critical early on in the project lifecycle when preparing the ground for investment. They foster project development and strengthen documentation. Targeted non-financial interventions can play a facilitating role and help take projects forward to full investment maturity. Debt-based instruments, such as on-lending and co-lending structures, can help local finance institutions overcome key barriers, especially limited access to capital and low experience in lending to renewable energy projects.

Access to effective risk mitigation instruments is critical to mobilising private investment. Public finance institutions make an essential contribution by providing private investors with risk mitigation instruments. These include guarantees, currency hedging instruments and liquidity reserve facilities. They help mobilise private capital while reducing the capital requirements of the public finance institution. In order to increase the use of risk mitigation instruments, these organisations need to simplify procedures, reduce transaction costs, set internal incentives, and further expand their toolbox with instruments specifically targeting renewable energy project needs.

To significantly scale up investment capital, renewable energy projects must become more accessible to mainstream investors. Structured finance can help increase investment volumes by reducing due diligence costs. Standardisation of project documents and aggregation are important mechanisms allowing smaller projects to be pooled together. These mechanisms can also help securitise renewable energy assets for the purpose of trading in capital markets. In turn, tools such as green bonds and Yieldcos can help open capital-market access and attract greater liquidity and long-term finance into the renewable energy sector.

Policy makers and development financial institutions (DFIs) can address key investment risks, along with underlying barriers for renewable energy projects. Doing so calls for a targeted portfolio of approaches, presented in five action areas (see next page).



ACTION AREAS

With appropriate instruments and facilities in place, investment in renewables can be scaled up rapidly. This way, renewable energy can move quickly from niche to mainstream in markets where it has lagged behind. The global energy transition depends on the ability of the markets, and the sector, to attract massive investment inflows.

In coming years, policy makers, international finance institutions, developers, and investors must seize the opportunities to unlock renewable energy investment at scale.

FIVE ACTION AREAS TO SCALE UP RENEWABLE ENERGY INVESTMENT



1 Advance renewable energy projects from initiation to full investment maturity.

- » Support project preparation through capacity building and dedicated grants
- » Facilitate interaction between project developers and investors, using platforms like IRENA's *Sustainable Energy Marketplace* (<http://marketplace.irena.org/>)



2 Engage local financial institutions in renewable energy finance.

- » Develop dedicated resources and build capacity at local financial institutions
- » Design and implement on-lending facilities for renewable energy projects



3 Mitigate risks to attract private investors.

- » Streamline procedures and redirect institutional incentives to enable greater provision of risk mitigation instruments
- » Develop new risk mitigation instruments, structures, funds or facilities for power off-taker risk and currency risk in emerging markets



4 Mobilise more capital market investment.

- » Establish standardised project documentation, tendering, contracting and due diligence processes
- » Expand the project pipeline and aggregate projects
- » Develop policy and guidelines for green bond issuance



5 Create facilities dedicated to scaling up renewable energy investment.

- » Establish financing facilities to issue risk mitigation instruments, cover transaction fees, or support the design of structured finance mechanisms
- » Utilise various funding sources, including climate finance, to provide resources for dedicated financing facilities for renewables at national, global or regional level

ABOUT THE REPORT

In order to scale up renewable energy to fulfil its promise for a sustainable energy future and wider socio-economic benefits, investment has to increase significantly above current levels. The cost of many renewable energy technologies has declined rapidly in recent years, making them increasingly cost-competitive with fossil fuel technologies, even amid low global oil prices. Furthermore, renewables bring wide-reaching benefits, including for human health, energy access, environmental protection and the response to climate change, not to mention their potential to create new jobs across the world.

Yet despite these opportunities, global investment in renewables remains below its potential. This is explained by market barriers and the perception of high risk that prevent private investors from increasing their involvement in renewable energy finance.

IRENA has engaged governments and the international investor community to examine the current financing landscape in the renewable energy sector. This report is the result. It identifies the main risks and barriers limiting investment, supplying a toolkit for policy makers, public and private investors, and public finance institutions to scale up their investments in renewable energy. The accompanying case studies and survey material, collected throughout the preparation of this report, reflect IRENA's continuous engagement with its member states and industry stakeholders.

This report is meant to serve as an all-in-one guide to the key financial market instruments for renewables. Greater familiarity with those instruments, particularly among policy makers, investors and financial institutions, will bring down the financing cost of renewable energy projects.

- » **Chapter 1** provides an overview of the remarkable growth of renewable energy in the power sector driven by its increasingly strong business case and its socioeconomic benefits. It describes the immediate risks and barriers constraining the acceleration of investment to meet global energy and climate goals.
- » **Chapter 2** analyses the various policy, finance and knowledge tools available to overcome specific barriers related to project initiation, development and financing. These include enabling policies, project preparation support and concessional finance.
- » **Chapter 3** focusses on financial risk mitigation instruments, such as guarantees and hedging instruments, that can reduce or reallocate investment risks. The chapter uses three case studies to analyse the effectiveness of financial risk mitigation instruments and presents results of a survey on the utilisation of these instruments.
- » **Chapter 4** examines how structured finance, in particular standardisation and aggregation, can increase the opportunities in the renewable energy market for institutional and other large-scale investors. It also considers two recent capital market tools of special relevance to renewables: green bonds and Yieldcos.
- » **Chapter 5** demonstrates the application of policies and financial tools to real-life renewable energy projects via three analytical case studies. Through the lens of a credit-rating framework, the case studies show how financial risk mitigation instruments and structured finance mechanisms can enhance a project's overall credit quality. Success factors in each case are analysed in depth.
- » **Chapter 6** offers recommendations to national policy makers and public finance institutions, including proposals for co-operation with IRENA aimed at unlocking renewable energy investment and thereby meeting global energy and climate priorities.



1 THE RENEWABLE ENERGY OPPORTUNITY

KEY POINTS:

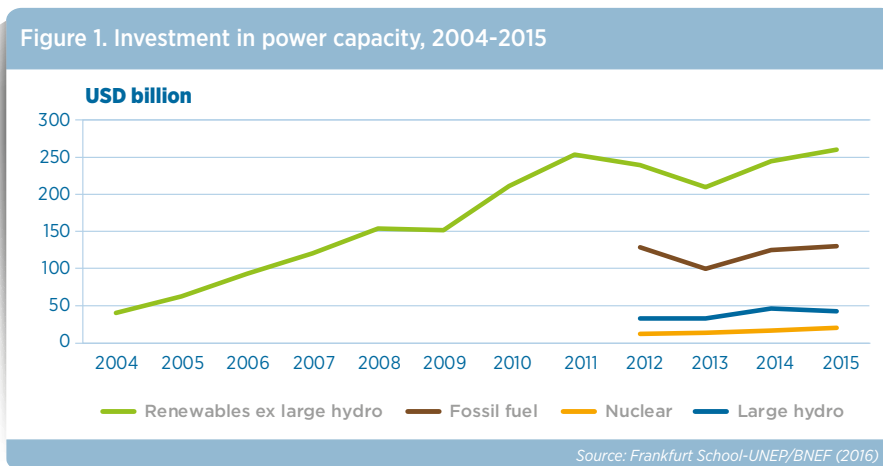
- » Driven by increasing cost-competitiveness, investment in renewable energy has experienced unprecedented growth in recent years, with USD 286 billion invested globally in 2015.
- » Meeting growing energy demand and making the transition to a low-carbon energy future means scaling up renewable energy investment much more rapidly than currently forecasted.
- » The combined socioeconomic, environmental, health and climate benefits provide a strong case for policy intervention to accelerate investment in renewable energy worldwide.
- » Key investment risks and barriers must be overcome in order to open the market to potential sources of private capital such as institutional investors.
- » Public finance targeted at risk mitigation and structured finance can leverage private capital to unlock investment in renewable energy.

Renewable energy investment is urgently required not only to meet growing energy demand and reduce climate concerns but also to enable sustainable development and growth with significant socioeconomic, environmental and health benefits. Although falling renewable energy technology costs have significantly lowered the upfront capital needed, financing renewable energy projects remains difficult in many parts of the world. This is due to the high cost of capital elevated by risks and underlying market barriers. Mobilising private capital is central to rapidly scaling up investment in renewable energy. The role of public finance in this regard is to address investment constraints faced by the private sector. Mechanisms to effectively leverage private finance include, for example, risk mitigation instruments and structured finance mechanisms.

This chapter discusses the need for and opportunities to scale up renewable energy investment, and explains the constraints (risks and barriers) to be resolved in order to mobilise private capital.

1.1 Falling costs provoke rapid growth

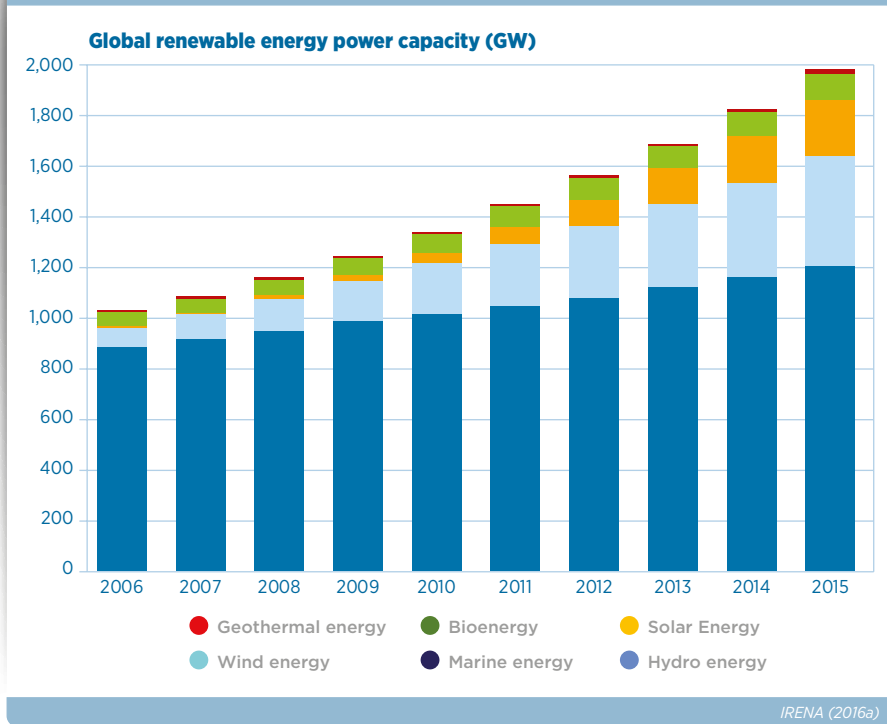
The rapidly rising cost-competitiveness of renewable energy technologies has precipitated a period of unprecedented growth in global investment during the last 10+ years. Data released by the Frankfurt School-United Nations Environment Programme (UNEP) and Bloomberg New Energy Finance (BNEF) showed that USD 286 billion was invested in renewable energy globally in 2015. This exceeded the previous record of USD 278.5 billion reached in 2011, a more than fivefold increase since 2004. Growth continued even in the wake of falling fossil fuel costs since mid-2014. Investment in renewable power capacity in 2015 continued to be well over twice the year's net investment in fossil fuel power capacity, just like the previous year (Figure 1).



Solar PV module prices have fallen more than 75% since 2009, and residential solar PV systems are 65% cheaper than in 2008. Onshore wind is now one of the most cost-competitive sources of electricity in many countries, generating power for as little as USD 0.04 per kilowatt-hour (kWh) without financial support. For isolated off-grid or small-scale electricity systems, renewables offer the most economical solution, generating electricity at less than a quarter of the cost of diesel or oil-fired generation. (IRENA, 2015a).

With rapidly decreasing technology cost, renewable power generation growth has significantly exceeded investment growth because the same investment value enables more renewable energy deployment on the ground. Global renewable power generation capacity almost doubled from 1,037 gigawatts (GW) in 2006 to 1,985 GW in 2015 (IRENA, 2016a). Solar PV capacity in particular has grown by approximately 35 times the 2006 level from a mere 6.5 GW to 226 GW (Figure 2). Accelerated investment growth in renewable energy can amplify this momentum in the global energy transition.

Figure 2. Growth trajectory of global renewable power capacity, 2006-2015



Rising energy demand

Further investment in new installations is essential to meet growing energy demand. This is predicted to increase by 30% globally by 2030 (IRENA, 2016b). Most of this growth will take place in developing countries,¹ particularly the Asia-Pacific region, Middle East and Africa. In Africa, for instance, forecasts indicate that electricity demand will triple by 2030 due to rising living standards, ongoing industrialisation and growing electrification rates. This will require annual investments of around USD 70 billion per year between now and 2030 into the power generation, transmission and distribution infrastructure alone (IRENA, 2015b).

Renewable energy plays a central role in matching such energy demand in developing countries. This is because countries aim to advance energy access and satisfy power needs with renewable energy technologies that are cleaner and in many cases more competitive than alternatives. Most recently, the growth in renewable energy capacity has been more rapid in developing

¹ For the purposes of this report, developing countries consist of all non-OECD countries. Emerging markets, on the other hand, refer to non-OECD countries that are not low income or low-middle income countries as classified by the World Bank (World Bank, 2013).

Figure 3. Global annual investment in renewable energy in developing and developed countries, 2004-2015



countries. In 2015, developing countries actually overtook developed countries in terms of their share of global renewable energy investment (Figure 3).

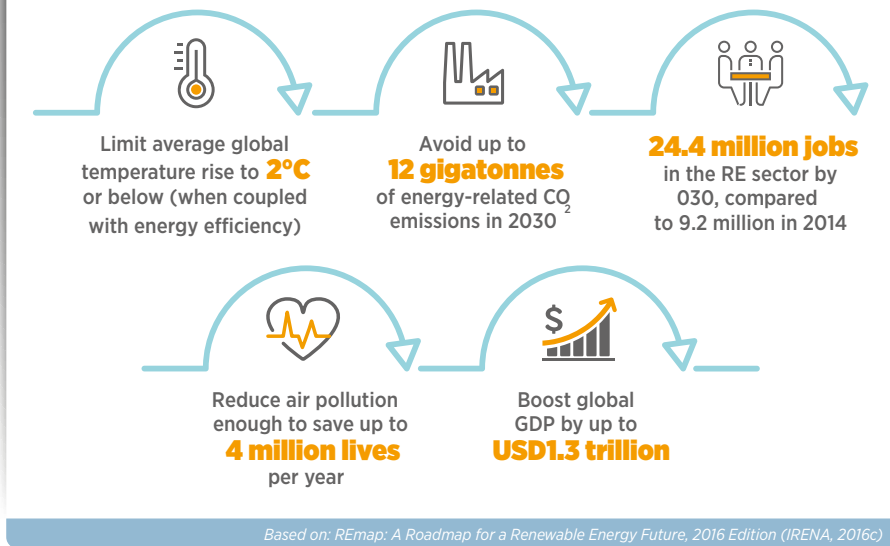
Doubling the share of renewable energy

The significant scale-up of renewables will play a central role in meeting the world's future energy supply amid a number of concerns. They include rising energy demand, the need to cut costs, air pollution reduction to save millions of lives, increasing economic growth and employment. Last but not least, the world needs to minimise the mean temperature increase to below 2° Celsius, which a scale-up of renewables combined with increased energy efficiency can help achieve.

To provide these benefits, the renewable energy share must at least double by 2030 from today's level of 18%. This is both a technically feasible and economically affordable prospect, as IRENA's REmap study shows (IRENA, 2016b). IRENA projections suggest that doubling the share of renewable energy in the planet's energy mix would increase global gross domestic product by 1.1%. It would improve total welfare² by 3.7% and generate jobs in the sector for over 24 million people (Figure 4).

² A combined indicator for welfare considers a number of factors including economic impacts based on consumption and investment; social impacts based on expenditure on health and education; and environmental impacts measured as greenhouse gas emissions and materials consumption.

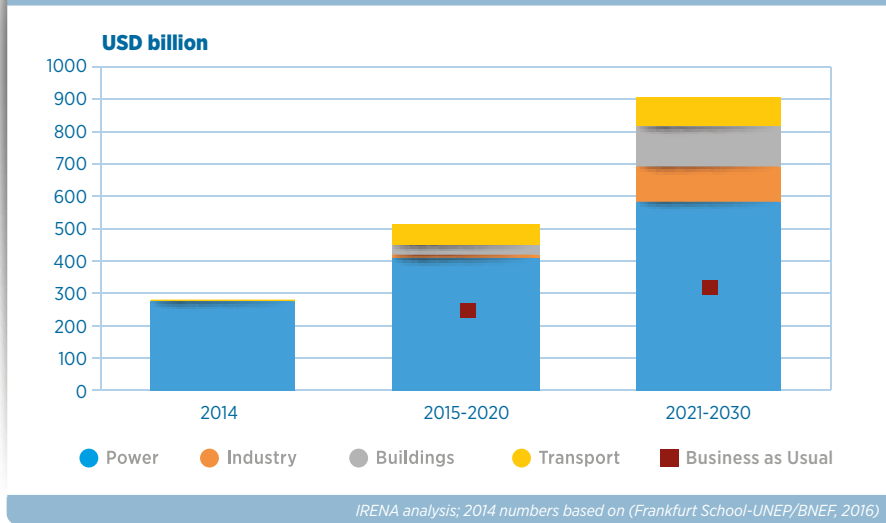
Figure 4. Benefits of doubling the share of renewable energy



Doubling the share of renewables requires annual average investment of more than USD 500 billion between 2015 and 2020. The average then needs to reach USD 900 billion between 2021 and 2030 – considerably more than currently planned (IRENA, 2015). Investments up to 2020 will be particularly important because they will lay the foundation for continued acceleration in later years. Almost 80% of this investment would occur in the power sector. However, the share of renewables will also need to grow in other areas between 2021 and 2030, particularly in transport, and for heating and cooling in buildings (Figure 5).

The current pace of renewable energy deployment is only slightly higher than the 30% growth projection for global energy demand (IRENA, 2016b). This means that under a business-as-usual scenario, the world's energy systems will not decarbonise rapidly enough to meet international climate objectives. This includes the aim to limit the mean global mean temperature increase to below 2° Celsius. Many of the Intended Nationally Determined Contributions submitted for more than 190 nations before the adoption of the Paris Agreement in December 2015 refer to policy action to scale up renewables. Steps discussed in this report will support their implementation and allow countries to even do more.

Figure 5. Investment needs to double renewables in the energy mix by 2030



1.2 Unlocking potential investment

Most of the investment needed must come from the private sector. Consisting of utility companies, corporates, project developers and various investment funds, this has historically covered a large share of renewable energy investment, accounting for over 85% (IRENA, 2015c). It is also a key project implementer and will in future continue to act as a central driving force of renewable energy deployment.

Institutional investors such as pension funds, insurance companies, endowments and sovereign wealth funds (Box 1) could play a particularly important role in scaling up renewable energy investment in future as the largest potential source of private capital. Between them they manage over USD 90 trillion in total assets in developed countries alone (OECD, 2015). The OECD estimates that around USD 2.80 trillion per annum is potentially available from pension funds and insurance companies for new clean energy investment (Kaminker and Stewart, 2012). It is thus a major potential source of capital. In addition, institutional investors tend to have a stronger appetite for sustainable and responsible investment due to their fiduciary duties. Given their growing interest in renewable energy, it is thus possible to attract institutional and other large-scale investors now and in future. Indeed, this is essential if investment volumes are to be scaled up.

BOX 1: TYPES OF INSTITUTIONAL INVESTORS

Institutional investors are large-scale investing entities which pool money to purchase securities and real property or investment assets, or to provide loans. This publication focuses on the four types of institutional investors below.

- » **Insurance companies** issue products (policies) that are short-term (travel or accident insurance), medium-term (buildings insurance) or long-term (life, medical negligence and annuities). They generally purchase medium and longer-term assets and are less sensitive to liquidity issues than banks. Their investment horizon is well matched to longer-term renewable energy projects (15-20 years). Portfolios are constructed to produce greater returns than the associated liability payouts.
- » **Pension funds** manage liabilities constituted of a stream of payments made to pension beneficiaries over time. These liabilities are rather long-term, in some cases extending over more than 40 years. Pension plans feature diversified asset portfolios with higher liquidity than insurance companies and lower liquidity than banks.
- » **Endowments and foundations** receive capital from trusts, donations and investment returns. Typically, donations are used to capitalise the trust, which is renewed by further regular charitable contributions or investment returns. This segment has actively advocated renewable energy investment because many endowments and foundations seek to align their interests with their clients, who are sensitive to environmental and social governance issues.
- » **Sovereign wealth funds** receive capital from government taxes or central bank reserves. These funds typically make long-term investments that will benefit the country's economy or citizens. Some sovereign wealth funds whose funding largely comes from oil revenue are showing greater interest in investing in renewable energy.

Constraints on investment

As discussed above, the strong case for renewable energy arises from its many benefits. The falling technology costs make it commercially viable in more and more countries. Nevertheless, global investment remains below its potential.

A range of barriers can obstruct the development and financing of renewable energy projects. An important factor to explain this is the front-loaded cost structure of most renewable energy projects. The limited experience and capacity of policy makers and national financial systems is also a fundamental obstacle to increasing renewable energy investment, even where this would be economically and commercially efficient. Lack of experience and capacity gaps in local financial sectors also translate into higher capital costs for renewable projects.

In practice, this means that risk-adjusted capital, i.e. capital which accounts for the risk return profile, is still not sufficiently available in potential growth markets for renewable energy projects.³ This is despite the dramatic decline in the capital cost of renewable energy projects as technology costs decreased (IRENA, 2015a). Investors often perceive risks as high. Such risks include political, regulatory, counterparty, currency and liquidity risk, as well as the grid interconnection and transmission-line delay risk. The high risk perception adds a risk premium to the cost of capital, which limits access to affordable capital. Risk mitigation instruments and structures provided by public finance institutions can mobilise capital in renewable energy investment by addressing investment risks. However, they are still not used enough, contributing to the high cost of capital for renewables projects.

Finally, some barriers can be particularly difficult for large-scale investors, especially institutional investors. They consist of insufficient investment deal size and high transaction costs, and financial regulations restraining illiquid and riskier investments. This can contribute to problems in going beyond small-scale investment.

Figure 6 gives an overview of those investment constraints.

³ For the purpose of this report, risk is defined as an uncertainty related to the outcome of a certain event preventing investment while barriers refer to obstacles (OECD, 2015) or challenges in developing, financing, investing and operating projects.

Figure 6. Types of investment constraints in renewable energy

Project start-up and development	Investment risk management	Scaling-up investment
<ul style="list-style-type: none"> • Limited experience in the financial sector • Availability of investment-ready projects • Limited access to capital 	<ul style="list-style-type: none"> • Political risk • Policy and regulatory risk • Counterparty risk (power off-taker risk) • Grid interconnection and transmission line risk • Currency risk • Liquidity and refinancing risk • Resource risk • Technology risk 	<ul style="list-style-type: none"> • Insufficient investment size and high transaction costs • Financial regulations restraining illiquid and riskier investments

Chapters 2, 3 and 4 discuss each of these three types of risks and barriers in greater depth and highlight the policies, financial instruments and tools to address each group of investment constraints.

The role of public finance

Public policy and finance has an important role in creating an enabling environment for renewable energy investment using public funds in a way that releases additional investment. Policy makers and public finance institutions will have to work out how to make the best of limited public funding sources to increase the overall capital for renewables. Public funding is not expected to increase above its current share of 15% of total renewables investment (IRENA, 2015a). This means public finance institutions should pay increasing attention to helping mitigate the risks and barriers affecting private finance aimed at scaling up renewable energy investment.

Public finance institutions provide public capital to support public and private sector projects as well as policies and programmes that serve the public good with economic, environmental or social benefits (Venugopal et al., 2012). A number of such institutions have been established and resourced with the aim of supporting renewable energy investment. For reading ease, the main types of public finance institutions are defined below for the purposes of this report.

- » **International financial institutions** include global and regional multilateral development banks that provide funds, financing instruments and risk mitigation instruments. They use their own capital (raised on the initial capital provided by government donors) or act on behalf of multiple government donors. Examples include the World Bank Group, the Asian Development Bank (ADB), the European Investment Bank (EIB), the European Bank for Reconstruction and Development (EBRD), the African Development Bank (AfDB), the Islamic Development Bank, the Inter-American Development Bank, the Asian Infrastructure Investment Bank and the New Development Bank.
- » **Development Finance Institutions (DFIs)** include most of the international financial institutions mentioned above and in addition encompass bilateral development agencies, such as the AFD (the French Development Agency), KfW (the German Development Bank) and JICA (the Japanese International Cooperation Agency). These provide bilateral finance (typically from one developed country to several developing countries). They also include national development banks and government funding agencies that provide finance within their own individual countries, such as BNDES, the Brazilian Development Bank.⁴
- » **Local financial institutions** refer to both public and private finance institutions with a main presence in the domestic market. They could be large or very small in terms of managed capital.
- » **Export credit agencies** are public agencies and entities supplying government-backed loans, guarantees and insurance to corporations from their home country aiming to do business overseas in developing countries and emerging markets. Most industrialised economies have export credit agencies to promote exports and imports.

⁴ The International Development Finance Club brings many DFIs together: <https://www.idfc.org/>.

- » **Climate finance institutions** include international climate funds and intermediary institutions created by multiple government donors to channel public funds from developed countries to climate-relevant projects in developing countries (Venugopal et al., 2012). Among the most prominent climate finance institutions supporting renewable energy deployment are the Global Environment Facility (GEF), the Climate Investment Funds (CIFs) and the Green Climate Fund (GCF). Often functioning as implementing agencies for climate funds, DFIs also channel a large share of public climate finance to developing countries.

Public finance has traditionally focused on concessional lending and grants to fund projects directly. However, there is increasing emphasis on using it more as a mobilisation tool to crowd in private capital rather than for direct financing (Bielenberg et al., 2016; CAFOD et al., 2015; World Bank Group, 2016). Expanding finance beyond grants and loans to guarantees, derivative instruments, liquidity facilities and other innovative structures can provide a more efficient means to overcome private sector investment challenges in different regions. This is important for projects, such as energy projects, that generate sufficient revenues to eventually cover their initial capital costs. However, some projects for energy access with wider social benefits may continue to require funding through grants or concessional loans.

With appropriate instruments and facilities in place, investment in renewables can be rapidly scaled up. Investment can thus move quickly from niche to mainstream even in markets where it has been lagging behind. The global energy transition will depend on the ability of developing renewable energy markets to attract massive levels of investment.

In the chapters that follow, this report offers an overview of financial tools and targeted action available to policy makers, public finance institutions, developers and investors to bring renewable energy investment to scale. Chapters 2, 3 and 4 of this report discuss in greater depth these risks and barriers, highlighting policies and tools employed to address each category of investment constraint.



2 BREAKING DOWN THE BARRIERS

KEY POINTS:

- » Enabling policies create stable investment environments, help overcome barriers and ensure predictable project revenue streams.
- » Technical assistance and grant funding can be critical in the early project development stage. They lay the ground for investment by supporting project development and the documentation process.
- » Targeted non-financial interventions such as project initiation and facilitation tools can ease the process of identifying renewable energy projects and investors. These tools take the project forward from its initial point to full investment maturity.
- » Debt-based instruments like on-lending and co-lending structures can break down key financing barriers, especially limited access to capital and local lending experience in renewable energy.

Directing energy sector investment towards renewables means dissolving market barriers currently obstructing the development and financing of renewable energy projects. The technical aspects of renewable energy, lack of familiarity, limited knowledge and skills among project proponents and local financial institutions all reinforce a lack of track record and reliable investment data, especially in emerging markets. Investors find it hard to identify attractive projects, and project developers find it hard to identify investors. This often becomes a key barrier to renewable energy investment.

This chapter concentrates on enabling policies, debt-based finance instruments and hybrid structures that can overcome the barriers to developing and financing renewable energy projects. An overview of all the instruments that support project pipeline development and facilitate capital access, as well as their application, is displayed in Table 1 (next page).

Table 1. Policies and tools addressing barriers to developing and financing renewable energy projects

	Limited experience in financial sector	Availability of investment-ready projects	Limited access to capital
Finance policies	✓		✓
Project development and preparation facilities		✓	✓
Project initiation and facilitation tools	✓	✓	✓
On-lending structures	✓		✓
Loan syndication	✓		✓
Subordinated debt			✓
Convertible grants and loans			✓

IRENA

2.1 Enabling policies

Lack of long-term policies and incentives and lack of clarity, consistency and visibility on policy measures supporting a renewable energy industry and market can also pose major obstacles to renewables deployment. They exist even in markets where the underlying economics are highly conducive to these technologies. A key component of any effort to scale up global investment in renewables must be policy commitment at the national level. A range of different tools and programmes developed and implemented by national or sub-national government acts as a set of enabling policies. These include regulatory tools as part of energy and finance policies. Targeted interventions that complement the regulations include public finance programmes and non-financial interventions.

Such policies are important not only in their own right, but also matter indirectly by affecting investment risk and in turn the cost of capital. Policy or regulatory risk is often associated with changes in legal or regulatory measures that have significant, adverse impacts on project development or implementation. These measures create the stable and predictable investment environment critical to ensure predictable project revenue streams. More direct public interventions include national or municipal targets, feed-in-tariffs, competitive tendering or auction schemes, net-metering, quotas and tax incentives. These policy tools are discussed elsewhere: IRENA, 2015e; IRENA and CEM, 2015; REN21, 2015).

Public policy commitment can work as a critical factor to open up renewable energy investment opportunities, as case studies show (Box 2). While tools such as renewable energy targets provide a supportive and important signal to investors, dedicated finance policies can actually lower investment risks to reduce the cost of capital.

They can establish a sector-based funding mechanism to facilitate financing or provide regulations and guidelines for capital markets to increase deal flow liquidity and funding supply. Prominent examples include priority sector lending, differentiated interest rates, a funding mechanism dedicated to renewable energy and guidelines for green bonds issuance.

BOX 2: FINANCE POLICIES IN INDIA

India's government has established ambitious capacity targets to deliver renewable energy deployment. This includes 100 GW of solar energy, 60 GW of wind energy and 10 GW of biomass energy by 2022 along with 50 GW of hydropower by 2017 (National Institution for Transforming India, 2015). These goals are supplemented by policy support through a range of subsidy mechanisms. In addition to these energy policies, India has established several finance policy mechanisms described below:

- » **Priority sector lending:** In 2015, the Reserve Bank of India introduced renewable energy into the priority sector lending category, which would incentivise banks to lend to this segment. Priority sector lending allows an increased lending cap and preferential interest rates for renewable energy projects as part of the Reserve Bank of India's priority lending sectors. The inclusion of renewable energy into the priority lending sector is enabling commercial banks to prolong the loan tenor from 10-15 years to 20-25 years (Gombar, 2015).
- » **A revolving National Clean Energy Fund:** The pool of money is collected by a clean energy tax on coal to support environmental and renewable energy projects. The Indian government is also considering a currency risk guarantee fund (see Section 3.2) to cover potential losses against local currency depreciation (Dutta, 2015).
- » **Green bond issuance guidelines:** The Securities and Exchange Board of India – the securities markets regulator – views the green bond market as a key tool to help raise the finance needed to meet India's ambitious targets. This country entered the green bond market in 2015, issuing USD 1.1 billion in green bonds from a number of sources (Yes Bank, Export-Import Bank of India, CLP Wind Farms and Industrial Development Bank of India) (Climate Bonds Initiative, 2016a). In January 2016, the Securities and Exchange Board of India released its official green bond requirements. These set guidelines on the green bond issuance review, reporting and tracking process. Further discussion on green bonds can be found in Section 4.2.

Other countries have also established finance policies dedicated to green or renewable energy projects. For instance, the Malaysian government has set up a USD 1 billion green technology financing scheme, which subsidises interest on loans by 2% for renewable energy projects. The People's Bank of China – the central bank – established an institutional framework for green bond issuance in the interbank bond market in December 2015 (Kidney, Sonerud and Oliver, 2015).

2.2 Supporting project pipeline development

For many investors, the inability to find projects mature for investment is a significant constraint. This is sometimes due to lack of information about opportunities in a new market such as the renewable energy market. It may also be due to the capacity constraints affecting project sponsors wishing to move from project idea to a well-documented project. Developing renewable energy projects requires a comprehensive understanding of due diligence processes and applicable regulations, and the ability to prepare project proposals and financial documents covering all project development stages. In many developing countries – and for most newcomers in the renewable energy industry – it is not always easy to gain the necessary technical capacity, skills and resources for such tasks. Planning and zoning authorities may require special expertise to identify the social, economic and environmental criteria that renewable projects should satisfy.

Project development

Technical assistance and grant funding for project development and document preparation can increase the renewable energy deal flow and improve the pipeline of projects ready for investment. For example, Cabeólica (Box 7) received a technical support grant from the Private Infrastructure Development Group (PIDG) Technical Assistance Facility for resource assessments and technical studies. This included wind pattern and technical engineering studies. In addition, the grant facilitated access to high-quality and rigorous technical analysis, and attracted high-profile technology providers. A technical assistance grant to the Yap Renewable Energy Development project (Box 4) ensured that earlier delays caused by inadequacies in the bidding and procurement process were eliminated. Appropriately skilled engineering consultants were thus engaged as design and supervision consultants. The grant also covered technical feasibility studies for wind, solar and diesel generation, and funding for the environmental and social impact assessment study.

Several project preparation facilities⁵ help generate more deal flows by addressing the gap in early-stage financing, including the following:

- » **Clean Energy Finance Facility for the Caribbean and Central America** is a collaborative financing mechanism pooling US government expertise⁶ and resources to catalyse greater public and private sector investment in clean energy infrastructure in the Caribbean and Central America. The facility provides support for essential project development costs to encourage investment in clean energy projects, including renewable energy. In particular, the US Trade and Development Agency leverages its project planning expertise and early-stage funding to support activities in eligible low- and middle-income countries (Overseas Private Investment Corporation, OPIC, n.d).
- » **The Ukraine Sustainable Energy Lending Facility** was established by the EBRD to foster renewable energy power generation projects in the Ukraine using a simplified and rapid approval process to reduce transaction costs. In addition to loans, the facility provides project developers with technical assistance from international and local experts. This includes improving feasibility studies and preparing documents required for project appraisal, permitting and licensing, commercial negotiations and loan applications (European Bank for Reconstruction and Development, EBRD, 2014a).
- » **The New Partnership for Africa's Development Infrastructure Project Preparation Facility Special Fund** is created by the AfDB. It is designed as a facility with a distinct role in financing regional/continental project preparatory activities through grants. These activities include advisory services, feasibility studies, environmental and social impact analysis, technical assistance, workshops and seminars. This fund is targeting support to the specific infrastructure needs of the member countries, including renewable energy projects (New Partnership for Africa's Development Infrastructure Project Preparation Facility Special Fund, 2016).

Not all project preparation facilities target renewable energy projects (World Economic Forum, 2015). Furthermore, some facilities provide technical assistance along with grants, while others disburse grants without

⁵ The list includes ADB's Clean Energy Financing Partnership Facility, ADB's Asia Pacific Project Preparation Facility, EBRD's Infrastructure Project Preparation Facility, EIB's MED 5P (Public-Private Partnership Project Preparation) Facility, IDB's Sustainable Energy and Climate Change Initiative, IDB's Infafund, and the Global Infrastructure Facility (Sustainable Energy4All, 2015).

⁶ The four US government partners under the facility are the US Department of State, the US Agency for International Development (USAID), US Trade and Development Agency and OPIC.

being directly involved in the preparation process. Either way, project preparation facilities represent a promising way to support the initiation phase of renewable energy projects. Consequently, more funding should be aimed at such facilities.

Other non-financial tools are also available to support project development and preparation. For example, IRENA's *Project Navigator* is an online tool (<https://navigator.irena.org>) which provides project developers with a step-by-step framework to develop high quality project proposals. It assists in the preparation of written project documentation and business proposals.

Project facilitation

One of the biggest barriers affecting the release of renewable energy investment is the shortage of investment-ready or bankable projects with an attractive value proposition. These projects can secure financing and generate sustainable revenue streams with all the necessary components aligned so that investors feel confident in long-term project success (World Energy Council, 2014). In many developing countries, the pipeline of deals in renewable energy is not evident to investors. This makes them reluctant to build the internal capacity to evaluate renewables deals. Targeted non-financial interventions such as project initiation and facilitation tools thus make a big difference. They provide the necessary signal to investors that a pipeline of deals is becoming available in the near future, making it worth their while to develop internal capacity.

While grant funding and project preparation facilities can support the project development process, improving renewable energy market transparency and liquidity requires more interactive project facilitation support. Transparency has to encompass information on projects, investors, financing sources and mechanisms, legal and technical advisory services and regulatory procedures.

IRENA's *Sustainable Energy Marketplace* (<http://marketplace.irena.org/>) is an online platform supplying this type of information to relevant stakeholders. The Marketplace aims to create a global virtual platform with regional hubs (Africa, the Caribbean and Latin America, and more), to connect project developers and owners with financiers, investors, and service and technology providers (Figure 7). Users can search for projects with specified investment criteria, financing sources or advisors. The platform allows users to find and connect with experts, as well as gain access to project development tools and data on markets, regulations and incentives. By providing timely access to renewable energy project information, the Marketplace can increase market transparency and significantly improve the visibility of renewable energy projects, helping them secure capital.

Figure 7. Snapshot of IRENA Sustainable Energy Marketplace



2.3 Facilitating access to capital

Limited availability of local debt finance is a key obstacle to investing in renewable energy, especially in developing countries (ADB and World Bank, 2015). A recent study conducted by the Climate Policy Initiative finds that limited availability of local debt is the biggest barrier to financing renewable energy projects in India. This manifests itself through less favourable lending terms such as high cost, short tenor and variable rates. It raises the cost of renewable energy in the country by 24%-32% compared with similar projects in the US (Nelson and Shrimali, 2014). Access to debt finance can be particularly difficult for small-scale projects such as off-grid solar PV systems (IRENA, 2015d). Due to the early-stage nature of the business and lack of track record, off-grid solar start-up companies often face difficulties securing working capital debt through bank loans and credit lines (Lighting Global, BNEF and the Global Off-Grid Lighting Association, 2016).

In order to improve the access to affordable capital, public finance institutions may provide concessional loans for renewable energy projects in developing countries. For example, the IRENA/Abu Dhabi Fund for Development (ADFD) Project Facility offers loans with a tenor of up to 20 years, a five-year grace period and interest rates of 1%-2% to cover 50% of total project cost.

With longer loan tenors, lower interest rates or extended grace periods, concessional lending plays an important role in filling the gap in affordable debt financing. However, the positive impacts of concessional loans can

only extend beyond the projects benefiting from the loans if supplemented by capacity building for local lending institutions to improve the country's investment environment. On-lending structures and loan syndication can thus, through capacity building, reduce key financial barriers such as limited access to debt and lending experience in renewable energy.

Flexibility offered by hybrid structures can also facilitate the more active involvement of public finance institutions and investors into renewables, thereby improving the project developer access to capital. Hybrid structures combine key characteristics of two financial instruments and thereby allow projects to benefit from both instruments while reducing and transferring risks. These hybrid structures include, for instance, mezzanine finance, which is subordinated to senior debt but has priority over equity. Subordinated debt can attract private investors who are not familiar with renewable energy projects. Another option is convertible grants which can be applied so that public finance supports the risky stages of project development while providing a safety margin for failure. A third option is convertible loans, which help lower the cost of capital by providing contingent claims to capture the equity upside. Box 3 discusses how hybrid structures stack up in terms of risk and cash flow priority in capital structure.

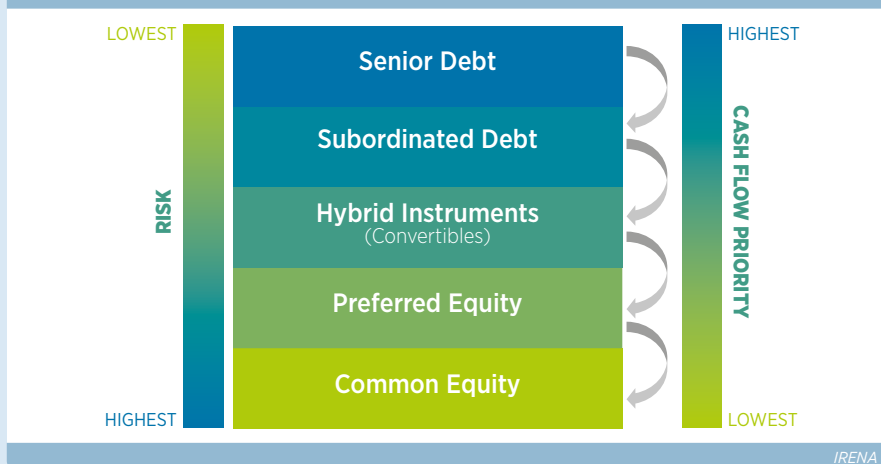
BOX 3: THE CAPITAL STACK

Project finance often requires a combination of funding instruments to form the capital structure. The three main elements of the capital structure are equity, debt and hybrid instruments (i.e. those that share characteristics of both debt and equity). Often referred to as the capital stack, the structure can range from very simple debt and equity combinations to highly complex securitised forms of capital.

Figure 8 shows how the risk level among the different types of capital varies, being lowest for senior debt and highest for common equity. This can be attributed to the cash flow priority of each capital type. Senior debt has the highest cash-flow priority. Cash flows resulting from the project are paid to senior debt holders first. Only when they have received their payment will subordinated debt be repaid. Common equity is last in line and consequently incurs the highest risk that project funds will not suffice to completely repay this tranche.

This section introduces some of the debt and hybrid instruments that can help improve local lending capacity, access to capital and risk-adjusted returns for renewable energy investment. These include on-lending structures, loan syndication, subordinated debt, convertible grants and loans.

Figure 8. Capital stack



IRENA

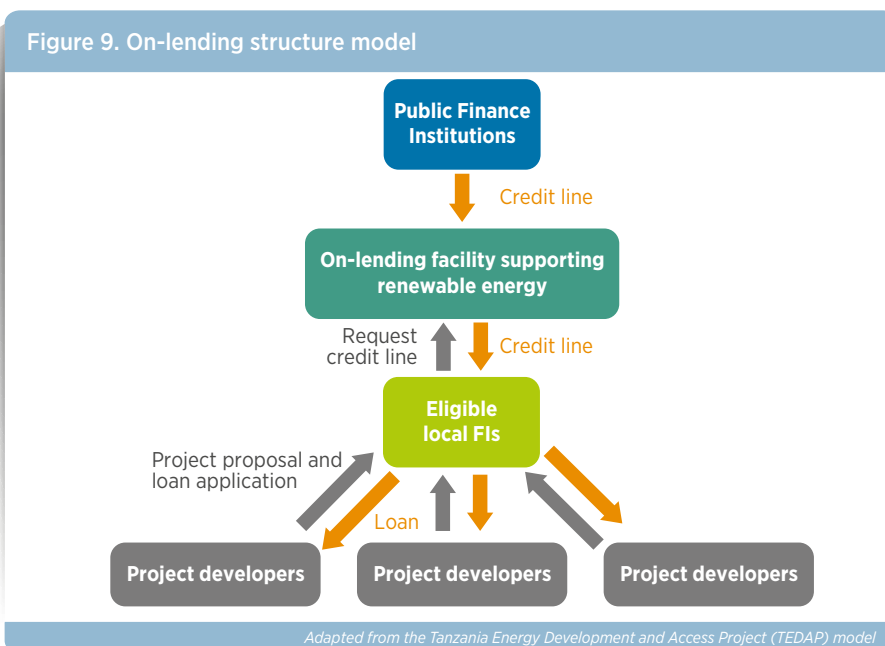
Placed in the middle of the capital stack, subordinated debt and hybrid instruments placed in the middle of the capital stack have unique characteristics that public finance institutions can use to reduce the cost of capital and to mobilise private capital in renewable energy investment.

On-lending structures

Many local financial institutions lack the experience or information necessary to finance renewable energy projects. Structuring term sheets and developing screening criteria to assess the bankability of Power Purchase Agreements (PPAs) and credit risks requires an understanding of financial as well as technical aspects of renewables. The lack of track record and performance history (Climate Investment Funds, 2012) of certain renewable energy technologies further adds to the perception of high risk of renewables by local financial institutions. The absence of technology standards and comparable benchmarks for renewable energy projects has the same effect. In addition, financiers may not be familiar with market players and the industry structure in countries with nascent renewable energy markets.

On-lending, also known as financial intermediary lending, can increase the availability of local debt, improve access to local financing and help build local lending capacity. Many DFIs use their high credit quality and market access to borrow debt at low rates and on-lend them via credit lines to a government or other institution. While not necessarily cheaper than ordinary loans, the local lender may access consultancy services and training to develop feasible projects, thus building experience and a track record.

This practice reduces the local banks' risk, making them more willing to lend, and improves the overall effectiveness of the investment. From a project developer standpoint, on-lending can increase the availability of financing, possibly on better terms than it might otherwise find in the local market. An example of a typical on-lending structure is illustrated in Figure 9.



On-lending facilities typically use credit lines. This is credit offered by banks which the borrower can draw upon if needed but is not obliged to. A credit line has a certain limit agreed between the lender and the borrower. When a credit line is used, the remaining limit is reduced accordingly. As the borrower repays the loan balance, the credit line is recovered and is thus of a revolving nature. Revolving, contingent credit lines are used for short-term financing needs. For example, they provide flexibility in the debt financing of businesses or act as buffer against short-term income volatility. Another use of credit lines is discussed in Section 3.3.

National governments and DFIs can develop on-lending structures targeted at small- to medium-scale renewable energy systems. Some prominent examples include the following:

- » The World Bank and the GEF-funded TEDAP provide credit lines to eligible commercial banks in Tanzania to support small-scale rural renewable energy projects via on-lending. When a project developer requests a loan from any of the participating banks, the local bank (after a full appraisal of the project) requests a corresponding credit line from the TEDAP administrator, the Tanzania Rural Electrification Agency. As a result of TEDAP's on-lending intervention, the interest rate was reduced from 6.24% to 5.61 % in 2011 (Rural Energy Agency, 2011).
- » ARB Apex Bank, the implementing agency of the Ghana Energy Development and Access Project, acts as a mini-central bank by lending capital to a vast network of rural and community banks across Ghana. These in turn finance solar home systems to rural households lacking electricity. In order to facilitate on-lending schemes for off-grid renewable energy systems, the bank developed in-house technical expertise with technological knowhow (IRENA, 2015d).
- » The EBRD's Sustainable Energy Financing Facility in Turkey aims to address finance shortcomings by providing credit lines to local financial institutions for on-lending to small and medium-sized enterprises. This finances energy efficiency and renewable energy projects. This model combined concessional funding from the Clean Technology Fund, non-concessional funding from the EBRD and technical assistance to banks and investors financed by EU and Clean Technology Fund resources. Facility funding of USD 289 million was channelled into 370 sustainable energy projects. This mobilised a total project value of USD 460 million between 2010 and 2012 (EBRD, 2014b).

Loan syndication

DFIs can co-lend senior debt with commercial banks and distribute the risks among a broader group of lenders, thereby limiting each bank's risk-taking. This applies especially to larger and riskier projects such as offshore wind power. While no single commercial bank could extend the large loans needed, many banks participate in a syndicate to finance such large-scale projects.

When a DFI participates in loan syndication, this can facilitate local bank participation because local banks can piggyback on the development bank's experience of renewable energy project finance. Foreign banks find the participation of development banks in project finance politically reassuring (Wang et al., 2013). For example, DFIs with experience in a particular renewable energy technology could lead the early rounds of financing with soft loans.

Local banks in syndication with other banks then take the lead for later rounds (Lavine, 2013). In this way, local banks can enhance their capacity and interest in lending to renewables through the knowledge gained from the early rounds. Meanwhile, borrowers benefit from the lower cost of local financing. Through this experience, local financial institutions can build a track record and capacity in consultancy services to finance renewable energy projects on their own.

B-loan structures led by a public finance institution in syndicated loans can benefit both participants (lenders) and borrowers. In this type of scheme, a DFI retains a portion of the loan for its own account (the 'A-Loan') and sells the remaining portion to participants (the 'B-loan') (International Finance Corporation, IFC, 2016). By contracting with a DFI instead of lending directly to the projects, commercial banks and other financial institutions can lend to DFI-financed projects. This means they benefit from the DFI's high credit rating, strong relationship with governments and ability to provide risk mitigation.

Borrowers can achieve financing with longer tenors by signing a single loan agreement with the DFI. They then benefit from lower financing and transaction costs as well as a more simplified administration and documentation process than if signing with multiple lenders. The effectiveness of B-loan structures is further discussed in the Jordanian solar case study in Section 5.3.

Subordinated debt

Subordinated debt can help to insulate senior debt investors from unacceptable risks and reduces the cost of capital in cases where equity is too expensive. This can be especially important where senior debt investors are unfamiliar with the risks inherent in renewable energy projects. As a form of mezzanine financing, subordinated debt can be provided by public investors to attract private investors. For example, the UK Green Investment Bank (GIB) invested GBP 70 million in a biomass plant together with the Irish utility Electricity Supply Board. The GIB and the utility invested the capital in

the form of equity and a shareholder loan, which is a type of subordinated loan. Through this structure, the equity investors were able to raise GBP 120 million from an export credit agency and two commercial banks (GIB, 2015). Such subordinated debt supported by public institutions can also work as a type of credit enhancement for senior debt (see Box 12).

Convertible grants

Convertible grants provide the ability to shift funding from grant to loan. This instrument offers public finance institutions a useful way to support early-stage project development and high risk renewable energy technologies with the potential to benefit from loan interest. At the same time, they leave a safety buffer for project developers (the beneficiaries of public finance support) should the desired outcome not materialise.

Convertible grants have been proposed in the European Union's Electrification Financing Initiative (ElectriFI) to support renewable energy and energy access projects in developing countries. Under this initiative, private sector equity investors at the early investment stage can enjoy a safety buffer from convertible grants. These convert into subordinated debt once they reach particular milestones (such as the completion of a feasibility study, financial closure, or project completion).

Subordinated debt (up to 30% of total project cost) can be made available in cases where equity availability is low or comprises in-kind contributions (5%-15% of total project cost) (European Union, 2014). Convertible grants can be also used to lower geothermal resource risk during exploratory drilling (Section 3.4).

Convertible loans

Convertible loans are like convertible grants, in that they can be converted, at certain points and at certain pre-agreed terms, into another instrument with a higher risk and return profile, in this case equity. They can support early-stage project development by mitigating risks while allowing for potential upside returns to lenders. This structure can be used by public finance institutions to finance project development activities or new renewable energy technology deployment.

On the one hand, convertible loans can provide the borrower with the option to repay the loan instead of equity conversion and tailor the repayment

schedule according to the project schedule. On the other hand, they allow the public finance institution to fund projects at reasonable terms compared with the high risk of the investment. The embedded opportunity and related upside potential to convert the debt into equity can result in lower cost of the debt to the borrower.

For example, project development cost could be financed by a convertible loan (project development loan) to be repaid by refinancing it at the construction stage using construction stage senior debt. If the project is implemented on schedule, the project owners are able to repay the loan and avoid the dilution. If the project is delayed or cancelled, the project company avoids going bankrupt since the loan will be converted to equity, although the project owners' equity stake would then be diluted.



3 FINANCIAL INSTRUMENTS ADDRESSING INVESTMENT RISKS

KEY POINTS:

- » Investors' perceptions of risk result in an added premium on the cost of capital in renewable energy projects and may prevent them from investing at all. A powerful set of instruments is available to address risks and unlock investment in renewables.
- » Guarantees issued by public finance institutions such as political risk insurance, partial risk guarantees and export credit guarantees can mitigate various types of investment risks, including political, policy, regulatory, credit and technology risk. However, the current use of such guarantee instruments for renewables remains limited.
- » Currency risk mitigation measures include hedging instruments resolving currency mismatch in renewable energy projects, as well as mechanisms to deal with the high cost of hedging itself.
- » Liquidity risk mitigation instruments can be used to reduce the power off-taker's credit risk arising from liquidity concerns and to mitigate refinancing risk by helping to extend loan tenors.
- » Geothermal energy projects carry a particularly heavy upfront resource risk during the exploration drilling stage. Grants, convertible grants and various forms of guarantee-based instruments can reduce or reallocate such resource risk.

Risk mitigation is especially important in renewable energy projects because of their high upfront capital requirement. Financial de-risking instruments accompanied by sound policy can reduce the financing costs of renewable energy investment and help attract capital at scale (Waissbein et al., 2013). Project risk can take multiple and often parallel forms (Table 2). This includes political and regulatory risk, counterparty, grid and transmission link risk, currency, liquidity and refinancing risk, as well as resource risk. Resource risk is a particular concern for geothermal energy projects.

Table 2. Definition of key investment risks

Political Risk	Risks associated with political events that adversely impact the value of investments (e.g. war, civil disturbance, currency inconvertibility, breach of contract, expropriation, non-honouring of obligations).
Policy or Regulatory Risk	Risks associated with changes in legal or regulatory policies that have significant, adverse impacts on project development or implementation (e.g. incentive programs, interconnection regulations, permitting process)
Counterparty Risk (Power Off-Taker Risk)	Credit and default risk by a counterparty in a financial transaction. For renewable energy investments, it is related to the risk of default by power off-taker, typically the electric utility.
Grid and Transmission Risk	Limitations associated with limitations in interconnection, grid management, and transmission infrastructure.
Technology Risk	Risk associated with use of nascent technology or inexperienced and unskilled labour deploying it.
Currency Risk	Risks associated with changing or volatile foreign exchange rates that adversely impact the value of investments and arises when there is a currency mismatch between assets (revenues) and liabilities (debt financing).
Liquidity Risk	Possibility of operational liquidity issues arising from revenue shortfalls or mismatches between the timing of cash receipts and payments.
Refinancing Risk	Risk that a borrower is unable to refinance the outstanding loan midway through the life of a project due to inadequate loan terms (the maturity of the loan is mismatched with the lifetime of the asset).
Resource Risk	Risk associated with uncertainties around the availability, future price and/or supply of the renewable energy resource (e.g. risk related to geothermal energy projects).

IRENA analysis

By providing access to effective risk mitigation instruments, public finance institutions make a critical contribution to helping mobilise private capital for renewable energy investment. It is a particularly important strategy in the light of the limited public resources available for investment in renewable energy projects. These instruments will hence become increasingly important as the rate of private investment requirements in renewable energy project rises along with the growing need for new energy solutions across the world.

This chapter discusses several types of financial risk mitigation instruments targeting these investment risks. The first part of this chapter focuses on various types of guarantee instruments, the most prominent financial risk mitigation tool. It examines their use in renewable energy projects. The rest of the chapter considers currency, liquidity and resource risk mitigation instruments more closely. These are an increasingly significant feature of renewable energy investment. Box 4, Box 6 and Box 7 offer case studies that demonstrate how these measures can play a critical role in enabling investment. Table 3 displays a matrix of risk types and the instruments to address them.

Table 3. Financial risk mitigation tools to address investment risks

	Political risk	Policy and regulatory risk	Counterparty risk (power off-taker risk)	Grid interconnection and transmission line risk	Technology risk	Currency risk	Liquidity and refinancing risk	Resource risk
Government guarantee	✓	✓	✓					
Political risk insurance	✓	✓	✓		✓		✓	
Partial risk/credit guarantee	✓	✓	✓		✓	✓		
Export credit guarantee	✓	✓	✓		✓	✓		
Currency risk hedging instrument							✓	
Currency risk guarantee fund							✓	
Local currency lending							✓	
Internal/external liquidity facility				✓				✓
Liquidity guarantee								✓
Put option								✓
Grant and convertible grant								✓
Resource guarantee fund								✓
Geothermal exploration insurance								✓
Portfolio guarantee								✓

IRENA

3.1 Guarantee instruments

By addressing various risks, guarantee instruments can improve the structure and quality of renewable energy investment, making projects more attractive to private investors. A recent study finds that increased use of guarantees could result in an additional USD 100-165 billion in private sector investment in sustainable infrastructure over the next 15 years (Bielenberg et al., 2016).

Guarantees supporting energy investments are usually issued by public entities such as governments and international finance institutions to address political, policy, credit and currency risk, for instance. Such risks covered by guarantees in renewable energy investments are in general similar to those covered in fossil fuel projects. Guarantee instruments dedicated to mitigating a technology-specific risk (e.g. geothermal resource risk guarantees) are an exception to this. The use of guarantees for renewable energy investments differs from those used for fossil fuel in the limited track record thus far in applying, issuing and using the guarantees.

Guarantees offer an efficient way of leveraging private investment with limited public capital. However, moral hazard may arise because a guarantee may provide the buyer with a counterproductive incentive to engage in riskier behaviour, undermining its purpose to guard against risk. Such behaviour would magnify the costs for the entity providing the guarantee. To dispel moral hazard and reward projects that are financially viable, guarantees are issued usually only after comprehensive due diligence and screening. Limiting the guarantee to the partial coverage of potential losses can also reduce potential moral hazards.

This section examines various types of guarantee that can be used in renewable energy investments. The guarantee instruments discussed in this section are versatile. They can be used to mitigate investment risks, including political, policy, regulatory, currency, credit and technology risk. Other types of guarantee instruments dedicated to specific risk categories, especially currency, liquidity and resource risk, are discussed in the later sections.

While the use of guarantee instruments is well known in project finance, it has been less common in renewable energy investment. The end of this section presents the results of a survey showing the extent of guarantee use, revealing another barrier to attracting private capital.

Government guarantee

By issuing guarantees, governments backstop project risks they are in a better position to take, thus helping enable financing. In the three case studies presented in this chapter, including the Yap Renewable Energy Project in the Federated States of Micronesia (Box 4), governments provided guarantees to mitigate currency, regulatory and power off-taker risk. Typically issued by the treasury or ministry of finance, government guarantees are often required by investors and lenders for projects in developing countries. Commercial lenders in particular may require a government guarantee when they are not confident about the project's financial viability without government backing.

Sometimes governments are not able to provide a guarantee for one of the following reasons:

- » Public sector financial constraints and associated International Monetary Fund obligations mean some governments can only provide a letter of comfort (or assurance of willingness to enter a contract) through the state utility to purchase electricity from the project;
- » Some governments do not provide an additional guarantee letter on top of a government-backed PPA;
- » Some countries are not able to provide a guarantee for relatively small loans as they have vehicles only for larger loans.

Private sector projects sometimes face difficulty in obtaining a government guarantee, and promising project proposals have fallen through the process as a result. Lenders and development funds supporting renewable energy projects could consider the following possible alternatives to government guarantees:

- » A national bank guarantee, in which a central bank or a state-level bank (public finance institution) guarantees a project instead of the ministry of finance. Alternatively, a guarantee fund set up by reciprocal guarantee partnerships could play this role. These partnerships are usually set up by federal or provincial government banks and have a liquid fund used as collateral. Argentina, Spain and other countries have developed these types of funds.
- » A corporate guarantee fund or trust with a credit-risk rating or other similar indicator, which ensures they comply with international solvency standards.

Sometimes, these alternative approaches may not be sufficient or strong enough to be acceptable, or the creditworthiness of the government entity may be in doubt. In these situations, risk guarantees issued by public finance institutions such as DFIs or export credit agencies may be necessary. The sections below discuss guarantees that leverage the creditworthiness of public finance institutions to mitigate various project risks as well as risks associated with government.

BOX 4: YAP RENEWABLE ENERGY DEVELOPMENT PROJECT

The State of Yap, in the Federated States of Micronesia, has been developing a 3.6 MW wind-solar-diesel hybrid project to reduce dependency on imported diesel. Once completed in 2017, the project will be owned by Yap State Public Services Corporation, which will operate the assets and sell the electricity produced. The total cost of the project is USD 11.14 million, of which the majority is debt financed by the ADB (see Table 4).

The developer implemented tailored strategies to overcome the risks of each individual element.

- » To reduce the risk of late- or non-payment of loan obligations (principal and interest) by the borrower (the Yap state government), the Federated States of Micronesia provided a sovereign loan guarantee. This covered late payment and default risk on the part of Yap State Public Services Corporation. This satisfied the condition precedent for long-term loans provided by the ADB.
- » Commercial risks associated with securing leases for the solar installations were reduced by establishing long-term leasehold rights to install, maintain and operate the systems on government-owned rooftops.
- » To mitigate resource risk for the wind power plant, a detailed wind resource analysis was conducted including long-term monitoring. The study revealed that the wind resources had been overestimated in the initial internal rate of return calculations.
- » A technical assistance grant financed by the Asian Clean Energy Fund under the Clean Energy Financing Partnership Facility also ensured that earlier delays caused by inadequacies in the bidding and procurement process were eliminated. It ensured appropriately skilled engineering consultants were engaged as design and supervision consultants supplying project management services to overcome capacity barriers.

Table 4. Financial structure of Yap renewable energy development project

Capital	Type	Share of project	Value (USD million)	Terms	Source of Capital
Equity	Public	19%	2.12	Not applicable	YSPSC
	Sub-total	19%	2.12		
Debt (public)	Ordinary Capital Resources (OCR) loan	42%	4.68	25 years including 5 year grace period; interest: Libor (10-year fixed swap rate) plus 0.4% spread + 0.2% maturity charge; 0.15% commitment charge/year	Asian Development Bank
	Special Funds Resources loan	39%	4.34	25 years including 5 year grace period; interest rate: 2% per annum	
	Sub-total	81%	9.02		
Grand total		100%	11.14		

IRENA interviews and research (ADB, 2013, 2012; Nabeyan, 2015)

Political risk insurance

Investors are highly sensitive to the potential impact of political risk, making the transfer of such risks essential, especially in countries with an unstable political system or inadequate rule of law. Political risk insurance⁷ issued by public finance institutions can provide a broad coverage of risks related to government action, building on their strong creditworthiness and government membership.

A member of the World Bank Group, the Multilateral Investment Guarantee Agency (MIGA) is the largest public provider of political risk insurance in terms of volume. Five main categories of political risk typically covered by MIGA's political risk insurance⁸ include:

- » War, terrorism and civil disturbance, which may include losses from revolution, insurrection, coups d'état, sabotage and terrorism.
- » Currency inconvertibility and transfer restriction, meaning losses arising from an investor's inability to convert local currency into hard currency due to government action (or inaction).

⁷ In contrast to guarantees, insurance "typically requires a specified period which claims filed by the insured are to be evaluated before payment by the insurer," (Matsukawa and Habeck, 2007). Otherwise, in the context of risk mitigation instruments, there is no critical difference between the two, and some insurance products are also labelled guarantees by the issuers. This report therefore does not differentiate between insurance instruments and guarantees but follows the names and terms provided by the issuers.

⁸ The MIGA political risk insurance differs from other World Bank guarantees in that it can guarantee equity in addition to debt and does not require a counter-guarantee from the host government (The Independent Evaluation Group, 2009).

- » Breach of contract, meaning losses arising from the utility's breach or repudiation of a contract (e.g. breach of a PPA by a government entity). This coverage requires arbitration.
- » Expropriation, meaning losses arising from government action like nationalisation or confiscation which reduce investors' ownership or control over an asset. In addition to outright nationalisation and confiscation, such behaviour may include 'creeping' expropriation—a series of acts that, over time, lead to expropriation.
- » Non-honouring of financial obligations,⁹ meaning losses resulting when a sovereign or state-owned enterprise defaults on financial payment obligations such as guarantees of loan repayment or equity injection.

In addition to political risk, political risk insurance can be used to address policy and power off-taker risks. OPIC, the US government's DFI, extends the coverage of its political risk insurance to offer protection against such risks for renewable energy investments (OPIC, 2011). This application is relevant because many governments participate in the market as power off-takers through state-owned utilities and set policies that support revenue, such as feed-in tariffs and tax credits. It could, for example, be relevant in a case where the government-owned utility breaches the PPA by unexpectedly changing policies without negotiations.

The use of political risk mitigation instruments thus can play a key role in attracting private capital. The MIGA political risk insurance mitigated such government-related risks affecting the 250 megawatt (MW) Bujagali hydropower project in Uganda through 'breach of contract' coverage (for 90% of the equity investment). This drew in a higher level of private investment than any other comparable hydropower project in the region (Frisari and Micale, 2015).

⁹ Clients can be protected against sovereign institutions that do not honour their financial obligations without the need to obtain an arbitral award, thereby reducing the time needed to obtain a claim payment (MIGA, 2012).

Partial risk guarantee

Another guarantee instrument to cover political risks is the partial risk guarantee structure. This was first introduced by the World Bank to cover a wider range of political risks (and for a longer tenor) than those covered by the insurance market (Matsukawa and Habeck, 2007). Depending on the specific coverage on the contractual agreements, a partial risk guarantee can also be used to mitigate policy and regulatory risks. It can be provided to investors to ensure a government's obligation to compensate for loss of regulated revenues resulting from defined regulatory risk. This could happen when the government or regulatory agency changes, repeals or fails to comply with the key provisions of the regulatory framework (AfDB, 2013a). It can also be used to backstop a government commitment in the early stages of power sector reform to ensure reliable and timely enforcement of the measures required for the reform (AfDB, 2013a).

Uncertain grid access is one of the most significant factors in determining the commercial viability of a new power project (Clean Energy Pipeline, 2015). Partial risk guarantees can be particularly important for covering transmission line and grid interconnection risk because such infrastructure systems are often owned by government entities.

In many cases, renewable energy independent power producers (IPPs) must assess whether they can operate at partial capacity or bear the full cost of grid expansion and interconnection. Developers in sub-Saharan Africa note that existing transmission infrastructure often prevents renewable energy power generators from interconnecting with the national grid (Roelf, 2015), delaying financial closure and deterring investors. Box 5 showcases how a partial risk guarantee could address transmission line delay risk in the development of the Lake Turkana Wind project in Kenya.

Partial risk guarantees are an effective means of lowering moral hazard associated with insurance. However, since the coverage is less than the guarantees with full coverage, the risk mitigation may not be as effective. Establishing the right balance of coverage is thus essential.

BOX 5: ADDRESSING TRANSMISSION LINE DELAY RISK WITH A PARTIAL RISK GUARANTEE: THE LAKE TURKANA WIND PROJECT

Lake Turkana is the site of Africa's largest wind project to date. The project involves the construction of a 310 MW wind farm in the Great Rift Valley in northwestern Kenya. It comprises 365 turbines of 850 KW capacity each and is being developed by an IPP under a 20-year take-or-pay PPA signed with the Kenya Power and Lighting Company. Kenya's state-owned utility, the Kenya Electricity Transmission Company, funds and constructs a 428-kilometre high voltage transmission line for the evacuation of the power to the national grid.

The main objective of the project is to provide clean, reliable and low cost power to Kenyan consumers. With average annual electricity production estimated at 1,440 gigawatt-hours, the completed project will make up approximately 17% of Kenya's installed generation capacity (AfDB, 2013b). The wind energy generated by Lake Turkana Wind Power will be cost-competitive on a national basis at EUR 0.075/kWh (Lake Turkana Wind Power, 2015). The tariffs are set in Euro (EUR) terms but to be paid in local currency, removing currency risk for Euro-based debt repayment.

To reach financial close, the project had to deal with transmission line delay risk to make sure the transmission line is established in time to connect the generated power to the grid. In the event of delay, the Kenya Power and Lighting Company would be exposed to financial penalties due to its inability to take up power from the wind farm (Mbugua, 2012). This was also a power off-taker and liquidity risk concern for the Lake Turkana wind project and its investors. In other words, they were uncertain whether the off-taker could buy the electricity and make payments to the wind power producer in cases of power oversupply (electricity produced exceeding demand). This could be caused by a delay in transmission line construction. Power off-taker and liquidity risk in this context are therefore closely related to transmission line delay risk.

To manage these risks, developers first asked the World Bank's International Development Agency (IDA) whether it could provide a partial risk guarantee to cover these risks. However, the IDA declined because the Kenyan government would not issue a government counter-guarantee. Thereafter, MIGA considered

providing political risk insurance without such a counter-guarantee, but then withdrew from the project due to the concerns about oversupply.

A year later, the AfDB stepped in, issuing its first-ever partial risk guarantee through the Africa Development Fund. The bank deposited EUR 20 million into an escrow account of EUR 90 million (about USD 120 million) for the project. This ensures the off-taker's PPA payment obligations for the first six months, once the project starts to generate power.¹⁰ Kenya's government has provided the other EUR 70 million and has issued a letter of support to cover political risk.

The partial risk guarantee played a pivotal role in the financial closure of this project. This is because it covered the delay risk for the construction of a 428-kilometre publicly owned transmission line between substations needed to connect the project to the national grid (AfDB, 2013b). This example demonstrates the importance of partial risk guarantees in commissioning large-scale power projects in developing countries and aligning transmission line construction with power generation.

Partial credit guarantee

Partial credit guarantee can cover part of the debt service default by the borrower regardless of the cause of default for a specific period of the debt term for a public investment. Being relatively more flexible than political risk insurance or partial risk guarantees, partial credit guarantees can cover a wider range of risks. For renewable energy projects, partial credit guarantees can be employed to address currency transfer and convertibility risk caused by host government action. For example, the IFC's partial credit guarantee can mitigate currency risk with the guarantee structured to cover only the debt service due during the estimated time of currency inconvertibility (IFC, n.d.). This can offer a cost-effective way to reduce transfer and convertibility risk because it guarantees only the debt portion of the financing during a specific time period.

¹⁰ Due to a take-or-pay PPA, the Kenya Power and Lighting Company has to purchase power from January 2017 regardless of whether the transmission line is completed. During the first six months, the government of Kenya and the AfDB's partial risk guarantee would cover the payment with EUR 70 million and EUR 20 million respectively.

Partial credit guarantees can address technology risks in small and medium-sized renewable energy companies to enhance their credit. Due to their size and the nature of nascent technologies, these companies often have difficulties in providing industry-standard completion and performance guarantees, which may prohibit them from participating in bidding processes. The US Department of Energy loan guarantee scheme is targeted to support new domestic technologies via partial credit guarantees to win their first reference cases. The ARECA (Accelerating Renewable Energy Investments in Central America and Panama) project partial credit guarantee scheme by the Central American Bank for Economic Integration (CABEI) also targets small-scale renewable energy projects under 10 MW. It covers 75% of the loans up to USD 500,000 (Aldana, Braly-Cartillier and Shuford, 2014). Such a high coverage provides a strong incentive to engage in small-scale projects and allows project developers to accept some of the other high transaction costs.

In addition, partial credit guarantees can be used to reduce power off-taker risk in developing countries by enhancing public utility creditworthiness. A partial credit guarantee was used to spread the credit risk of the power off-taker and facilitate local debt financing in the Kalangala case discussed in Box 6.

BOX 6: KALANGALA INFRASTRUCTURE SERVICES, UGANDA

Kalangala Infrastructure Services is the first of its kind not only in Uganda but also the African continent. The project is a multi-sector initiative that provides a range of infrastructure services, including improved access to water, safer transportation and solar power. The USD 38.72 million budget includes a 1.6 MW solar PV-diesel hybrid power generation system linked into a mini-grid, a 33-kilovolt transmission system, a low-voltage distribution system and the installation of a prepaid metering system for households and businesses.

The renewables project (budget USD 13.8 million) was set up by developer EleQtra for InfraCo Africa in the Bugala Island, Lake Victoria, region of the Kalangala district of Uganda. Its aim was to reach some of the poorest residents while also being financially viable. Table 5 provides a breakdown of the project's finances.

Kalangala was not an easy project to finance. Besides political and currency issues, the project was exposed to a range of risks, including general project risks, technical and bureaucratic complexity and off-taker/liquidity

risks. A blended financial structure was therefore put in place, combining concessional finance from DFIs with commercial lending and output-based assistance in the form of grants. These grants covered technical risks during the development phase. Risk mitigation instruments, meanwhile, opened access to concessional financing.

This blended approach helped the project overcome the financing barrier at the development stage and, mobilise private investment as well as participation by a high-profile technology provider. Specific elements included:

- » A Technical Assistance Fund, which facilitated access to high-quality and rigorous technical analysis and helped to attract the participation of high-profile technology providers.
- » A joint partial credit guarantee between GuarantCo and USAID, which addressed power off-taker risk (Uganda Electricity Transmission Company) and compensated for the lack of local currency debt with a long-term loan tenor. The partial credit guarantee provided cover to both commercial banks and institutional lenders, thereby leveraging additional private sector investment in the project. However, the negotiation and implementation of the cover took four years.
- » Currency hedging, achieved by matching project cash flows as closely as possible (i.e. by fitting project revenues to expenses).

Table 5. Financial structure of Kalangala Infrastructure Services

Capital	Type	Share of project	Value (USD million)	Terms	Source of Capital
Equity	Public	20%	7.72	Not applicable	InfraCo Africa
		19%	7.50		Industrial Development Corporation (S. Africa)
		17%	6.50		Ugandan Development Corporation
	Sub-total	56%	21.72		
Debt	Public	18%	7.00	12 years with 18 month grace period; Interest rate 5.5% + 6 month LIBOR	Emerging Africa Infrastructure Fund (EAIF)
	Private	13%	5.00	12 years with 18 month grace period; interest rate 7.827%	Nedbank
	Sub-total	31%	12.00		PIDG Technical Assistance Fund
Grant	Public	13%	5.00	Not applicable	
Grand total		100%	38.72		

IRENA interviews and research (eleQtra, 2015a; GuarantCo, 2011; Hipwell, 2015; Infraco Africa, 2011; PIDA, 2015)

Export credit guarantee

If a project involves trade, it may be possible to get access to an export credit guarantee. Like most credit guarantees, export credit guarantees cover default on any debt service regardless of the cause, thereby offering a comprehensive risk coverage (both commercial and non-commercial) to private exporters or their lenders. This can be particularly useful for mitigating technology risk for renewable energy technology providers and equipment manufacturers without a proven track record and weak credit ratings. The presence of export credit guarantees and involvement of export credit agencies can also reduce the perceived risk of local lenders as well as financing costs. It increases the project developer's chance of acquiring affordable project finance with long-term loan tenors.

Many export credit agencies are increasingly interested in supporting renewables. Under the *OECD Arrangement on Officially Supported Export Credits Sector Understanding for Renewable Energy, Climate Change Mitigation and Water Projects*, participating export credit agencies can offer longer credit repayment periods. The maximum is 18 years instead of ten years. In addition, they can offer flexible repayment structures for renewable energy projects in the importing countries if the project fulfils certain requirements (OECD, 2014). An increase in the tenor can reduce the interest rate, leading to a decrease in the electricity tariff. The longer tenor enables more flexibility in cash flow, which can thus reduce the repayment risk to borrowers.

LIMITED USE OF GUARANTEES IN RENEWABLE ENERGY INVESTMENTS – IRENA SURVEY RESULTS

This section has shown how guarantees issued by public finance institutions not only manage and change the perception of risk but also improve lending terms and returns. They strengthen government participation and commitment, leading to improved project bankability and mobilisation of private investment. Despite these benefits, little data are available tracking guarantees and how they are being used in renewable energy projects. Understanding the use of risk mitigation instruments is key to releasing renewable energy investment.

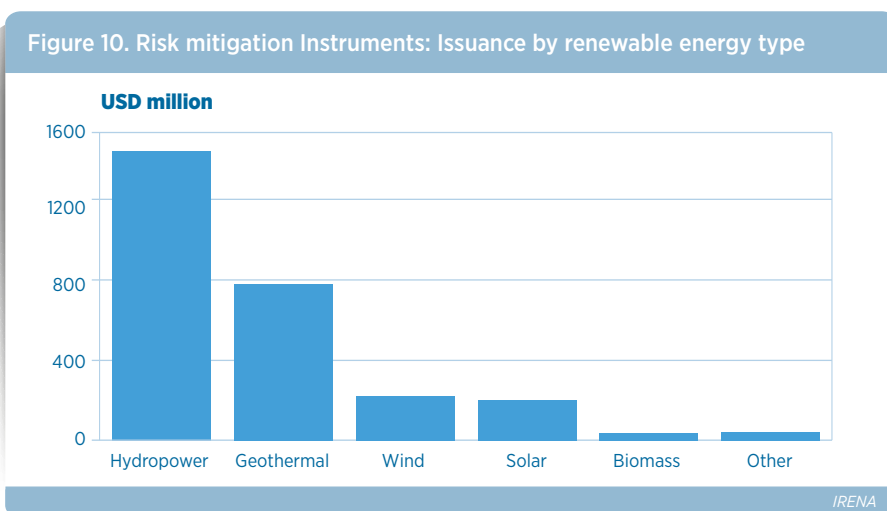
IRENA thus conducted a survey of international financial institutions between March and June 2014,¹¹ reaching out to 35 separate institutions. Eleven organisations responded, supplying IRENA with data on the issuance of

¹¹ The survey questionnaire and data template are published online.

renewable energy risk mitigation instruments. Complementary data were collected through additional research on further five other organisations. A number of respondents also participated in targeted interviews, supplying insights on the opportunities, barriers and project developer needs. The survey focused on the guarantee instruments discussed in this section: political risk insurance, partial risk guarantees, partial credit guarantees and export credit insurance.

Based on data from 16 institutions,¹² IRENA analysed guarantee issuance and use in renewable energy investment. The key findings are summarised below.

- » **Use of guarantee instruments for renewables remains limited.** Although international financial institutions are well positioned to mitigate investment risks, they have dedicated only about 4% of their total infrastructure risk mitigation issuance value to renewable energy. Among the institutions surveyed, this rate ranged from 0% to 13%. In particular, four organisations indicated that they have no experience of deploying risk mitigation instruments for renewable energy projects.¹³
- » **Guarantees have been used mainly to support larger-scale projects.** Hydropower has received the most support followed by geothermal energy. As illustrated in Figure 10 below, hydropower projects received slightly over half (54%) of the value of risk mitigation instruments issued. Geothermal projects followed, receiving 29% of the value of risk mitigation instruments issued. Wind projects received 8% and solar received 7%. Biomass and other technologies made up the remaining 2%.

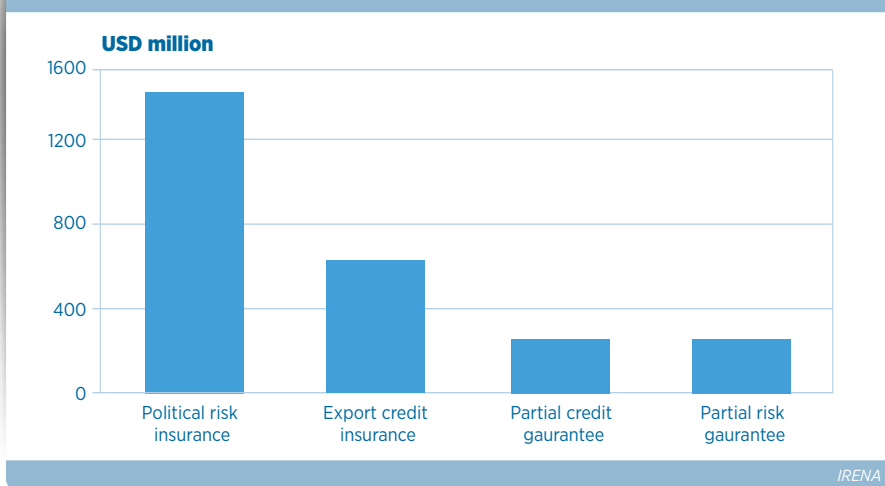


¹² ADB, AfDB, Africa Trade Insurance Agency, Development Bank of Southern Africa, UK Export Credits Guarantee Department, Export Development Canada, EBRD, GuarantCo, International Bank for Reconstruction and Development, Islamic Corporation for the Insurance of Investments and Export Credit, IDA, IFC, Korea EximBank, MIGA, OPIC and Swiss Export Risk Insurance.

¹³ However, most if not all of the organisations have supported renewable energy projects with various loan products.

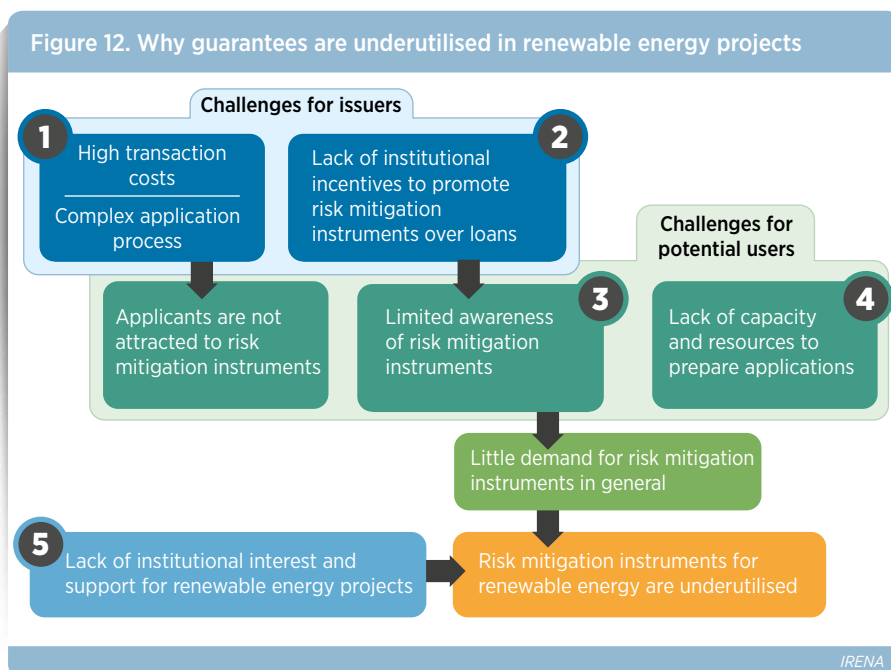
- » **Political risk insurance is the most common form of support.** It made up 56% of the value of all issuances for renewable energy projects captured in the survey. This was followed by export credit insurance (24%), partial risk guarantees (10%) and partial credit guarantees (10%).

Figure 11. Risk mitigation for renewables: Issuance by instrument type



- » **Institutions placing priority on renewable energy issue more guarantees.** Seven out of 16 institutions designated renewables as a priority sector, which entails setting up a dedicated team or relevant strategies. The aggregated value of risk mitigation instruments issued by the seven institutions that give the sector priority accounts for over 70% of total issuance value. While the sector's priority status allows for institutional-level support, it also reflects increasing demand to issue guarantees for renewable energy projects.
- » **The lack of demand for risk mitigation instruments from users, not just for renewables, is the main reason for underutilisation.** As illustrated in Figure 12, this is mainly due to lack of product awareness, long processing times, high due diligence requirements and high transaction costs. These are compounded by potential users' lack of financial or administrative capacity to manage the risk mitigation instrument application and reporting requirements (e.g. feasibility studies, financial modelling). Such a low inquiry rate can also result from competition between loans and guarantees within the issuing organisations.
- » **The lack of institutional incentives or resources to increase the provision of risk mitigation instruments for renewable energy investments is a limiting factor on the supply side.** Of the issuing institutions

researched, none had developed formal quotas or goals to drive the use of risk mitigation instruments for renewable energy. Risk mitigation instruments were issued according to demand from host countries.



Based on the results of this analysis, Chapter 6 provides specific recommendations that could help increase the use of guarantees in renewable energy projects. The following sections focus on mechanisms targeted at specific risks – currency, liquidity and resource risk for geothermal energy.

3.2 Currency risk mitigation instruments

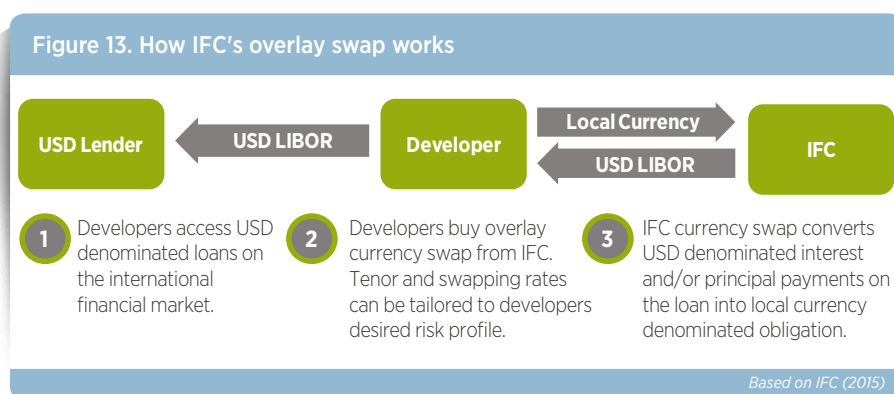
Currency risk arises in situations in which the project has revenue in one currency and loan payments in another. For renewable energy projects, a mismatch between the financing currency (hard) and the revenue currency (local) is often a problem for debt repayment. Due to these concerns, some transnational project developers would only sign a contract in hard currency to insulate themselves from currency risk. Although it can remove currency risk, it also opens up exposure to non-payment risk if the off-taker cannot pay the PPA price in hard currency (Chadbourne, 2014). Some governments take some of the currency risk by offering USD tariffs payable in local currency (see Cabeólica Wind Farm project in Cabo Verde, Box 7).

This approach can, in principle, be beneficial for project developers because the government will be taking over the majority of the currency exchange risk. However, there may be other problems such as convertibility risk (Abdel-Razek, 2015) if local banks do not have the ability to convert debt payments denominated in the local currency into foreign currency.

While currency hedging instruments are commonly used to mitigate currency risk, they are accompanied in some countries by high costs, which increases the cost of capital. As alternative ways to address currency risk, other options such as a currency risk guarantee fund or local currency lending instruments can be used in renewable energy projects. Focussing the discussion on renewable energy, this section considers how risk mitigation instruments can resolve currency mismatches.

Currency hedging instruments

Taking an offsetting position on a security (selling or buying) is known as hedging and can help protect the security against adverse price movements (Nickolas, 2015) and mitigate market and commercial risks. Hedging instruments such as forward contracts and swaps have been used to address currency mismatch in renewable energy projects. A currency forward contract can eliminate the risk of a loss in value arising from making the payment by using the instrument to lock in the differential in advance. This allows projects and investors to artificially remove currency fluctuations. An overlay currency swap allows projects in developing countries to borrow from the international financial markets with minimal to no foreign currency exchange risk. As illustrated in Figure 13 below, IFC currency swaps convert USD LIBOR¹⁴ loan payments into local currency obligations, (IFC, 2015). The tenor and swapping rates of the overlay currency swap can be adjusted to suit the needs of the investor and the developer.



¹⁴ The London Interbank Offered Rate (LIBOR) is the average of interest rates estimated by each of the leading banks in London. It is one of the most commonly used benchmark interest rates for short-term loans.

In many countries, however, forward or swap markets are not sufficiently liquid to execute these trades in the requisite amount over a long period. This therefore limits the extent to which they can mitigate risks. More often, the cost of currency hedging can be so high that it offsets the lower cost advantage of foreign debt. In India, for instance, the cost of a currency hedging instrument is said to be around 6%-7% (Bridge to India, 2015). This elevates the cost of borrowing in foreign currency but it may still be advantageous given the high cost of local debt.

Currency risk guarantee fund

A currency risk guarantee fund can address high costs of hedging by covering the difference in exchange values between local and hard currencies over the long term. The Indian government, for instance, has been experimenting with the concept and has plans to launch such a fund to support solar development. Under this fund, distribution companies would quote their price for solar energy in hard currency (USD) while locking up solar power for 25-year contracts and charging customers in Indian Rupees (INR).

India's Ministry of New and Renewable Energy may create a (real) hedging fund¹⁵ of approximately USD 1 billion by charging developers a hedging fee of INR 0.90/kWh (about USD 0.015/kWh). The fee would be put into an escrow account to cover against local currency depreciation (Dutta, 2015). Such a scheme would help developers access international capital and reduce high hedging costs. In addition, pooling the hedging costs and putting the government's weight behind the programme will significantly reduce the cost of currency hedging in the market (Bridge to India, 2015). India's government is in the process of planning such a fund. This includes consideration of the right amount of hedging fee to be charged.

Local currency lending

Local currency financing is a more fundamental way to resolve currency mismatch. DFIs can address high hedging costs by investing capital in funds that provide local currency lending through portfolio diversification. For example, several DFIs and non-governmental organisations have since 2007 invested in the TCX Currency Fund, which offers local currency lending for developing markets. Investors can diversify risks through direct investment in the fund, which is exposed to over 40 developing market currencies (TCX Fund, 2013).

¹⁵ This concept is being developed by the India Innovation Lab for Green Finance (Energynext, 2016).

Another example is GuarantCo, which is sponsored by the governments of the UK, Sweden, Switzerland and the Netherlands through the PIDG and the Dutch development bank FMO (GuarantCo, 2016). GuarantCo provides flexible guarantees over local currency loans to support projects and companies in raising debt financing in emerging markets. GuarantCo provides partial credit and partial risk guarantees, first loss guarantees, tenor extension or liquidity guarantees, thus loosening constraints in local currency debt finance to infrastructure projects (GuarantCo, 2016).

BOX 7: CABEÓLICA WIND, CABO VERDE

The 25.5 MW Cabeólica wind farm project was the first commercial-scale wind farm in sub-Saharan Africa. It includes four privately financed wind farms on the islands of Boa Vista, Sao Vicente, Sal and Santiago. Thirty turbines across the wind farms are now producing up to 28 MW of renewable power and are benefiting nearly 95% of the islands' 475,000 inhabitants.

The project was developed by InfraCo Africa and established by the PIDG, an organisation funded by governments and multilateral agencies. It is now managed by a special purpose company, Cabeólica. It was set up in 2009 by the government of Cabo Verde, government-owned utility Electra and InfraCo Africa. Financial closure of a 70:30 debt-equity structure was reached in 2010, and the project was commissioned in 2011 (Table 6).

Given the government's lack of a track record in supporting private sector investment, particularly in renewables, investors and lenders initially insisted on MIGA's political risk insurance cover. However, investor perception of risk changed with the issuance of a government support agreement, and the MIGA political risk insurance cover was no longer seen as necessary. The government demonstrated its commitment to renewables by establishing the public-private partnership, unlocking the project and the renewables market in Cabo Verde. Another crucial factor underlying the effectiveness of this public-private partnership was the selection of a private partner (Infraco Africa). It had the appropriate credentials, experience, established track record and well-defined governance frameworks (transparency, efficiency etc.).

Strong government support and the establishment of a public-private partnership provided investors with sufficient confidence to proceed without external mitigation instruments. This lowered the lending rate from approximately 9% at the outset of the project to 7%. The government support agreement was crucial in attracting other financing as well as technical partners (e.g. Vestas) to the project. In addition, risk mitigation instruments dealt with the risks and barriers outlined below:

- » The project resolved currency risk with the PPA denominated in local currency but pegged to the Euro. This included a clause to adjust the payment currency in the extreme event that the local currency should be disconnected from the Euro at any point over the 20-year lifetime of the PPA.
- » A technical support grant from the PIDG Technical Assistance Facility was used for resource assessments and technical studies, including wind pattern and technical engineering studies. The grant facilitated access to high-quality and rigorous technical analysis and attracted the participation of high-profile technology providers.
- » To mitigate procurement risk, a turnkey engineering, procurement and construction (EPC) contract and maintenance services contract were signed with a leading company in wind energy technology. This reduced the sponsor's exposure to risks during the construction and operation of the project.

Table 6. Financial structure of Cabeóica Wind Farm Project

Capital	Type	Share of project	Value (USD million)	Terms	Source of Capital
Equity	Public	3.3%	2.2	Not applicable	InfraCo Africa (€2.0m)
		13.3%	8.7		African Finance Corporation (€8.0m)
		13.0%	8.5		FinnFund (€7.8m)
	Sub-total	29.6%	19.4		
Debt	General debt	47.0%	30.8	14 years; interest rate approx. 7%	European Investment Bank (€28.4m)
		23.4%	15.4	14 years; interest rate approx. 7%	African Development Bank (€14.2m)
	Sub-total	70.4%	46.2		
Grand total		100%	65.6		

IRENA interviews and research (AFC, 2014; AfDB, 2012; eleQtra, 2015b; InfraCo Africa, 2015; Lopes, 2015)

3.3 Liquidity risk mitigation instruments

Liquidity risk may be a key concern to renewable energy investors when, for instance, utilities are affected by liquidity constraints or when the timing of cash receipts and payments is mismatched. Liquidity risk mitigation instruments can involve various financial instruments to provide short-term cash flow to a project or company or to extend time to improve a project's liquidity profile. Liquidity facilities are commonly used in project finance, either internally within a project structure or externally alongside the special purpose vehicle (SPV). Put options, although less commonly used in renewable energy investments, can provide an opportunity to extend loan tenors at a cost of option premium. Such liquidity risk mitigation instruments are particularly useful to address the liquidity and credit risks of a renewable energy project developer or power off-taker.

Internal liquidity facilities

Internal liquidity facilities can be employed to advance or support payments to bridge short-term cash flow problems and help ensure timely payment to investors. Examples of internal liquidity facilities include:

- » Debt service reserve accounts, which provide a distinct source of funding for a limited period of time in the event of insufficient cash flow.
- » Excess spread accounts, which accumulate cash flow above that required for debt service in a separate account supplying a source of funds if cash flow falls short of requirements.
- » Over-collateralisation, which provides additional assets which the SPV can draw on to supplement the cash flow available for debt service. It occurs when more collateral than needed is posted to secure financing, which results in a bond issuance that is less than the total value of the underlying assets. For example, when SolarCity issued its first asset-backed securities in 2013, about 62%¹⁶ of the value of the underlying assets (solar PVs) was held as over-collateralisation. This credit enhancement, combined with SolarCity's track record and the credit quality of the household borrowers, resulted in an investment grade credit rating, which helped secure a lower cost of capital (BNEF, 2014).
- » Contingent equity, which protects lenders in situations of unexpected cost overruns during project development. By putting equity aside, project owners provide a safety buffer for emergency funding for

¹⁶ Since the inaugural issue, the percentage of over-collateralisation has decreased (BNEF, 2014).

possible project cost overruns. For example, this was used in a geothermal energy project to cover potential cost overruns related to unexpected drilling costs (see Sarulla geothermal project case study in Section 5.2). Contingent equity tranches were also established to fund cost overruns in the construction phase in an off-shore wind farm project (see Walney off-shore wind farm projects in Section 5.1). Studies suggest that the cost of setting up a contingent capital facility may be more economical than the cost of a credit guarantee as long as the trigger events are well defined (Farooquee and Shrimali, 2016).

External liquidity facilities

Renewable energy investors may have concerns that periods of temporary cash flow shortfalls could arise, which in turn would lead to late or missed payments. Since renewable energy markets are still quite new and the pool of potential buyers is shallow, particularly in developing countries, investors may price in a 'liquidity premium' (Clean Energy Pipeline, 2015). This compensates for the additional risk of cash flow shortfall or for having to discount the asset if they need to sell. This liquidity premium is added to the financing costs, increasing the cost of capital for the project.

External liquidity facilities can loosen liquidity constraints for power off-takers. In developing countries, where many power off-takers experience such constraints, IPPs have a hard time reaching financial closure. Often, they are unable to obtain a letter of credit from an accepted commercial bank without backing from the off-takers. Since the sole income of most IPPs depends on future payments under the PPA, they are not in a position to put collateral into the letter of credit. Most off-takers thus have to provide full cash collateral to back their letters of credit. Yet due to their constrained liquidity, poor credit ratings or financial instability, many off-takers in developing countries are unable to post cash collateral for a letter of credit.

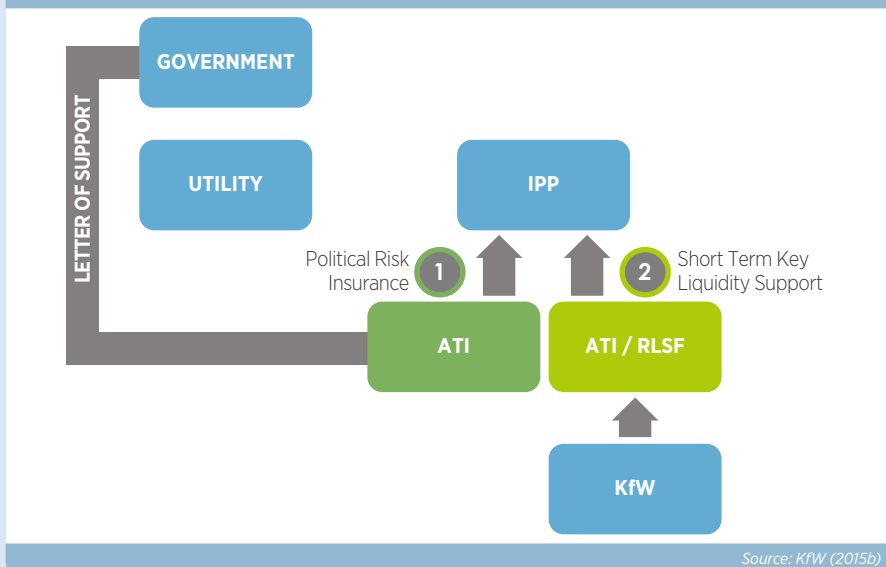
Typical risk mitigation instruments are often unable to provide a coverage against cash flow illiquidity or potential off-taker defaults.¹⁷ A liquidity facility can help fill this gap by providing a short-term letter of credit or credit line to IPPs without additional cash requirements from utilities (Box 8).

¹⁷ *Power sector reform is a long-term solution to addressing power off-taker risk, though not a financial instrument. By unbundling generation, transmission and distribution and restructuring the utility business models, power off-takers can clear up balance sheets, diversify risks and improve their business models. With assistance from the World Bank and IFC, the Tanzanian electricity utility Tanesco started restructuring in 2014 and plans to complete the reform by 2025 (Tsakhara, 2015).*

BOX 8: REGIONAL LIQUIDITY FACILITIES

The German development bank KfW partnered with the Africa Trade Insurance Agency and IRENA to develop the Regional Liquidity Support Facility (RLSF). Initially targeting five countries in sub-Saharan Africa (Ghana, Kenya, Zambia, Malawi and Rwanda), this aims to ease the stress on utility balance sheets and enable financial closure for renewable IPPs (KfW, 2015a). It does so by resolving the short-term cash flow shortfall problems in Africa (Figure 14). The ATI will manage the cash collateral and provide a short-term liquidity risk insurance to member countries, thereby providing an additional leverage on the RLSF funds (KfW, 2015a). Furthermore, the RLSF will make its utilisation visible by publicly announcing the performance of utilities. This will reduce future lender risk mitigation requirements by providing a reliable benchmark for actual payment performance. KfW has submitted a funding proposal to the Green Climate Fund. Further scaling up this initiative could drive greater private sector investment into renewables in developing countries.

Figure 14. Structure of the Regional Liquidity Support Facility



Liquidity guarantee

The length of tenor can be a key limitation encountered by project developers seeking local financing. Inadequate loan terms expose projects to liquidity and refinancing risk. This occurs when the maturity of the loan is mismatched with the lifetime of the asset, and the borrower is unable to refinance the outstanding loan midway through the life of a project. This is particularly acute in low-income developing countries, where debt of over five years' maturity is difficult to access.

Some DFIs utilise liquidity guarantees to lengthen maturities of local currency finance. An example is the West Nile Rural Electrification Project in Uganda, where regulations limit maximum loan tenor to eight years. To allow for a longer-term loan, the World Bank structured two separate senior loans for local banks to lend to the project. The first loan expires after eight years when a bullet repayment of the outstanding principal is to be made. This repayment was funded from a new seven-year loan, making the total period loan repayment period 15 years. A liquidity facility guarantee was used to ensure that local banks would have sufficient funds to make the second loan after eight years, thereby removing repayment risk for the project developer. The fees and margin payable to each local bank were designed to incentivise it to continue financing for the full 15 years (Wang et al., 2013).

Put options

Like liquidity guarantees, put options can be used to mitigate renewable energy investment refinancing risk. DFIs provide a put option to local commercial bank lenders as a way to ensure long-term lending for borrowers. For example, in the Philippines Leyte geothermal project, bondholders contracted a put option to sell their bonds to the World Bank on maturity in return for repayment of the principal. This ensured investors that such long-term bonds will be honoured when they reach maturity (World Bank, 2012). This is considered a promising technique for extending the maturity of loans to match the requirements of renewable energy projects (World Economic Forum, 2006).

3.4 Geothermal resource risk mitigation

The resource risk during geological exploration and drilling in the early stages of geothermal project development is the main barrier to properly assessing the resource potential, elevating transaction cost (Chouraki, 2013). The high cost of locating and confirming geothermal resource, as well as long lead times for project development, are significant barriers to financing geothermal energy projects (Micale et al., 2014). Geothermal project exploration can account for 35%-50% of capital costs before the resource is confirmed (Vlahakis, 2015). The lead time from identifying a project to making a drilling decision on a well with a proven production capacity takes an average of about 5.5 years (Micale et al., 2014), adding several years to the project's development time. Ten years elapsed between the start and financial closure of the Sarulla geothermal project in Indonesia (see case study in Section 5.2).

A number of risk mitigation instruments dedicated to geothermal energy have thus recently emerged. National governments support the mitigation of geothermal resource risk by contributing to geothermal energy funds that distribute grants and guarantees to eligible exploration projects. Alternatively they share the risk with a private insurer. Dedicated guarantee instruments manage specific challenges of early-stage geothermal energy project development, while portfolio guarantees allow for effective risk management by pooling different wells together.

Grants

Grants can incentivise renewable energy development in potentially high risk activities, such as drilling for geothermal well exploration. For example, the African Union Commission, the German Federal Ministry for Economic Cooperation and Development and the EU-Africa Infrastructure Trust Fund via KfW established the Geothermal Risk Mitigation Facility. The facility funds geothermal development in East Africa by providing grants for surface studies, exploration drillings, continuation premium and regional databases (Geothermal Risk Mitigation Facility, 2012).

Convertible grants

Some governments and public finance institutions use convertible grants to mitigate geothermal resource risk during the exploration drilling process. For example, the EU, Germany, multilateral and regional development banks established the Geothermal Development Facility in Latin America.¹⁸ The facility has an initial resource of USD 75 million with commitments of an additional USD 1 billion (The Inter-American Dialogue, 2015). The facility offers convertible grants for the entire value chain of exploratory drilling. If exploratory drilling turns out to be successful through the discovery of a resourceful and drillable well, the grant is converted to a loan. The project has to repay 80% of the funds received (KfW, 2015b). However, if it is unsuccessful, there is no financial commitment to repayment, and the grants are not converted to loans. This instrument specifically targets the high risk of exploration drilling, providing a safety cushion for projects to buffer against unsuccessful drills. At the same time it allows funding facilities to recover public funds with successful drilling outcomes.

Guarantee funds

Guarantee funds are widely used by DFIs and national governments to provide a safety net for developers in the case of unsuccessful drilling results. For example, the Inter-American Development Bank provided funding of USD 85 million to the government of Mexico (The Inter-American Dialogue, 2015). This established a geothermal financing and risk transfer scheme to provide loan guarantees during the drilling and production phase in Mexico (Qbic, 2015). The Indonesian Ministry of Finance also set up a USD 300 million geothermal guarantee fund to mitigate resource risk. It received support from the US State Department in deploying these funds to develop financial structures and risk mitigation instruments in Indonesia (The White House, 2015).

¹⁸ *Projects in Bolivia, Chile, Colombia, Costa Rica, Ecuador, El Salvador, Guatemala, Honduras, Nicaragua and Peru are eligible to benefit from this facility (KfW, 2015b).*

Exploration insurance

Exploration insurance via a public-private partnership allows a private insurer and government to share the burden of potential failure in geothermal exploration drilling. In partnership with the IFC, Munich Re has implemented an insurance product for exploration risk in Turkey. The insurance covers drilling costs for exploration wells and costs for simulation measures and well development (Munich Re, 2015a). However, the public-private partnership model can be complex to design, implement and monitor, and higher insurance premiums may increase overall upfront costs (Sanyal, 2013).

Portfolio guarantees

Portfolio guarantees can cover a proportion of the losses on a group of projects in order to diversify exploration risks across different wells. A multi-well exploration risk cover is provided for the Kenyan Akiira project, developed by Akiira Geothermal. Munich Re is engaging in a series of up to eight drillings, making the project's financing more dependable and easier to schedule. The premiums become due in instalments as the drillings progress (Munich Re, 2015b).

4 MECHANISMS FOR SCALING UP INVESTMENT

KEY POINTS:

- » Standardised project documentation can help aggregate renewable energy projects, either as a prerequisite for bundling projects into larger portfolios or for securitising assets in the capital markets.
- » Aggregation can help small or medium-scale renewable energy projects improve access to financing sources and investors. Broadening the investor base for these assets in this way can help reduce the cost of capital.
- » Carving out asset-backed securities with varied risk and return features allows targeted access to different segments of the investment community. This can open access to lower costs of capital.
- » The credit rating methodology can serve as a tool to help project developers and other stakeholders evaluate potential renewable energy project risks and return through the investor lens.
- » Capital market tools such as green bonds and Yieldcos offer great potential to open up markets and mobilise institutional investors.

While the financial risk mitigation instruments discussed in Chapter 3 are aimed at investment risks, this chapter examines ways to break through barriers to attracting large-scale private investment. These barriers include, for instance, insufficient investment size, high transaction costs and limited market liquidity. Structured finance mechanisms and capital market tools can help scale up renewable energy investment and open opportunities for institutional and other major investors to enter in the renewable energy market.

The first part of this chapter assesses structured finance mechanisms and highlights how they can reduce transaction costs to open up access to capital markets. It also presents a credit rating methodology for structured finance mechanisms, which can be used as an evidence-based proxy for an institutional

investor's due diligence process. The second part of this chapter discusses two innovative financing mechanisms – green bonds and Yieldcos – and analyses how they can break through the barriers to scaling up investment. An overview of different structured finance mechanisms and their application can be found in Table 7.

Table 7. Structured finance mechanisms and capital market instruments to scale up investment

	Insufficient investment size and high transaction costs	Financial regulations restraining illiquid and riskier investments
Standardisation	✓	
Aggregation	✓	
Securitisation	✓	✓
Green bonds	✓	✓
Yieldcos		✓

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4.1 Structured finance mechanisms

To attract more capital from investors, it will be necessary to make renewable energy projects available for mainstream investing. Most renewable energy deals today are considered too small, unique or high risk, associated with high due diligence costs, to attract institutional and other large-scale investors. Structured finance can help overcome such barriers, especially when the underlying investment vehicles are standardised and/or aggregated to cut due diligence costs. Many in the renewable energy policy-making and investment communities are unfamiliar with structured finance. In most structured finance transactions, project assets that will generate the cash flow must be isolated from the sponsor. This way, other investors are able to narrow the focus of both the risks and returns to the project itself.

Standardised project documentation and aggregation are important mechanisms in structured finance transactions. They allow assets to be pooled in larger portfolios and, under certain conditions, securitised to be traded in capital markets. They can help lower due diligence cost, better conform to investor requirements, broaden the investor pool and diversify individual asset risks (Lowder and Mendelsohn, 2013). This section discusses how structured finance mechanisms - standardised contracts, aggregation and securitisation – can overcome the barriers to scaling up institutional investment in renewable energy.

Standardised contracts

One of the main contributors to transaction costs is complexity, combined with the 'over-the-counter' nature of contractual documentation for many renewable energy projects. This is a legacy of an energy sector oriented towards fossil fuels, where power projects used to be large in size and technically complex. However, many renewable energy projects, especially solar and biomass, tend to be much smaller and simpler than conventional energy projects, so there is an opportunity to standardise project documentation.

Standardised contracts can reduce due diligence costs for investors and help to drive market growth. The process of standardising contracts has long been used in structured finance – from futures contracts to mortgage loans. If applied to renewable energy markets like solar, standardised contracts could result in significantly greater investment from institutional and other investors as they allow an easier and faster project review process.

Standardised contracts can be employed to establish ownership structures, servicer requirements or PPAs, to name a few uses. The primary (or in some cases exclusive) source of revenue for renewable energy projects arises from the sale of energy through a PPA. Establishing common features for PPAs is thus a starting point for standardising contracts. Standardised features of renewable energy PPAs typically deal with five areas. These include (i) energy purchase requirements and rates (ii) grid interconnection and transmission responsibilities (iii) agreement assignment or termination (iv) adverse regulatory or tax changes or (v) dispute resolution and force majeure (OPIC, 2015). Two case studies in Chapter 5 (Walney Wind Farm and Jordanian Solar) illustrate the potential of standardisation.

Within the banking community, a number of institutions have their own internal standardised contract protocols. However, the efforts thus far to harmonise contracts and other project documents across the broader renewable energy financial sector have been limited. There is a clear need to develop industry-wide standards. This presents a significant opportunity for a strong convener to facilitate standards across regions and the industry. Box 9 describes two initiatives aimed at standardising contracts and other documents for renewable energy projects to provide a foundation for aggregation and securitisation.

BOX 9: INITIATIVES TO STANDARDISE PROJECT DOCUMENTS

The National Renewable Energy Laboratory (NREL) in the US has developed a standardised residential lease and commercial PPA contracts via the Solar Access to Public Capital working group. This represents 440 organisations, including residential and commercial solar developers, law firms, investment banks and capital managers, rating agencies and engineers (NREL, 2015). The standardised documents have been made publicly available and act as the necessary first step to enable solar project securitisation. It has already met with some success, having been used by SolarCity, a national solar developer that successfully issued asset-backed securities on bundled cash payments of these PPAs.

National governments could also take steps to streamline investment through standardised contracts with a particular focus on PPAs. This is the approach South Africa took with the Renewable Energy Independent Power Producer Procurement Programme. The well-designed and transparent procurement process facilitated over 3,900 MW of projects during its first two rounds (Eberhard, Kolker and Leigland, 2014).

Aggregation

Renewable energy projects tend to vary in terms of size. They range from very small, micro-scale (<100 kW) to large, utility-scale projects. Since transaction and due diligence costs tend to be similar for all project sizes, smaller-scale projects are at a relative disadvantage in attracting large-scale investors (UNEP, 2015). Banks are looking for larger deals partly to cover the due diligence and transaction costs involved and partly to have a meaningful impact on their portfolios. Institutional investors such as pension funds and insurance companies require 'benchmark-size' deals greater than USD 300 million (Kidney and Oliver, 2014). This is because few institutional investors have the internal capacity or willingness to evaluate and underwrite individual renewable energy projects (McCrone, 2013; Sanders et al., 2013). Domestic institutional investors in developing countries may lack the capacity or mandate to form an in-house investment team to perform the due diligence, structuring and negotiations required for direct investment.

Aggregating smaller-scale renewable energy assets can help scale up investment volume and reduce due diligence costs per project for institutional investors. Asset aggregation in distinct structures permits the creation of various individual tranches to appeal to a variety of investor appetites, broadening the potential pool of capital providers. It can also increase the

financing capability of DFIs. Assuming that the probability of default for any one project remains the same, the amount of reserves held by a DFI is much less when lending to an aggregated project than many individual projects (Hussain, 2013). The Jordanian solar project case study in Chapter 5 illustrates how multiple solar projects could be aggregated to improve due diligence process and access larger pools of investment.

Through aggregation, small or medium-scale renewable energy projects can improve their access to financing sources and investors. However, building a replicable aggregation model that can be scaled up requires strong support and commitment from governments as well as consensus on specific terms of standardisation from industry stakeholders. An initiative of this type is described in Box 10.

BOX 10: INITIATIVE FOR AGGREGATING SMALL-SCALE RENEWABLE INVESTMENTS

UNDP, the GEF and the Climate Bonds Initiative are exploring the possibility of implementing the Climate Aggregation Platform for Developing Countries. The initiative aims to scale up business and financial models in order to aggregate small-scale, low-carbon energy investments. Building a robust pipeline of standardised renewable energy assets in developing countries could increase access to low-cost sources of financing and tap into new investor bases (e.g. institutional investors). The Climate Aggregation Platform is structured around three core activities in particular:

1. Management of a global working group that promotes engagement and co-ordination among finance and industry stakeholders;
2. Development of standardised toolkits (e.g. template contracts, performance metrics, transaction structures) that promote the standardisation of terms necessary to aggregate projects;
3. Demonstration of projects and provision of technical assistance for developing countries.

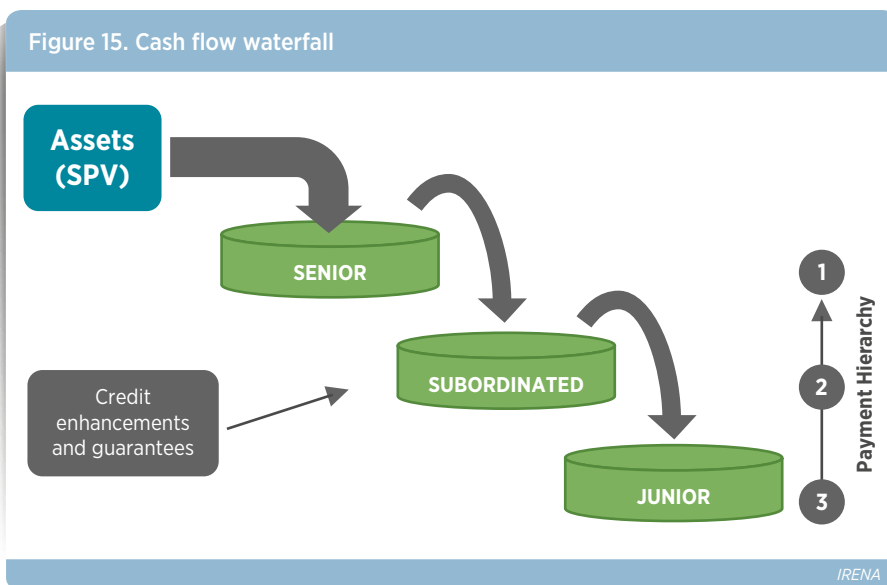
Implementation of these activities is expected to showcase pilot projects and best practices. This will foster development of the policy and market architecture necessary to build a robust pipeline of small-scale renewable energy projects and ultimately achieve scale (Climate Finance Aggregation Initiative, 2014).

Securitisation

Renewable energy asset securitisation allows project sponsors to issue individual securities featuring a variety of ratings, risks and returns to correspond to different investor preferences. As securitisation enables banks or other capital providers to access a secondary market, capital can be reinvested, replenishing the amount available for renewable energy projects. Creating a model for securitising small-scale solar assets could thus significantly reduce the cost of financing and free up funding to accelerate this process.

The securitisation process starts by grouping assets with similar characteristics and then selling them to a separate entity, usually an SPV, to protect the assets from any outside claims by creditors. The capital structure is then constructed to apply various claims on both the cash flows and market value of the project in the form of debt, equity and hybrid structures. Securitisation takes this process a step further, issuing distinct and marketable securities (tranches) out of the trust, in order to create securities such as asset-backed securities. These can be sold in the financial markets.

One way of creating highly rated securities is prioritising the payback of certain tranches from low to high risk, as indicated by the cash flow waterfall in Figure 15. The cash flow waterfall represents the path of the energy payments from the individual assets within the SPV to the different tranches of the asset-backed securities. Principal and interest payments first go to the highest rated security, usually called the senior tranche. The remaining funds are passed down to the next lower tranche. The junior tranche is last in line and thus has



the first loss position. Carving out different securities with unique risk and return features can result in a broader array of investments, which appeal to different segments of the investment community. Broadening the investor base for these assets holds the promise of lowering the cost of capital by tapping in to new sources of investment.

A wide variety of financial instruments, including those discussed in Chapter 3 (guarantees, credit enhancements via liquidity facilities etc.) can be attached to the pool to reduce the risk of default. The credit quality of the securities issued can be raised in such a way that their credit rating is higher than the rating of the issuer, the SPV (Lowder and Mendelsohn, 2013).

BOX 11: OFF-GRID SOLAR SECURITISATION IN AFRICA

In order for off-grid solar businesses to scale up and expand, they have to go beyond relying on impact investors and DFIs and aim to secure large sums of commercial debt capital securitising their receivables. Some companies are trying to access mainstream finance via securitisation to mobilise large-scale private investors.

Dutch impact investor Oikocredit International, New York-based merchant bank Persistent Energy Capital and London-based developer BBOXX are trying to replicate the US model of securitising residential solar panels in Kenya and Rwanda. They have plans to expand to Pakistan and Nigeria (Hirtenstein, 2016). They signed the first off-grid solar contract securitisation deal into notes in Africa early in 2016. The team is targeting institutional investors with an aim to raise USD 16 million in 2016 and USD 2 billion over five years (Hirtenstein, 2016).

Securitising off-grid solar receivables in the pay-as-you-go model¹⁹ demonstrates a promising way of building a track record and institutional know-how to execute such a deal. However, refinancing such receivables (as often happens in the US market with mortgages or car loans) is unlikely to become common for several more years. Until then, such transactions structured with an SPV will remain a minority of total debt issuance to pay-as-you-go companies (Lighting Global, BNEF and GOGLA, 2016).

¹⁹ Innovative end-user payment scheme which allows end-users payment schedule flexibility.

While securitisation has been successfully used for decades in the developed world to finance everything from home mortgages to automobile purchases, its application is fairly recent in the renewable energy markets. SolarCity was the first company to securitise a portfolio of solar leases in 2013 and since then it has raised USD 450 million in four rounds of issuing asset-backed securities (PV Magazine, 2015). This successful model was first considered too complex and advanced for developing countries to implement but some investors viewed it as a new opportunity (Box 11). As experience builds up, similar efforts to turn the off-grid solar industry into an asset class are likely to spread to other parts of the developing world.

Credit rating framework as a proxy for investor due diligence

To address project risks via structured finance, it is essential to understand how investors evaluate renewable energy investments. Project due diligence²⁰ is an important part of this assessment. Notably, no single standard due diligence process is consistently applied across projects. However, the credit rating process is a good proxy for investor due diligence (as illustrated in Figure 16). Credit rating agencies conduct an assessment of the creditworthiness of a borrower and can be assigned to any entity that seeks to borrow money, including individuals, corporations, states or SPVs.

This report uses the credit rating methodology from FitchRatings as a proxy for the due diligence process (FitchRatings, 2014). Other methodologies, such as those from Standard and Poor's, Moody's and other rating agencies, would also be applicable. When available, criteria dedicated to renewables (e.g. rating debt instruments whose repayment is dependent upon cash flow from the operation of solar power projects) (FitchRatings, 2016) could make a better option for various renewable energy project structures. Driven by strong demand, credit rating agencies are beginning to develop and update such dedicated credit rating methodologies for renewables.

²⁰ Due diligence is the fact-finding process through which investors learn about a deal and assess the risks and rewards associated with investment. Key factors assessed during the due diligence process include financial, legal and regulatory risks as well as the project's structure, operations, suppliers, off-take agreements, competitive positioning and future outlook. When implemented correctly, due diligence can be an effective way to identify potential issues that could shape or kill a deal and provide assurances that the investment is the right decision at the right price (GE Capital, 2012).

Figure 16. Credit ratings as a proxy for due diligence on structured finance options

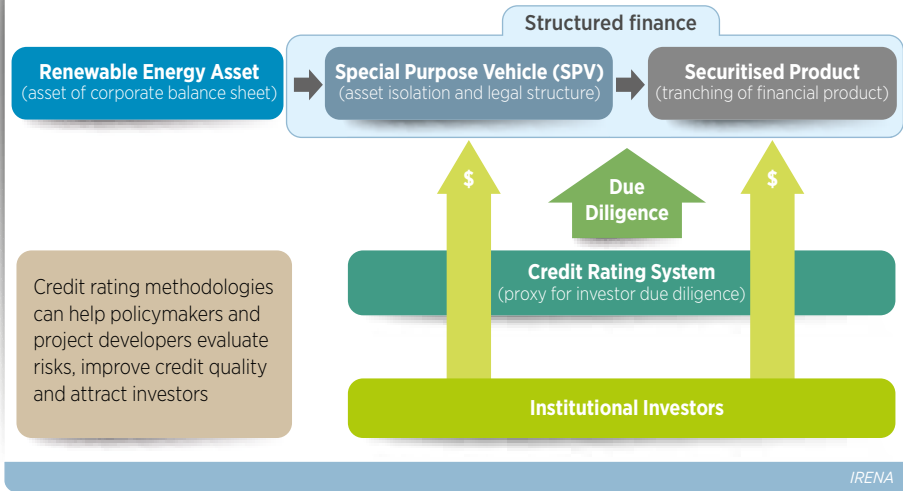


Table 8 lists the key rating drivers for the *FitchRatings Global Structured Finance Rating Criteria*,²¹ describing major concerns and risk management strategies for each driver and identifying issues related to their application for renewable energy investments.

²¹ This ratings framework is primarily designed to evaluate project finance deals with structured finance instruments. However, it can also be applied to a broader scope (beyond standardisation, aggregation and securitisation) because the main purpose of applying such criteria is not to use a particular rating system but to adopt a systematic framework for project due diligence from the investors' viewpoint.

Table 8. Financial risk mitigation tools to address investment risks

Key rating driver	Description	Issues affecting renewable energy investments
Asset isolation & legal structure	<p>Key concerns: evaluate whether claims by or against sponsor (e.g. bankruptcy) on underlying assets could influence the overall deal</p> <p>Risk management: create a bankruptcy remote structure that insulates assets from outside claims</p>	Investors want to limit risk to the project, focusing on the energy-generating assets. Related factors such as PPAs need to be attached to the project itself and not the sponsor in order to maintain effective separation between the assets and the sponsor.
Financial structure	<p>Key concerns: assess the ability of the structure to perform under various market stress scenarios</p> <p>Risk management: the 'payment priority waterfall' combined with credit enhancements must be sufficient to repay principal in full by the legal maturity date</p>	The financial viability of renewable energy projects often depends on incentive mechanisms or tax breaks. Investors will look for the support mechanisms they can align with the full financing term.
Credit enhancement	<p>Key concerns: assess the ability to protect investors from losses arising from defaults in the asset pool</p> <p>Risk management: ensure sufficient credit enhancements are in place to 'withstand default' based on losses in the asset pool under various scenarios</p>	Due to the perceived high risk of renewable energy projects, adding sufficient credit enhancements into deals can increase financing costs.
Asset quality	<p>Key concerns: assess ability of the asset to generate sufficient cash flow</p> <p>Risk management: ensure adequate amount and quality of assets to service obligations without enhancements in the base case scenario</p>	Some newer renewable energy technologies lack the track record to support investor requirement for sufficient asset quality over the term of the financing. Technological advances could also render certain renewable energy technologies obsolete over the period.
Originator & servicer quality	<p>Key concerns: assess if central operational participants can effectively fulfil their roles to support the performance of the asset pool</p> <p>Risk management: evaluate operator and servicer capabilities and processes to establish confidence in the management of all aspects of the asset</p>	Many players in the renewable energy field are new and have a limited track record. Investors consider relevant business or operational experience as a factor for lowering risk.
Surveillance	<p>Key concerns: ascertain whether assets are likely to perform as expected and/or whether it is likely that new risks will arise</p> <p>Risk management: detailed and frequent asset reporting and verification of the asset pool</p>	No unique issues for renewable energy investors.

Using the credit rating system as a proxy for due diligence can help assess policies, risk mitigation instruments or other market interventions. This improves credit quality and helps attract investors to renewable energy assets in structured finance. It also enables policy makers and other stakeholders to use a well-established framework to analyse the impact of policy and financing interventions on the risk profile of renewable energy projects.

Figure 17 illustrates the impact of standardised contracts on the six global structured finance rating criteria established by FitchRatings. Standardised contracts have a broad and positive impact across all rating criteria.

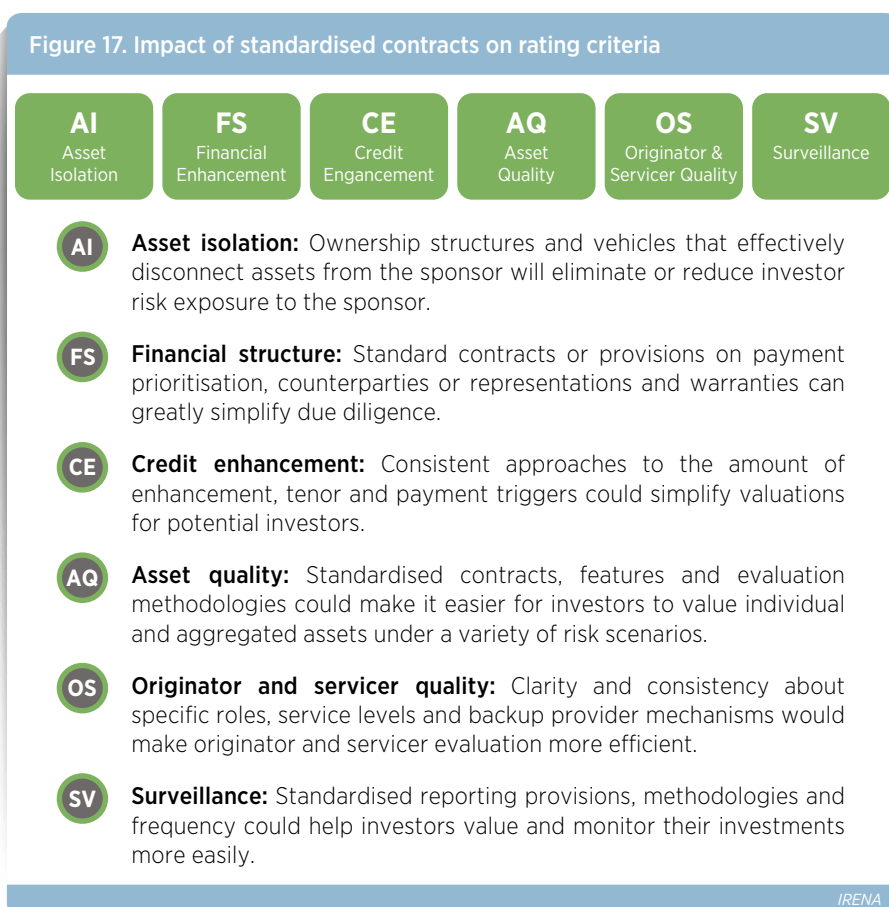
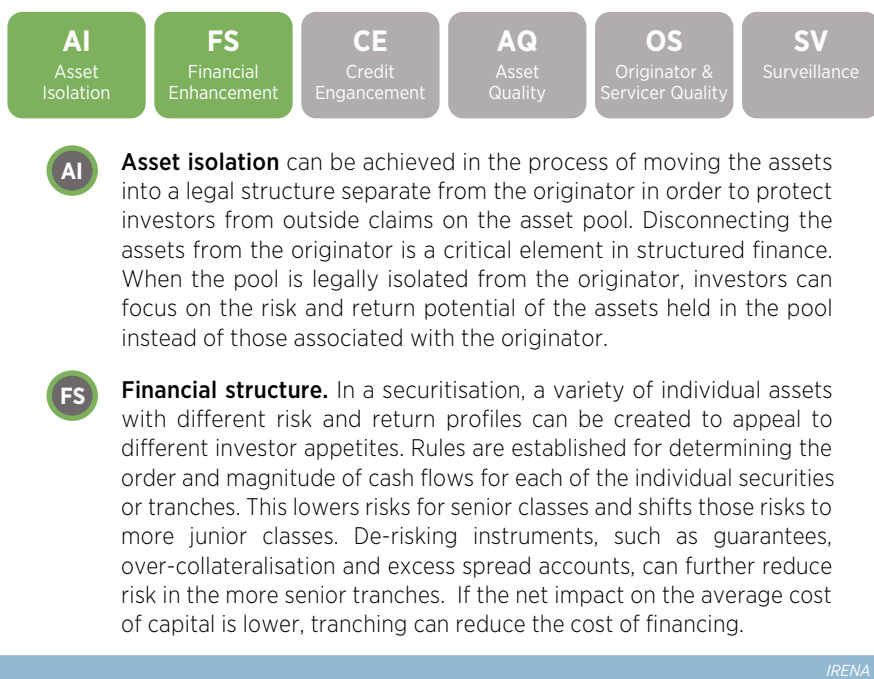


Figure 18 illustrates the impact of aggregation and securitisation on the six global structured finance rating criteria established by FitchRatings. As illustrated (by orange highlights) in the figure, the benefits of pooling renewable energy assets would arise primarily in financial structure and asset isolation.

Figure 18. Impact of aggregation and securitisation on rating criteria



4.2 Capital market tools

Enabling policies, financial structures and risk mitigation instruments are not sufficient alone to achieve the necessary scale of investment. Financial regulations such as Basel III and Solvency II²² restrain banks and insurance companies from investing in illiquid or risky assets. Institutional investors and banks may therefore be discouraged from providing long-term lending to renewable energy projects. Access to capital markets is becoming increasingly important in this context, as it provides necessary liquidity and long-term finance needed in the renewable energy sector. Specific capital market tools such as green bonds and Yieldcos have the potential to address the barriers to unlocking large-scale investment in renewable energy.

²² The evolution of financial regulations in the wake of the 2008 global financial crisis has created new obstacles for banks and insurance companies relating to their lending or investments. The Bank for International Settlements' Basel III framework requires banks to hold more capital to absorb risks, which increases bank lending costs (World Energy Council, 2014). Insurance companies face similar constraints with the Solvency II regulations (Liebreich, 2013) in Europe. However, the European Commission changed its regulations in 2015 to make infrastructure investment more favourable to insurers (European Commission, 2015).

Green bonds

Green bonds are fixed income securities labelled 'green' to finance environmental or climate-related investment (Climate Bond Initiative, 2015). They provide an increasingly attractive vehicle for institutional investors to invest in renewable energy in the capital markets (Climate Bonds Initiative, 2016b). Green bonds can also offer a means to raise large-scale long-term non-bank financing for borrowers, possibly at a lower cost of capital.

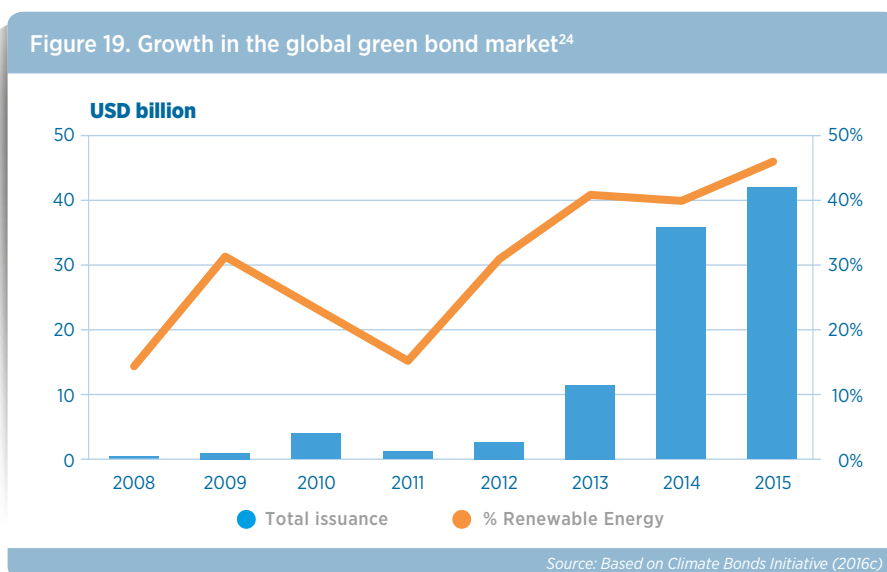
Like other bonds, green bonds can take the form of debentures (full recourse) backed only by the creditworthiness of the issuer. Alternatively they can be revenue-backed, channelling revenue from fees, tolls or other sources to service debt payments. Green project bonds finance assets placed in a trust or SPV to insulate investors from the developer. Green asset-backed securities are securities issued out of an SPV holding a pool of assets. Any entity that can issue a bond can in principle also issue a green bond if they have green assets to allocate proceeds to. Issuers in the green bond market are diverse, including corporates, development banks, commercial banks, cities and municipalities.

Bond financing tends to be difficult for pre-construction and construction stage projects because investors typically require a few years of operational history from the underlying assets. Bond financing has thus mainly worked as a refinancing option for operative renewable energy assets and asset pools. However, work is being done by public finance institutions and there are a few cases where a renewable energy project at the construction stage has been partly financed by issuing bonds. For example, the construction of a 550 MW Topaz solar farm in the US was financed by USD 850 million project bond issued by MidAmerican Energy. This was the holding company of the utility Pacific Gas & Electric, which purchased the solar farm from the developer First Solar (NREL, 2012). With a 25-year PPA with the investment-grade utility, this project²³ was structured in such a way that bondholders essentially retain claims on all assets through 'full security package' (Owano, 2014).

The green bond market has increased quite rapidly over the past several years. It has grown not only in terms of the amount of issuance each year but also the number of currencies in which the bonds are denominated and the geographic scope of issuing countries (Climate Bonds Initiative, 2016b).

²³ However, in this particular case the project was heavily backed by strong project sponsors and other contractual counterparties. The credit rating of the project was improved by the balance sheets of these companies rather than the project's own merits (Reuters, 2012).

Figure 19 shows that nearly half the USD 41.8 billion proceeds labelled green bonds in 2015 went to renewable energy projects. This accounts for the largest sector within the green bond universe.



In addition to the labelled green bond market, a much larger universe of bonds finance climate mitigation and adaptation but are not classified as green.²⁵ As of June 2015, this additional climate bond universe stood at USD 532 billion. Renewable energy bonds made up USD 118.4 billion of this universe (Climate Bonds Initiative and HSBC, 2015).

Green bonds can attract new investors who are interested in renewable energy projects. While corporate green bonds can attract institutional investors to pure-play renewable energy companies, green asset-backed bonds and green project bonds can allow direct investment in renewable energy projects. By adhering to the green bond principles, standards and verification process, green bonds give investors assurance that their investments are indeed supporting green projects.

For issuers, green bonds can offer a means to raise large-scale long-term non-bank financing. The majority of outstanding issuances have tenors over 10 years (Climate Bonds Initiative and HSBC, 2015). This means that green bonds can be seen as a fitting instrument for long-term fixed price debt to

²⁴ The intended use of green bond proceeds are declared at issuance. The Climate Bonds Initiative bases the analysis on this declaration. For example, if at issuance a green bond is intended to finance renewable energy and energy efficiency, the split between the two is estimated at 50:50 unless declared otherwise. The percentage allocation for renewable energy in this graph therefore indicates where proceeds are likely to go rather than where proceeds have been allocated (Climate Bonds Initiative, 2016c).

²⁵ However, the labelled green bond market is growing faster than the unlabelled segment.

finance renewable energy. Furthermore, pooling and securitising smaller-scale renewable energy assets (Section 4.1) can effectively lower transaction costs, scale them up and turn them more investable and attractive to large-scale investors. Emerging evidence suggests that green labelling and certifying can provide lower cost of capital for renewable energy projects (Kidney, 2016).

High demand has prompted more issues of green bonds, which in turn could boost the interest of issuers to finance new renewable energy projects. Policy makers can support this momentum by establishing policies and guidelines for green bonds, setting the standards and requirements for review, reporting and tracking of issuance (see recommendation 4 in Chapter 6). DFIs can structure project bonds with credit enhancements to improve the credit profile of renewable energy projects to investment grade. Box 12 presents an example of such arrangement implemented in the UK to support an offshore wind project.

BOX 12: CREDIT ENHANCEMENT OF PROJECT BONDS

The Project Bond Credit Enhancement Facility, developed and implemented by the EIB, aims to support trans-European networks in the fields of transport and energy. The EIB aims to achieve this goal in two ways. The first is to provide a subordinated tranche of debt of up to 20% of the total credit enhanced senior bond. The second is to grant projects guarantee facilities through a revolving letter of credit of up to 20% of the total credit. When cash flow shortfalls occur during the construction or operation phase, the project can draw on the credit in order to protect senior tranche holders from repayment defaults (EIB, 2012). Using this facility, the EIB in 2015 agreed a GBP 51 million (USD 78 million) backing to support a transmission link to the second largest wind farm in the world (576 MW) at Gwynt y Mor in the UK. The Project Bond Credit Enhancement enhanced the credit rating of bonds issued to finance the offshore transmission link for the wind farm, which includes two offshore substations. This runs over 120 kilometres of high-voltage transmission cables and includes a new substation (EIB, 2015).

Since 2012 several infrastructure projects have been approved for refinancing through this credit enhancement facility. Risk-sharing facilities of this type as well as other guarantee mechanisms are expected to be used to leverage more investment in Europe. This includes the envisaged EUR 315 billion contained in the European Commission's Investment Plan for Europe (also known as the Juncker Plan) (European Commission, 2016a).

Yieldco structure

Since 2014, the Yieldco structure has emerged as an option for energy utilities and other renewable energy asset owners to spin off operative assets from their balance sheets to develop, finance and implement new projects. Equity-based Yieldco structures can act as a potential channel to attract institutional investors into the renewable energy sector.

In a typical Yieldco structure, an entity transfers its operative renewable energy assets into a new company it fully owns. This new entity is listed thereafter, and new equity is raised through a share issue, while the parent company typically remains as a significant minority owner in the Yieldco. Arrangements between the two entities may include sale and purchase of the operative assets offered by the parent to the Yieldco. The Yieldco then becomes a tax-efficient structure distributing its free cash flow entirely to its shareholders. This is achieved by offsetting taxable income with asset-depreciation expenses.

Yieldcos can enable institutional investors to invest equity directly in corporations to own operational renewable energy assets. Institutional investors can thus access a portfolio of renewable energy projects through Yieldcos as a new type of investment target with lower risks. This structure can allow risk diversification between individual projects in the large pool of renewable energy assets. For example, pension funds such as Teacher Retirement System of Texas, the California State Teachers' Retirement System and the California Public Employees' Retirement System, have invested in shares of NRG Yield (OECD, 2015).

The renewable energy assets in the Yieldcos typically have long term, fixed price and inflation-indexed revenue profiles. This means they are seen as entities that generate stable long-term cash flow to some extent similar to fixed income investments. The Yieldco structure is also considered a way to finance renewable energy projects at a lower cost of capital, typically aiming to provide 5%-7% equity return to their shareholders (Kaye Scholer, 2014). Moreover, Yieldcos can enjoy tax benefits offered to renewable energy, minimising their taxation as long as they are able to grow the portfolio and use the depreciation and tax credits in the US as a tax shield. In addition to addressing these barriers, Yieldcos can mitigate the following risks:

- » As the assets will be purchased by the Yieldco only when they are operational, the investors in a Yieldco are not exposed to construction risk. This is carried by the parent company (project developer or utility), which tends to be more capable of assessing and managing the construction risk.
- » The Yieldco is a publicly listed entity, and its shares can be traded on a stock exchange. This means the liquidity risk of a Yieldco to an investor is considerably lower than the liquidity risk related to ownership of an individual renewable energy asset.

The success of Yieldcos largely depends on growth and the ability to acquire new assets that can deliver steady cash flows. Yieldcos thus need to raise public offerings at high rates and maintain high share prices (Konrad, 2015). Investors have been increasingly concerned about the future of the Yieldco model after the share prices of most Yieldcos in the US fell sharply in 2015. Many analysts say this downturn occurred because demand for clean energy investments outpaced the actual performance and growth of the Yieldcos (Alloway, 2015; Konrad, 2015; Martin, 2015; Patel, 2015). The need of Yieldcos to keep originating and developing new, attractive projects may have diverted attention from actual project performance.

Other challenges are evident. A financially distressed parent company can expose its Yieldco to liquidity risk. When the parent company is heavily leveraged and short of cash, it may use its Yieldco as a source of cash flow (Konrad, 2015) by selling off more of its assets to the Yieldco. Investors became uncomfortable when, for instance, Yieldco TerraForm Global made a series of acquisitions to purchase emerging market renewable generation assets developed by its parent company, SunEdison (Shen, 2016). In addition, the rise of bond yields may increase the risk-adjusted returns expected from Yieldcos. This could undermine the low-cost financing benefit of such structures. Parent companies and their Yieldcos need to improve their performance and capacity in processing investment data on the project pipeline and in managing cash flows for profit distribution to shareholders (Alloway, 2015; Patel, 2015). This will compensate for tightening market conditions.

Yieldcos may provide a promising option to scale up renewable energy finance. Challenges, however, need to be addressed by parent companies, especially when markets are tightening.



5 CASE STUDIES

KEY POINTS:

- » Successful renewable energy projects have sound financial structure, strong asset and originator/servicer quality and credit enhancement, combining various financial risk mitigation instruments with structured finance mechanisms.
- » In particular, the three case studies in this chapter demonstrate the importance of the following:
 1. Strong government commitment to renewables. Proactive government measures are a key to successfully scaling up private sector investment. They include targeted financial and technical support to help industry minimise investment risks, develop the supply chain, ensure cost-effective grid investment and connection, secure consents and obtain access to finance.
 2. Effective use of available tools and instruments to mitigate risk and reduce project cost. These include the use of project scale and aggregation, project standardisation, and creative use of insurance/hedging and guarantee products.
 3. Effective use of complementarity between DFIs and private investors. DFIs can serve as equity providers, risk insurers and sources of liquidity throughout the project development process.

This chapter describes three cases in developed and developing countries, which illustrate how investors, policy makers and developers address various risks and barriers with enabling policies and financial risk mitigation instruments. It also shows how standardisation and aggregation attracted a wider range of investors to the renewable energy market. Information on the case studies was gathered through interviews with a number of experts close to the project. These included equity and debt investors, multilateral agencies, developers, policy makers, legal experts and other advisors. In each case, stakeholders shared first-hand experience on how structured finance and a range of policy and financial tools affected the key rating drivers for the project. Where there was no credit rating record, stakeholders were asked to participate in a theoretical exercise. This showed how they viewed the impacts of financial and policy factors – including the risk mitigation instruments – on the overall project risk profile.

5.1 Walney offshore wind farm: attracting institutional investors

Table 9. Snapshot of Walney Offshore Wind Farm

Technology	Offshore Wind
Installed Capacity	367 MW (102 turbines)
Location	Near Walney Island, UK
Financial close	December 2012
Total Investment	Estimated at GBP 1.5 billion

The Walney offshore wind farm is a 367 MW project off the coast of the UK and is one of the largest installed offshore wind projects in the world (DONG Energy, 2012). This UK project, in contrast to the case studies in developing countries, benefited from stable financial and policy support. Such advantages have enabled the UK to become a world leader in emerging renewable energy sources like offshore wind.

The UK is committed to increasing the rate of deployment of offshore wind in order to meet its energy and climate goals. In particular, its government is taking proactive steps to address a number of market development risks, supplying targeted financial and technical support. This helps industry minimise investment risks, develop the supply chain, ensure cost-effective grid investment and connection, secure consents, and access finance (UK Department of Energy and Climate Change, 2011).

Thanks to this supportive policy environment, as well as the creative use of structured finance, the Walney development consortium was able to attract non-traditional investors to provide equity for the project. Indeed, the Walney offshore wind project appears to be the first using an equity arrangement designed to attract non-utility investors, who could later refinance their position (once construction was completed) (de Graf, 2013). This case study focuses on the policy and structured finance tools, including standardisation, aggregation, tranching and liquidity facilities, which paved the way to expanding the pool of investors. Ultimately, they serve as essential precursors to securitisation.

Background on market challenges and opportunities

The Walney offshore wind project benefits from an exceptionally supportive and transparent host government with minimal political risks. The UK government has implemented a range of initiatives to minimise investment risk for developers. This includes a transparent (competitive) leasing process for government resources, access to finance via incentives, cost-effective grid investment and connection and other targeted technical assistance. Walney also benefits from easy access to UK and continental European investors and deep, liquid foreign exchange markets. For these reasons, Walney faced much lower investment risks than a similar project in the developing world.

Government support for offshore wind projects in the UK starts with the leasing process. The Crown Estate²⁶ owns most of the seabed (up to 12 nautical miles offshore) where offshore wind projects are built. To foster development, it has run a series of competitive rounds to issue development leases to developers. It has also set up transparent decision-making processes to manage any potential conflicts,²⁷ helping assure developers that projects will be able to proceed once leased. DONG Energy was awarded a 50-year lease to develop the Walney project as part of the ‘Round 2’ tendering process in December 2003 (DONG Energy, 2014).

The UK also supports the sale of transmission assets for offshore wind through the Offshore Transmission Owner process. This is a competitive regulatory regime governing the development of transmission networks. By granting licences to operate new offshore transmission assets, the government encourages generators to partner with the most efficient transmission operators. This results in lower costs and higher standards of services (Ofgem, 2015). The Offshore Transmission Owner process provides clarity and structure to the transmission development process, which in turn helps investors value the associated assets (i.e. the transmission infrastructure).

The UK government also provides significant financial incentives to Walney and other offshore wind developments. Renewable electricity projects in

²⁶ The Crown Estate is a collection of lands and holdings in the United Kingdom belonging to the Sovereign (the British monarch). Agents representing the Crown Estate manage assets on a day-by-day basis (The Crown Estate, 2016).

²⁷ This includes the creation of dispute resolution processes. For example, there has historically been some concern that wind farm leases could be amended or terminated in order to allow offshore gas or oil development to proceed. The UK Department of Energy and Climate Change has established procedures to ensure wind farm leases will not be affected without appropriate compensation (Department of Energy and Climate Change, 2011).

the UK receive income streams from the Renewable Obligation Certificates (ROCs), tradable certificates issued to operators of accredited renewable generating stations for the electricity they generate.²⁸ Offshore wind projects like Walney are eligible for two ROCs for each megawatt-hour of electricity they produce. This incentive serves to significantly lower the risk of the project income stream over the long term. The UK government's supportive policy framework influenced the success of the project because it provided a solid foundation on which developers could build the financial structure needed to attract investors.

Project structure

The following section describes the structure of the Walney offshore wind project (Figure 20). This includes a description of the roles and responsibilities of key players, the risk mitigation instruments employed to support the deal and their impact on the FitchRating criteria.

A. Roles and responsibilities of key players

- » **DONG Energy** is a Northern European energy group based in Denmark engaged in oil and gas production, offshore wind, other power generation and energy supply for residential and commercial customers. The company is heavily involved in the UK offshore wind market with equity in several major wind farms. It holds a 50.1% majority stake in Walney offshore wind and is the leading partner in the construction and operational phases of the development (DONG Energy, 2015). DONG, the initial equity investor, sold off minority equity stakes over time to a utility (Scottish and Southern Energy) and financial investors (OPW), ultimately retaining a 50.1% majority interest.
- » **Scottish and Southern Energy**, the second equity investor, purchased a 25.1% stake in the project from DONG Energy. Scottish and Southern Energy is a vertically integrated energy company that operates and invests in energy networks, projects and businesses. It is also one of the largest developers of renewables in the UK with more than 3,500 MW of renewables in its portfolio. In return for its investment, Scottish and Southern Energy is able to market the output of the wind farm in proportion to its equity share (DONG Energy, 2015). It also secured financial guarantees relating to the final construction cost of the project and its timely completion from DONG.

²⁸ Utility suppliers are required to procure ROCs to demonstrate they have met their renewable obligations.

- » Ampère Equity Fund and PGGM (a Dutch pension fund) created OPW, an incorporated joint venture, to acquire and hold a 24.8% minority stake in Walney offshore wind farm. Ampère Equity Fund has investments in various renewable energy projects in Europe and was advised by Global Capital Finance on this deal.²⁹ PGGM is one of the largest Dutch pension funds with more than EUR 108 billion in assets under management. PGGM is also a direct investor in Ampère Equity Fund and has made a number of investments in the renewables sector.

Table 10. Walney Offshore Wind Farm: Financial institutions and investment amounts

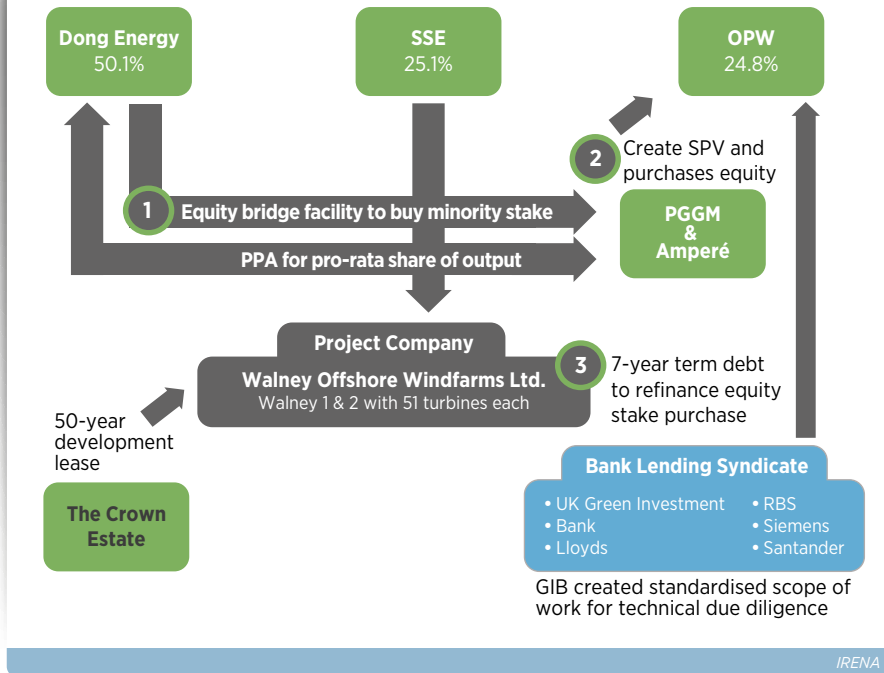
Type of investment	Organization	Amount
Equity	DONG Energy Group	50.1% majority stake (estimated at GBP 646 million)
	Scottish Southern Energy (SSE)	25.1% minority stake (estimated at GBP 324 million)
	OPW Hold CO UK Ltd. (dedicated investment vehicle for PGGM and Ampère Equity)	24.8% minority stake (estimated at GBP 320 million)
Debt (relates only to OPW minority stake) 70%	UK Green Investment Bank	Estimated at GBP 224 million
	Royal Bank of Scotland plc	
	Siemens	
	Santander	
	Lloyds Bank	

IRENA

The Walney structure has a number of innovative features that enabled non-traditional investors to participate in the deal. DONG provided interim financing to OPW, on the understanding that OPW would seek to refinance the stake once the project reached operational status. This arrangement required less upfront capital commitment from OPW and provided DONG with the ability to significantly reduce its balance sheet burden after construction, at which time OPW would refinance and repay DONG. The financial investors, on the other hand, were most exposed during construction and substantially reduced their exposure in the operational phase. In so doing, they could profit from the increase in valuation arising from the transition, while still maintaining an equity stake.

²⁹ Financial regulation prohibits Ampère Equity from making investments above 10% of the fund size into a single project.

Figure 20. Structure of the Walney Offshore Wind Farms project



In 2012, OPW refinanced 70% of the equity on a non-recourse basis with a five-member syndicate including four commercial banks and the UK GIB (PGGM, 2012). This appears to be the first project in which the funding structure was designed to attract non-utility investors who would seek to refinance their position once construction was complete (de Graf, 2013).

To ensure that Ampère and PGGM could refinance their equity stake, OPW set up a series of three SPV holding companies, which parsed out the claims on assets emanating from the equity ownership. The creation of the SPVs allowed OPW to segregate certain asset claims to the satisfaction of the bank consortium organised by the UK GIB that ultimately refinanced OPW's holding. In total, the banking syndicate refinanced 70% of the equity holding into a seven-year fixed-term loan.

In addition, production-based incentives (i.e. ROCs)³⁰ backed by a strong and stable UK governmental entity supported the revenue stream. Currency swaps provided protection for the majority of exposure for the non-domestic investors or lenders. 'Step-in' features³¹ on the bank financing dealt with

³⁰ Later, the Contract for Difference scheme provided a stable incentive payment based on the production of the system.

³¹ 'Step-in' features provide lenders with protection by enabling them to take control of project operations and cash flows in the event of non-performance.

some of the risks arising from DONG's majority ownership, effectively serving to reprioritise cash flow priority for the lenders on their pro-rata portion of project revenues.

In summary, the creative financial engineering used by DONG and its partners enabled new capital sources to support the offshore wind market. Each entity provided important benefits and managed risks they were best suited to manage. For example, the creation of OPW, combined with GIB-led debt refinancing, directed financial investors' risk exposure towards the construction phase, where capital is harder and more expensive to find. It paved the way to lower-cost long-term debt finance.

By working with DONG, Scottish and Southern Energy and OPW were able to secure a partner with critical experience in large-scale energy project development with deep financial resources. DONG, on the other hand, was able to maintain a majority position on the project while also reducing the burden on its balance sheet. This is particularly important for European utilities in the light of the intense financial pressures they have faced in recent years.

B. Use of risk mitigation instruments and structured finance

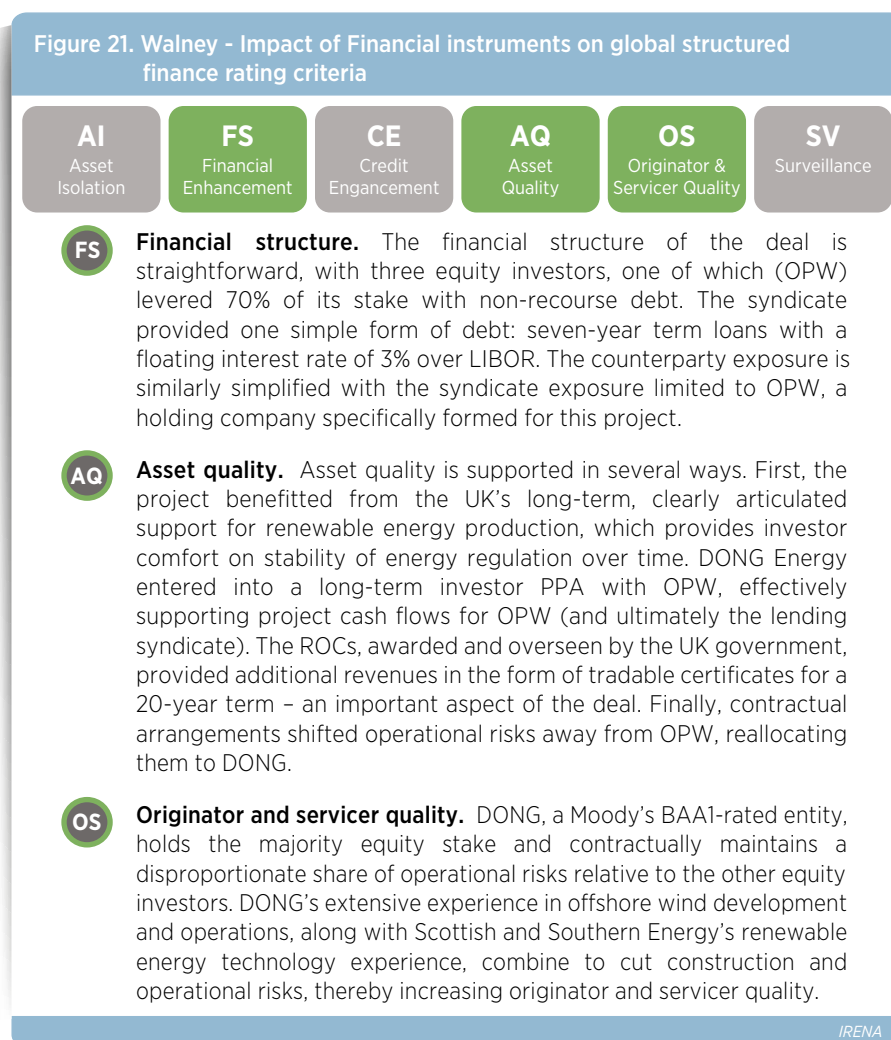
The Walney offshore wind deal is notable for its use of risk mitigation instruments and structured finance mechanisms that open the door to an expanding group of investors in renewable energy. This includes standardisation, aggregation, guarantees, tranching and liquidity facilities. Each is discussed briefly below.

- » **Standardisation.** The GIB created a standardised scope of work for the technical due diligence. The syndicate jointly negotiated the terms and conditions for both Walney 1 and 2. Each lender provided its own portion of the financing under identical terms. In addition, the syndicate engaged a single set of financial, legal and technical advisors, minimising the fee impact on overall project returns.
- » **Aggregation.** The Walney offshore wind deal combined the funding of two separate wind farms with a total capacity of 367 MW and 102 wind turbines. The two wind farms were built sequentially with commissioning of the Walney 1 followed one year later by Walney 2. The financial package wrapped both projects into one deal to capture scale and efficiency.
- » **Liquidity facilities.** Contingent equity tranches were established to fund cost overruns in the construction phase. Once operational, both a pre-funded six-month debt service reserve and a maintenance reserve

account were established to provide debt service support in the event of cash flow shortfalls. There is also a 100% cash flow sweep feature starting at year seven. This would redirect all project cash flows to the lenders if the full principal amount of the debt is not repaid by the end of year seven. This mechanism serves to protect the lenders in the event of sponsor default.

C. Impact on global structured finance rating criteria

The assessment of the project structure and risks based on the credit rating framework demonstrated the need to improve the financial structure, asset quality, originator and servicer quality criteria. Figure 21 outlines how the Fitch global structured finance rating criteria were affected by the use of the financing risk mitigation instruments.³²



³² This analysis draws from a variety of sources, including public filings, news releases, legal analysis and confidential interviews. It is predicated on the information available over the course of research, which includes both confidential 'on-background' interviews and public sources. It is possible that alternative conclusions might be reached with the benefit of greater disclosure of deal terms.

Success factors

A number of success factors stand out in this project that may be applied elsewhere. Governments, public finance institutions and developers all contributed to mitigating risks and building a strong project.

(1) Strong government support for renewable energy

Offshore wind is complex and costly to finance, and Walney stakeholders had to overcome a number of complex challenges. National energy goals and strong government support mechanisms (ROCs, Contract for Difference etc.) provided important assurances to project developers and financiers and increased the likelihood of project success. Clearly structured and transparent rules that govern the leasing process for the Crown-owned seabed provided a competitive process to support development of offshore wind for the Walney project. Historically, there been some concern that wind farm leases could be amended or terminated to allow offshore gas or oil development. Government procedures ensured that Walney and other wind farm leases were not affected by such changes in the leases unless accompanied by appropriate compensation.

(2) Effective use of available tools and instruments to mitigate risk and reduce project cost

Walney's developers shaped creative legal arrangements that determined the direction and priority of project cash flows such that certain investments mimic certain attributes of a tranchised tradable product. Such arrangements cut the cost of financing for developers like DONG because they limit the risk to banks and other financial entities of insufficient or non-timely repayment of loans and principal.

(3) Effective use of complementarity between private sector investors and DFIs

DFIs and other financing entities provided funding for refinancing equity stakes. Operational revenue-generating projects like Walney provide attractive opportunities for an expanding array of institutional investors searching for long-term income-producing assets. Debt refinancing provided by these investors, in turn, freed up DONG's balance sheet and allowed the company to recycle funds into new projects. This approach raised the number and amount of capital providers for equity refinancing at the operational phase. Thus, it increased the confidence that developers like DONG can ultimately monetise their stakes and drive renewable energy market development.

Developers created symbiotic partnerships. Large-scale renewable energy projects like Walney require a range of stakeholders from the energy, financial, legal and governmental sector to come together. The Walney project created a partnership in which each player takes on the roles and risks to which they are best suited. This limited exposure to a single entity and lowered overall project cost.

5.2 Sarulla geothermal power plant: managing risk for a complex geothermal deal

Indonesia is a growing economy with increasing energy demand. Energy use is expected to rise by 8.5% annually over the next ten years (Japan Bank for International Cooperation, 2014). To date, electric energy use has primarily been served by coal-fired power plants. This has created challenges for Indonesian utilities and policy makers in managing fuel price volatility and carbon emissions associated with fossil fuels.

Table 11. Snapshot of Sarulla Geothermal project

Technology	Geothermal Power
Installed Capacity	321 MW
Location	North Sumatra province, Indonesia
Financial close	March 2014
Total Investment	Estimated at USD 1.6 billion

In 2006, the Indonesian government created the National Energy Plan,³³ which established specific renewable energy goals to help address the country's fuel price volatility and carbon concerns. In particular, Indonesia set a goal to source 15% of its electricity from renewable sources by 2025 (IRENA, 2014a). Indonesia has about 40% of the world's geothermal resources (ADB and World Bank, 2015). The government aims to tap this source for about 9,500 MW of power generation, which would represent the country's largest renewable energy source (ADB and World Bank, 2015).

With these goals in mind, the Indonesian government introduced a range of financial and policy instruments in close collaboration with international development agencies and private sector leaders to encourage renewable energy project development. This case study explores how several

³³ The plan was reviewed and updated in 2014 by the federal parliament.

mechanisms – including guarantees, currency risk mitigation, interest rate hedges and liquidity facilities – were employed to drive the development of the Sarulla geothermal power project.

Background on market challenges and opportunities

Sarulla is one of the world's largest geothermal power plants. While it represents an enormous achievement for Indonesia's emerging geothermal market, the project also confronted a number of technical, political, regulatory, and financial challenges over the years. A brief summary of these, as well as Sarulla's long gestation period, are described below.

The Sarulla project started in 1993 when Pertamina – the state-owned oil, natural gas and mining company – awarded Unocal North Sumatera Geothermal (UNSG) the right to develop the Sarulla geothermal field and power plant. UNSG is a subsidiary of the international oil and gas company Unocal. Under the terms of a joint operating contract, the infrastructure and assets developed remained the property of Pertamina though UNSG had the exclusive right to use them (ERM, 2013). Between 1994 and 1997 UNSG conducted several engineering, technical, environmental and exploratory reviews to assess the productive potential of geothermal resources and the need for related infrastructure. In 1997, however, UNSG suspended work on the project due to the Asian financial crisis (PR Newswire, 2002). Several years later, in 2004, UNSG fully exited the project and sold its right as contractor to Indonesia state electric company PLN for USD 60 million (Chevron, 2004).³⁴

In 2005, the project was tendered and a letter of intent for development rights awarded to PT Geo Dipa Energi, a company jointly owned by PLN and Pertamina. The terms of the letter of intent required GT Geo Dipla Energi to present a financial plan as a basis for an energy service contract and joint operating contract within one year. However, PT Geo Dipa Energi failed to meet the deadline, and the letter of intent was rescinded in July 2006 (Chevron, 2004). It was then awarded to the next best bidder, a development consortium that included Medco Energi International, Ormat International, and Itochu Corporation. The consortium created a new company called Sarulla Operations. In 2007, Kyushu Electric Power Co also joined the consortium as an equity owner.

Under the Sarulla Operations consortium, the project faced new challenges due to changing market conditions that adversely affected the economics of the project. In particular, when the project was initially tendered in 2005, the consortium had bid a price of USD 4.642 cents (USD 0.642) /kWh for

³⁴ The acquisition was approved by Pertamina and the Ministry of Energy and Mineral Resources. In addition, the tender process was also approved to transfer PLN ownership as Pertamina contractor to a third party.

the energy service contract. However, by early 2008, raw materials were rising, and power plant equipment and drilling costs were increasing. It thus became clear that the consortium's original bid was no longer viable.³⁵ The consortium proposed a tariff adjustment which was subject to several rounds of negotiation with PLN and other relevant agencies and ministries. Despite the election of a new president and administrative changes among agencies, the relevant parties eventually agreed to a revised base tariff of USD 6.79 cents / kWh.³⁶ The terms were recorded in a 'Principle Agreement' in April 2010.

In 2013 the consortium finally signed an amended joint operating contract to develop the project. The 30-year energy service contract was signed with PLN the following month. Additional support mechanisms, including both tax exemptions and lower tax levels, made the financials of the deal more attractive (World Bank, 2015). Financial close for the USD 1.6 billion project was achieved in March 2014.

The Sarulla timeline and milestones draw attention to the substantial challenges faced by large-scale geothermal project development in Indonesia. Some stakeholders note that delays were unavoidable due to the Asian financial crisis while others note that the government's regulatory and procurement processes required substantial reform to accommodate the project. For example, there was no feed-in tariff, model PPA or other standardised procurement process to guide the development of the energy service contract and joint operating contract. They had to be negotiated on a case-by-case basis, adding time and expense to project development. These types of regulatory difficulties are not uncommon in developing countries, where governments have not created streamlined guidelines or regulatory frameworks that can foster robust market growth.

³⁵ Many other power projects in Indonesia had been delayed for various reasons and faced the same problem, leading to requests from companies to adjust the tariff to offset the increased construction costs (ERM, 2013).

³⁶ This tariff was calculated on a levelised basis with three step-down tariff stages.

Project structure

The following section describes the structure of the Sarulla geothermal project (Figure 22). This includes a description of the roles and responsibilities of key players, the risk mitigation tools used to support the deal, and their impact on the FitchRating criteria.

A. Roles and responsibilities of key players

Sarulla Operations, the owner-operator of the geothermal plant, is a consortium made up of four organisations:

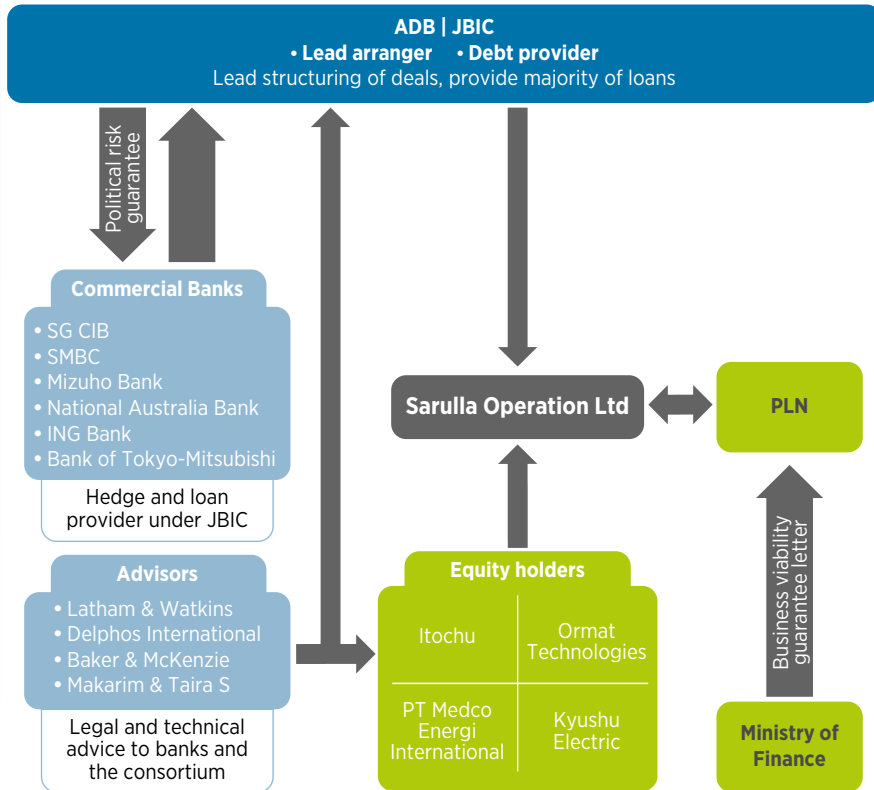
- » **PT Medco Energi International.** Medco is a publicly listed Indonesian oil and gas company and holds a 37.5% equity share in the Sarulla project. As an Indonesian based developer, Medco provided the necessary local knowledge and expertise to oversee the exploration, development and production of the geothermal project.
- » **Itochu Corporation.** Japan-based Itochu is a trading, investment, technology and logistic services company that holds a 25% equity share in Sarulla. It has responsibility over the operations and maintenance of the geothermal plant.
- » **Kyushu Electric Power Co.** Kyushu Electric is a Japan-based electric power company that engages in the design, construction and supervision of electric and civil engineering projects. The company holds a 25% equity share in Sarulla and is responsible for managing the geothermal reservoir (Yoi, 2014).
- » **Ormat International.** U.S.-based Ormat Technologies is a vertically integrated company dedicated to providing solutions for geothermal power, recovered energy generation and remote power. It holds a 12.75% equity share in Sarulla and is responsible for co-ordinating the design of the plant as well as supplying converters for the project (Wolf and Gabbay, 2015).

The consortium contributed USD 430 million in equity to the project and secured USD 1.17 billion in debt financing through the ADB and the Japanese Bank for International Cooperation. The scale and complexity of the project required partners covering a spectrum of roles from domestic governmental stakeholders to commercial banks:

- » **Pertamina Geothermal Energy.** Part of Pertamina Geothermal Energy's business model is to establish joint operating contracts with geothermal ventures such as Sarulla.³⁷ It was set up in 2006 as mandated by the government to develop 15 geothermal business working areas in Indonesia. PT Pertamina (Persero) owns 90% of the share of the company and PT Pertamina Dana Ventura owns 10%.
- » **PLN.** The Indonesia state electric company PLN will buy Sarulla Operations power for USD 6.79 cents/kWh for 30 years under an energy service contract. Investors in the project note that securing the energy service contract – a long-term, secure revenue source – was critical to the bankability of the project and its ability to attract investment (PLN, 2013).
- » **Government of Indonesia.** Stakeholders close to the project note that though the regulatory framework often hindered the development of Sarulla, the government did have a strong commitment to the project. As evidenced by Indonesia's National Energy Plan goals, its preferential tax treatment and off-taker guarantees, the government's support made a significant impact on the ultimate success of Sarulla.
- » **Technical and financial advisors.** A number of advisors supported the project. They included Latham & Watkins, who served as international legal counsel to the lenders; Baker & McKenzie and Wong & Leow, which advised the consortium on the energy service contract and the joint operating contract; Societe Generale Corporate & Investment Banking, which served as mandated lead arranger, technical bank and hedge provider; Delphos International, which served as financial advisor to the consortium; and Makarim & Taira S, which served as advisor to Pertamina Geothermal Energy.
- » **Multilateral and bilateral development organisations.** The ADB and Japanese Bank for International Cooperation (JBIC) served as lead arrangers for Sarulla (Wolf and Gabbay, 2015). The JBIC provided USD 490 million in senior debt and the ADB invested USD 330 million, including mezzanine debt from the Canadian Climate Fund and the Clean Technology Fund.
- » **Commercial banks.** Six different commercial banks participated in lending under the JBIC, a total of USD 330 million (Table 12).

³⁷ Pertamina Geothermal Energy entered a joint operating contract with Gunung Salak for a capacity of 375 MW managed by Chevron Geothermal Salak. Its contract with Darajat was for a capacity of 260 MW managed by Chevron Geothermal Indonesia, and with Wayang Windu for a capacity of 227 MW managed Magma Nusantara. Its joint operating contract with Bedugul was managed by Bali Energy, and its joint operating contract with Sarulla by the Sarulla Operations consortium.

Figure 22. Structure of the Sarulla geothermal project



IRENA

Table 12. Sarulla Geothermal projects: Financial institutions and loan sizes

Syndicate structure	Organization	Amount
Lead arrangers and development banks	Japan Bank for International Cooperation (JBIC)	USD 490 million (senior debt)
	Asian Development Bank (ADB) (lead arranger)	USD 250 million (senior debt)
	Canadian Climate Fund (Delivered through ADB)	USD 20 million (mezzanine debt)
	ADB Clean Technology Fund (CTF)	USD 80 million (mezzanine debt)
Commercial banks	Bank of Tokyo-Mitsubishi UFJ	USD 330 million (under JBIC EPRG)
	ING Bank	
	Societe Generale Corporate & Investment Banking	
	Sumitomo Mitsui Banking Corporation	
	Mizuho Bank	
	National Australia Bank	

Sources: ADB, 2014

B. Use of risk mitigation instruments

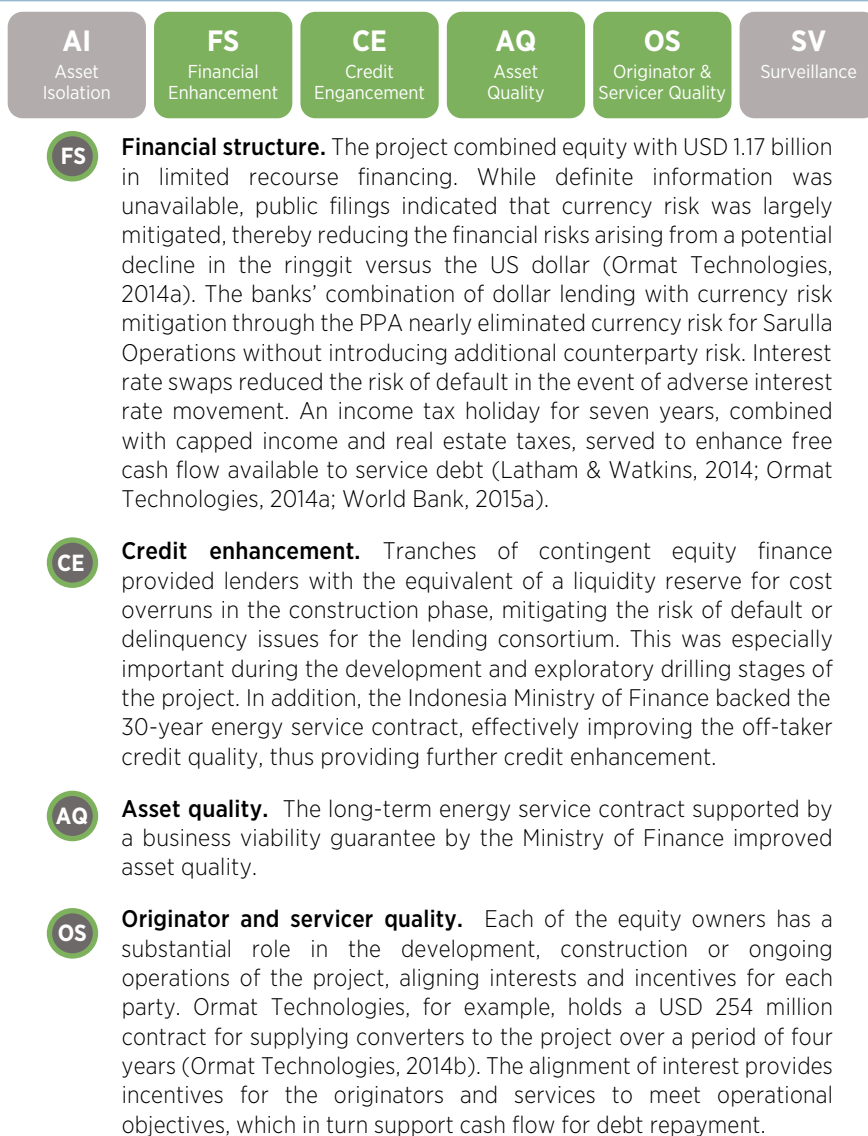
Several risk mitigation instruments were employed to reduce project risk and attract investment to the projects. This includes PPA guarantees, political risk guarantees, liquidity facilities and currency hedges. Each is discussed briefly below.

- » **PPA guarantees (or energy service contracts).** The Indonesian Ministry of Finance provided Sarulla Operations with a business viability guarantee letter for the power off-taker PLN (Wolf and Gabbay, 2015). Considering PLN had an investment grade rating of BA2 as a stand-alone entity, the guarantee presents a significant credit enhancement to the deal (Moody's, 2014). It provided investors with important assurances that the energy service contract would be honoured over the deal term.
- » **Risk guarantees.** The Japan Bank for International Cooperation provided an extended political risk guarantee. This protects investors from a range of political risks, including those associated with breach of contract by government parties, expropriation or nationalisation, political violence and currency non-convertibility (Norton Rose, 2012).
- » **Liquidity facilities.** The consortium set aside a tranche of contingent equity to mitigate completion risk during the exploratory drilling phase of the project (Project Finance International, 2014). The contingent equity is to be deployed if, for example, wells are drilled in the wrong place and more investment is required to cover the costs of the drilling programme.
- » **Currency hedging.** PLN's revenues come primarily from ratepayers who pay in local currency. However, as mandated by the energy service contract, the PLN tariff formula includes components indexed to USD, and thus PLN bears the currency risk. Stakeholders note that the government guarantee backing up PLN's energy service contract (in case of default) was of great importance to investors.
- » **Interest rate swap.** The Sarulla consortium hedged against interest rate fluctuations by purchasing an interest rate swap. This covers interest rate fluctuations for up to 90% of the LIBOR-based tranches of the loan (Wolf and Gabbay, 2015). Since geothermal projects usually have stable revenues (they are considered baseload power generation, and the rate of the energy service contract is fixed), they commonly use an interest rate swap to ensure debt payments also remain stable even when interest rates change.

C. Impact on global structured finance rating criteria

The assessment of the project structure and risks based on the credit rating framework demonstrated the need to improve the criteria in financial structure, credit enhancement, asset quality, originator and servicer quality. Figure 23 below outlines how the Fitch global structured finance rating criteria were affected by the deployment of the financial risk mitigation instruments.

Figure 23. Sarulla Geothermal Power: impact of financial instruments on global structured finance ratings



IRENA

Success factors

Like the Walney project, the Sarulla geothermal power plant featured a number of success factors that contributed towards its implementation. Some of them were similar to the Walney project:

(1) Strong government support for renewable energy

Even when the domestic regulatory framework poses challenges to the investor, national energy goals can demonstrate a strong commitment to renewables. Active collaboration with project developers and financiers can also contribute to the ultimate success of renewable energy projects. Stakeholders point out that this was an important factor affecting the development of the geothermal project described here.

Furthermore, government flexibility in renegotiating contracts or adapting policies can be essential. In many developing countries, including Indonesia, developers often experience long project lead times compared to those in developed countries. In the case of the Sarulla geothermal project, flexibility demonstrated by the authorities made a particular difference in adapting to changing market conditions such as rising raw materials prices, increasing power plant equipment and drilling costs.

Tax exemptions and other favourable tax treatment also helped move the projects forward. They provided foreign investors with additional revenues to achieve returns commensurate with the risk of investing in an emerging economy like Indonesia.

(2) Effective use of available tools and instruments to mitigate risk and reduce project cost

The long-term off-taker agreements in the Sarulla geothermal projects provided security to investors. Moreover, the government guarantees to backstop energy service contracts made a particular difference to managing the high off-taker risk. Political risk insurance provided protection for geothermal investors across a range of political risks that may adversely affect payments from the Indonesian government or government-owned utilities. Such guarantees are particularly important in developing countries, where these insurance products significantly enhance the credit quality of renewable energy projects, improving their attractiveness to foreign investors.

Other instruments used in the Sarulla case include:

- » Purchasing other hedging instruments limited the project's exposure to adverse interest and currency rate fluctuations. This was especially important for investors lending hard currency to the Sarulla geothermal project, which would receive payments in a volatile local currency.
- » Interest rate swap. Managing exposure to interest rate risk is especially important for geothermal projects, which have stable local currency revenues due to a baseload power generation profile and the fixed-rate energy service contract.
- » Contingent equity facilities reduced lenders' concerns about potential cost overruns during the Sarulla geothermal project construction phase. This instrument makes a major difference in developing countries where investors are not as familiar with unique project risks.

(3) Effective use of complementarity between private sector investors and DFIs

The alignment of operator and servicer interests. The alignment of interest provided incentives to the originators and servicers to meet operational objectives, which in turn supported cash flow for transaction debt.

5.3 Financing solar in Jordan: aggregating small-scale solar projects to attract investment

Jordan has limited oil and gas resources and has to import nearly all gas required for electricity production from neighbouring countries. Gas supply has frequently been interrupted in recent years, forcing Jordan to run power plants with imported oil, which has significantly increased the cost of electricity (Greenway, 2015). To diversify its energy resources and reduce fossil fuels imports, the government of Jordan set a 10% renewable energy target in 2005 (IRENA, 2014b).

The public and private sectors have implemented a number of innovative financial and policy tools to drive renewables development to meet energy goals. This case study explores several instruments, including guarantees, standardised contracts and aggregation, which have enabled seven solar PV projects in Jordan. Collectively they make up around 102 MW³⁸ of power.

³⁸ The capacity of a PV plant is usually reported on the basis of its gross total panel production capacity in direct current. In this case an aggregate of 102 MW in direct current is being installed across the seven plants.

Table 13. Snapshot of Jordanian solar projects

Technology	Solar-PV
Installed Capacity	102 MW (7 projects)
Location	Various locations across Jordan
Financial close	October 2014
Total Investment	USD 247 million

Background on market challenges and opportunities

The solar PV market has been historically slow to develop in Jordan, though recently some market analysts have announced that the country is going through a belated ‘solar PV spring’ (Tsagas, 2015). Jordan’s solar PV market was jump-started in 2012 when the government of Jordan established a direct proposal process as part of Renewable Energy and Energy Efficiency Law (Law No. 13). This new law enabled private companies to negotiate renewable energy PPAs directly with the Ministry of Energy and Mineral Resources at a fixed tariff in accordance with reference prices established by the Electricity Regulatory Commission (IEA, 2015).³⁹

For round 1 of the direct proposal process, the Ministry of Energy and Mineral Resources emphasised the Ma’an Development Area due to its proximity to high-population centres and its high solar irradiance. Qualified applicants entered into a Memorandum of Understanding with the Ministry of Energy and Mineral Resources, which was responsible for governing various terms and negotiations of the PPA. Interested developers also had to submit evidence of experience with renewable technologies, show the ability to raise capital and produce detailed analyses of generation capacity.

After completing the Memorandum of Understanding, developers were permitted to undertake detailed due diligence work, including the negotiation of land rights. The Ministry of Energy and Mineral Resources then evaluated proposals and awarded 12 PV projects the right to enter into PPAs with the National Electric Power Company. All the solar projects secured 20-year PPAs with the company (Tsagas, 2015).

³⁹ Renewable energy projects also receive a ten-year tax holiday of 75% and are exempt from customs and duties on imported equipment and services, as well as taxes on outgoing payments (Ghailayini, 2015).

It became evident, though, that even with PPAs in place, developers were finding it hard to secure financing. Due to the relatively small size of many of the projects, as well as investor unfamiliarity with the Jordanian renewable energy landscape, many investors were initially hesitant to commit funds. To address this, seven projects agreed to standardise and aggregate their projects in order to co-ordinate negotiations, reduce due diligence costs and attract investors (Cantelmi and Wood, 2015).

Project structure

The following section describes the structure of the projects that were part of the solar aggregation in Jordan (Figure 24). This includes a description of the roles and responsibilities of key players, the risk mitigation instruments deployed to support the deal, and the impact of those instruments on the FitchRating criteria.

A. Roles and responsibilities of key players

The IFC served as the lead arranger and lender of record for the solar aggregation in Jordan. Before the solar projects, the IFC had worked closely with the Kingdom of Jordan as lead arranger for the development of the Tafila wind farm. The project was the first wind direct proposal⁴⁰ submission and the country's first privately owned large-scale wind farm (Skoldeberg and Mustafa, 2013). The resulting structure of contracts and project agreements became the basis for the Round 1 solar projects (IFC, 2014). Building on its good relationship with the government and its experience with the new direct proposal process, the IFC offered advisory and financing services to the 12 solar projects.

Eventually, four development consortia appointed IFC as their lead arranger. They represented seven of the 12 projects and approximately 102 MW of capacity in solar power, an average of 91 MW, on a net delivered basis (Table 14). In this capacity, the IFC aggregated the seven projects in order to negotiate with investors and the government on their behalf (Cantelmi and Wood, 2015).

The IFC engaged a common team of legal, technical, financial and insurance advisors to serve all seven projects. By aggregating the projects, it was able to retain a very high-quality team of advisors to conduct due diligence and legal work, an approach that would probably have been prohibitively

⁴⁰ The direct proposal process allows developers to submit expressions of interest directly to the ministry, with standardised terms of reference and contracting for renewable energy projects.

expensive if applied to each project individually (Greenway, 2015). The team established standardised terms and template contracts that were almost identical across all projects, with variations permitted only to deal with unique project characteristics.

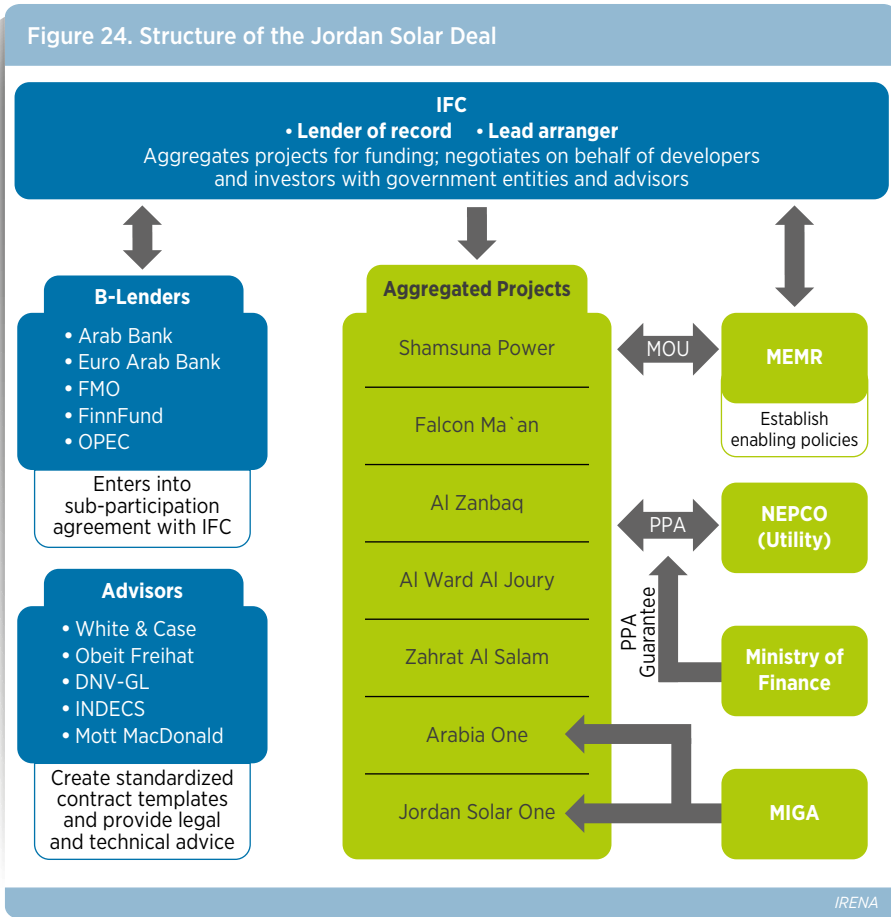
Table 14. Jordan: Project developers and sizes

Project Developer	Capacity (MW)	Total Project Cost (USD million)
Shamsuna Power Company	10	20
Falcon Ma'an for Solar Energy	21	50
Arabia One for Clean Energy Investments	10	30
Al Ward Al Joury for Energy Generation	10	30
Zahrat Al Salam for Energy Generation	10	30
Al Zanbaq for Energy Generation	10	30
Jordan Solar One (Mafraq)	20	57
TOTAL	91	247

After all projects had agreed to the IFC's terms, it offered potential lenders the opportunity to invest in the deal as B-lenders (see loan syndication in Section 2.3). This arrangement was highly attractive to investors. Instead of lending directly to the projects, they signed sub-participation agreements with the IFC, which acts as the lender of record. As a result, the organisation could negotiate on behalf of the other lenders in case of default. Lenders viewed this approach as an implicit form of political insurance. It leveraged the heft and authority of the IFC should unforeseen risks arise and mitigated the risks carried by members of the B-lending syndicate.

In total, the IFC arranged for a USD 207 million debt package to finance the projects. Debt was provided by the Arab Bank (Bahrain), Europe Arab Bank, the Dutch development bank FMO, FinnFund, the Organization of the Petroleum Exporting Countries (OPEC) Fund for International Development, and the IFC (Cantelmi and Wood, 2015). Although the initial intention was for each B-lender to participate proportionately across all seven projects, the lenders ultimately made different choices on both the projects to which they would lend and their degree of participation in each.

Figure 24. Structure of the Jordan Solar Deal



Each bank had slightly different motivations to join the syndication. The Amman-based Europe Arab Bank, for instance, viewed the project as an opportunity to help Jordan address its dependence on fossil fuel imports and establish a reputation for renewable energy investments in the region. Similarly, FMO recognised the potential of the project to create jobs in previously underserved areas of the country and reduce the environmental impact of electricity production. It also found this approach to be an efficient means of achieving its goal of funding smaller projects (Van den Bos, 2015). Regardless of each project’s motivation, the economics and risk profile created through aggregation, standardisation and the associated guarantees made the projects attractive to both commercial and development banks.

B. Use of risk mitigation instruments and structured finance

A number of risk mitigation instruments and structured finance mechanisms were employed to reduce project risk and attract investment for the projects. This includes PPA guarantees, risk guarantees, aggregation and standardised contracts. Each is discussed briefly below.

- » PPA guarantees. The Ministry of Finance provided a PPA guarantee to backstop the National Electric Power Company off-take agreement. In the case of default by the National Electric Power Company, the Ministry of Finance takes legal responsibility to ensure payments will be made to investors. According to developers and lenders, this was one of the most important financial instruments applied in this project because it significantly enhanced the quality and bankability of the PPA.
- » Risk guarantees. Two of the seven projects opted for risk guarantees provided by MIGA, covering a variety of risks including transfer restriction, expropriation, war and civil disturbance, and breach of contract. MIGA guarantees were directed at risks during the construction and operational phases and helped developers attract financing more easily (World Bank, 2015b).
- » Aggregation. The IFC and project developers shared resources and aggregated projects in three main ways. First, the IFC served as lead arranger to negotiate with government and investors, as well as to engage competent legal and technical advisors on behalf of the seven solar projects. By aggregating multiple, small-scale projects, the IFC was able to reduce the cost of due diligence and make financing requirements more attractive to the lender community (Cantelmi and Wood, 2015). Next, some of the developers took advantage of their concurrent work on several projects by employing the same engineering, procurement and construction (EPC) companies across projects, receiving bulk discounts. Finally, aggregation allowed certain energy infrastructure and services (e.g. transmission station and security services) to be shared across projects, leading to further cost savings (Greenway, 2015).

- » Standardised contracts. The Kingdom of Jordan established a direct proposal (tender) process for renewable energy that standardised terms of reference and contracting for projects. In addition, the IFC emphasised the need to standardise contracts and due diligence costs to attract financing as part of its project aggregation. In particular, the IFC retained advisors to form templates for due diligence documents, which were reviewed and agreed by the developers involved in the project. These documents were then refined for each separate project (Ghalayini, 2015).

Standardised contracts were produced in particular to address PPAs, financing and project permitting. For PPAs, this included the negotiation of common terms between developers and the National Electric Power Company on force majeure, archaeological discoveries and timing. It was agreed that 80% of the tariff would be paid in USD and 20% in Jordanian Dinar (Ghalayini, 2015). Standardised terms of financing included simplification and standardisation of financial documents to facilitate review by the individual projects (Cantelmi and Wood, 2015). An expedited permit process was developed for six of the projects, which were located on government land.

C. Impact on global structured finance rating criteria

The assessment of the project structure and risks based on the credit rating framework demonstrated the need to improve the criteria in financial structure, asset quality and surveillance. Figure 25 outlines how the Fitch global structured finance rating criteria were affected by the use of the financial risk mitigation instruments.

Figure 25. Jordan: impact of financial instruments on global structured finance ratings



- FS Financial structure.** Aggregation of legal agreements and technical advice by specialised firms across all seven projects enhanced the quality and consistency of the financial structure while also lowering costs. Legal agreements were drafted and negotiated to broadly apply to all seven projects, with variations limited to address only unique details applicable to the individual projects. This effort streamlined legal review and associated risk assessment. Similarly, technical advisors addressed engineering and measurement issues across the projects to minimise costs and maximise consistency.
- AQ Asset quality.** With the IFC as lead lender, and other lenders participating subject to the provisions of the B-lending programme, the lenders could benefit from the enhanced protection of the IFC's Preferred Creditor Treatment. Lenders believed the negotiating leverage of the IFC in the event of potential default mitigated downside risks to their investments. Asset quality was also bolstered by a long-term fixed PPA guaranteed by the Ministry of Finance.
- OS Originator and servicer quality.** Operator and servicer risk was mitigated by a careful vetting process embedded in the Ministry of Energy and Mineral Resources requirements and enhanced by strong legal and technical advice from the IFC. Aggregation of the seven projects enabled the IFC to cost-effectively engage experienced, high-quality advisors. The cost of such advice would otherwise have been prohibitive for these small, individual projects.
- SV Surveillance.** As the sole lender of record, the IFC is responsible for surveillance and supervision, and handles payments. The ongoing supervision of the process was consolidated in the hands of a single entity with substantial experience and solid reporting infrastructure, reducing the costs and resource drain associated with monitoring the individual projects.

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Success factors

As in the previously discussed case studies, the success of Jordan's solar programme is explained by a number of enabling factors:

(1) Strong government support for renewable energy

Standardised renewable energy tender terms of reference, documentation and pricing created an efficient and transparent process for the developers of the Jordanian solar projects. These efforts can be applied to many contracts affecting renewable energy development, including PPAs, tendering and due diligence requirements. Standardisation also accelerates development and reduces due diligence costs for investors, which are especially important to increase market participation. By enacting a direct proposal process, Jordan was able to allow greater flexibility during the tendering process, which enhanced efficiency and encouraged developer participation. This facilitates accelerated and lower-cost renewable energy development processes, which was also an important factor increasing developer participation.

(2) Effective use of available tools and instruments to mitigate risk and reduce project cost

Long-term, fixed-price PPA tariffs provided developers and investors with security in Jordan. The government also provided PPA guarantees for power off-takers, which mitigated investor concerns about payment defaults associated with utilities in the country. In addition, several developers employed the same EPC companies across projects, thereby receiving bulk discounts. With the aggregation of resources, certain energy infrastructure and services (e.g. transmission station and security) could also be shared across projects, leading to further cost savings.

(3) Effective use of complementarity between private sector investors and DFIs

The IFC helped developers standardise terms and contract templates across all projects, with variations permitted only to address unique project characteristics. MIGA offered political risk insurance for Jordan's solar projects, which reduced investors' concerns about political risks during the construction and operational phases.

Overall, Jordan's solar programme shows how standardising terms of reference and financial and legal documentation can reduce transaction costs, simplify due diligence for investors, and facilitate aggregation. Together with risk guarantees like those for the solar projects offer by DFIs, which reduced various political risks, and purchase guarantees, such a programme can significantly improve the credit quality of renewable energy projects and make projects attractive to investors.



6 RECOMMENDATIONS

Scaling up renewables gives the world the opportunity to meet energy needs that support economic development and growth and at the same time pursue social, environmental and climate objectives. With appropriate policies, instruments and facilities in place, as discussed in Chapters 2, 3 and 4, investment in renewables can be scaled up rapidly. To help create market conditions in the renewable energy sector that allow investors to overcome investment hurdles, governments and public finance institutions will need to engage proactively. They will need to focus on a set of targeted policies and dedicated instruments and mechanisms supported by effective facilities. The case studies analysed in this report demonstrate that the instruments and mechanisms available can indeed open up markets for investment and help to bring these to the scale that also attracts institutional investors. IRENA's survey shows that most risk mitigation instruments have not been actively used for renewable energy projects. Together, this suggests that there is an opportunity for stakeholders to engage more effectively to encourage renewable energy investment.

Policy makers and public finance institutions can deal with key investment risks and underlying barriers by deploying the right financial tools and taking action targeted at renewable energy. On the basis of the analysis presented in the report, this chapter summarises these recommendations and next steps. It concentrates on five priority action areas.

6.1 Advance renewable energy projects from initiation to full investment maturity

A steady flow of economically viable and financially sound projects is essential if renewable investment is to be scaled up. Early-stage project development initiatives can support pipeline development. IRENA's Sustainable Energy Marketplace (marketplace.irena.org) offers a mechanism to bring together projects and investors. The platform's efficient search functions improve renewable energy market transparency and liquidity. The interactive web-based facility provides access to project development tools and functions, including project preparation facilities. It enables governments to promote national investment frameworks or initiatives. Using this and other tools should facilitate further action to help renewable energy projects progress from initiation to investment maturity. In particular, governments and DFIs can:

- » **Support project preparation through capacity building and dedicated grants.** Governments and DFIs can offer on-the-job training for preparing feasibility studies or project proposals for project sponsors applying for loans. Tools like IRENA's *Project Navigator* (<https://navigator.irena.org/>) equip project developers with a framework to write high quality project proposals by supporting the preparation of written project documentation and business proposals. Business incubators and entrepreneurs can also help improve the quality of project proposals and risk assessment. Project preparation facilities providing technical assistance and grants for project preparation (Chapter 2) should receive more funding support to improve effectiveness and expand their geographic reach.
- » **Assess risks and barriers during project development from the viewpoint of investors.** Policy makers and multilaterals must understand investors' perceptions of risk and return over the lifecycle of renewable energy projects. The credit rating methodology is a useful evidence-based proxy for the investor's due diligence process (Chapter 4). It can serve as the 'lingua franca' for the variety of stakeholders (e.g. policy makers, DFIs and developers) engaged in renewable energy financing. By viewing the risks and rewards of renewable energy projects against the backdrop of credit rating drivers, stakeholders engaged across the development process can deepen their understanding and the resulting dialogue. In doing so, the credit rating process can also encourage the application of the right mix of country policies and market structures to drive renewables investment.
- » **Facilitate interaction between project developers and investors.** Improving the transparency and liquidity of renewable energy markets can help kick-start a project by allowing investors to identify investment-ready renewable energy projects. The Sustainable Energy Marketplace provides a virtual platform to connect project developers and owners with financiers, investors, and service and technology providers, in order to facilitate investing in and financing renewable energy. If project developers, DFIs, private finance institutions and policy-makers make active use of the Marketplace, the platform can help boost global market liquidity.

6.2 Engage local financial institutions in renewable energy finance

Improving access to affordable finance catalyses investment. Local financial institutions are at the forefront of capital provision, often with established local networks and knowhow. Even after identifying an attractive project pipeline, they may lack the ability to transform loan tenors to suit the investment horizons required by renewable energy projects. Accompanied by technical assistance, on-lending structures increase the availability of financing for developers and reduce the local banks' risk. DFIs should therefore increase such on-lending facilities available to local financial institutions by making full use of their high credit quality and market access to borrow funds at low rates. The following steps to design and implement effective on-lending facilities dedicated to renewables build on the lessons learnt from existing facilities:

- » **Design and plan on-lending facilities based on the financing needs of renewable energy projects.** Designing and planning an effective on-lending facility requires a solid understanding of local financing capacity and the right enabling policies. On-lending facilities should be able to provide varying loan sizes or tenor appropriate for different renewable energy technologies and scales. IRENA can work with DFIs and governments to identify suitable markets for pilot programmes in countries where the necessary policy framework for developing on-lending structures is in place.
- » **Develop dedicated resources and build capacity at local financial institutions.** Successful on-lending facilities require dedicated bank staff who can capture market opportunities and assess the investment attractiveness of renewable energy projects. Capacity building for partner banks can include training on eligibility criteria for the facility, technical aspects of project identification and evaluation, and case studies. IRENA can support on-lending facilities with templates for assessments that are simpler and easier for smaller-scale renewable energy projects. The experience of the IRENA/ADFD (Abu Dhabi Fund for Development) Project Facility can help develop a comprehensive screening process of potentially promising renewable energy projects.

- » **Raise awareness of renewable energy projects and on-lending facilities among market participants.** Introducing an on-lending facility for the first time is important especially if the country concerned has never created financial mechanisms dedicated to renewable energy. In such cases, few partner banks would have on-lending options on their list of lending priorities. They may not even be aware of renewable energy market opportunities. To raise awareness, leading public finance institutions and local financial institutions can jointly develop direct marketing materials such as websites or videos and organise promotion events. Higher demand created by these activities can lead to more successful disbursement through the on-lending facilities.

6.3 Mitigate risks to attract private investors

Policy makers and DFIs should systematically use existing risk mitigation instruments to address renewable energy risks and barriers, thereby attracting private investment. Suggested action includes information campaigns to raise awareness of existing risk mitigation instruments in developing countries and streamlining the application procedures for these instruments. It would also help to reorient institutional incentives to drive the provision of more risk mitigation instruments for renewable energy. Furthermore, new instruments, structures, funds or facilities should be formed and issued to cover risks not commonly addressed for renewable energy investments at present. These can include, for example, liquidity facilities (to address off-taker risks) and currency risk guarantee funds. Such initiatives require broad collaboration among investors, DFIs, local financial institutions, national governments and others. Specific action recommended includes:

- » **Increase awareness of existing risk mitigation instruments.** Ways to increase awareness include marketing or awareness-raising campaigns. This informs national policy makers, developers, investors or other relevant stakeholders of the benefits of existing risk mitigation instruments for renewable energy projects. The case studies in Chapter 3 provide some examples. To this effect, IRENA could work with the Global Clearing House⁴¹ to update and communicate its database on risk mitigation instruments.
- » **Streamline institutional procedures.** There is significant potential for streamlining institutional procedures that govern access to financial

⁴¹ The Global Clearinghouse for Development Finance ('GlobalDF') is a non-profit organisation committed to mobilising the private sector for development and to enhance aid effectiveness. One of its database directories includes the Risk Mitigation Product Directory, which lists a number of guarantee and insurance instruments from both public and private sector (The Global Clearinghouse, n.d).

instruments. Streamlining the transaction requirements could help developing countries in particular increase access to risk mitigation mechanisms and thus private sector capital. Specific activities include setting basic prequalification requirements to help project developers evaluate the suitability of risk mitigation instruments for their projects. In addition, DFIs could create simpler risk assessment templates and/or risk rating methodologies that are replicable and easily applied across projects. Combined with the recommendation 6.4, this could help aggregate projects with similar risk profiles, thus reducing overall transaction costs.

- » **Redirect institutional incentives to enable greater provision of risk mitigation instruments.** Risk mitigation instruments offer issuers a cost-efficient way to provide public finance. However, guarantee issuance is typically not favoured by public finance institutions because its volume is not captured in the Official Development Assistance flows.⁴² DFIs could adjust internal incentives such as quantitative lending targets, country lending limits or scoring guarantees at parity with loans (AfDB, 2013a). This would increase their ability to deploy a wider range of risk mitigation instruments. For instance, the World Bank Group is planning separate targets for guarantees and loans in order to encourage the issuance of guarantees.
- » **Promote the importance of renewable energy investment to the issuers of risk mitigation instruments.** Some organisations issuing public risk guarantees do not have a strong institutional focus on renewables. Most risk mitigation instrument providers have formed a team dedicated to climate change in general but very few have established a dedicated unit for renewable energy. Having a targeted team not only shows the institution's interest and willingness to finance renewable energy projects but also a level of expertise within the team to successfully process renewable energy deals. DFIs can increase their focus and expertise on renewable energy projects by establishing dedicated renewable energy targets and/or sector priority, not just to respond to market demand but also to proactively stimulate it. At the same time, IRENA can provide support by fostering greater communication between renewable energy industry stakeholders and organisations issuing existing risk mitigation instruments.

⁴² Guarantees have not been captured in the statistical framework of the OECD Development Assistance Committee (DAC) or in international financial statistics in general (OECD, 2013). However, this is likely to change: the DAC has undertaken work to modernise its statistical system in a way that captures the value of guarantees in mobilising private sector investment. This should create incentives for the issuance of guarantee instruments (OECD, 2016).

Some gaps still remain in risk mitigation instruments, structures, funds or facilities dedicated to renewable energy. Areas that must be addressed include liquidity risk associated with power off-takers and currency risk in developing countries. Promising new instruments include:

- » **Liquidity facilities to address power off-taker risks.** DFIs have not yet offered a specific risk mitigation instrument dedicated to addressing off-taker risk. DFI off-taker guarantees for renewable energy projects could help promote investment in developing countries where neither the utility nor host government is perceived as a creditworthy off-taker. Regional liquidity facilities proposed by German DFI KfW (see Box 8), for instance, can ease the stress on utility balance sheets. It can enable financial completion of renewable energy IPPs by providing them with a short-term letter of credit or credit line without additional cash requirements from utilities or long-term off-taker risk guarantee instruments. With an initial pool of capital from public finance, such facilities could address power off-taker risk in developing countries by targeting utility cash flow constraints.
- » **Currency risk guarantee fund.** India's guarantee fund model for currency risk can reduce the high cost of hedging and enable a pool of money to cover against local currency depreciation (Chapter 3). Assuming exchange rates follow the differences between the rates of inflation in the long term (20+ years), the depreciated value of local currency tends to approach the level of inflation. By covering the risk of currency fluctuation, a currency risk guarantee fund can reduce the risk premium to the long-term trend of inflation. This becomes more manageable than reducing the currency risk in the short term. Such a fund can be sourced by charging developers a small hedging fee (rather like an insurance premium) or through some other source of funding. India plans to create such a fund for renewables through a clean energy tax on coal.

6.4 Mobilise more capital market investment

To further incentivise renewable energy project financing, processes like terms of reference, documentation and payments need to be standardised. This would benefit developers, governments and investors by reducing due diligence costs in the near term. It would also support the aggregation and, over the long term, securitisation of renewable energy projects. This makes such assets more attractive to the lending community and accessible to institutional and other large-scale investors via capital markets. Policy makers in developing countries, with support from financing institutions and IRENA, can explore measures to standardise tendering, contracting and due diligence processes.

- » **Standardise contracting and installation terms.** DFIs and IRENA can convene stakeholders to establish standardised tendering, contracting and due diligence processes to increase renewable energy investment. Governments can play a leading role in standardising the renewable energy power contracting process and even develop a country-wide template for a specific renewable energy technology. Such initiatives could be backstopped by DFIs and IRENA through technical assistance from expert advisors. This could take the form of overall policy design and the implementation of best practice or project-level support to improve access to standardised documents and processes. On the deal level, DFIs acting as transaction lead can help establish and reinforce common contracts and risk assessment techniques, as demonstrated in the Jordanian solar case in Chapter 5. There is an additional opportunity to push for harmonised contracts across countries. In the near term, such activities could help aggregate projects, increasing the overall efficiency of the project development process and attracting greater interest from investors. Over the long term, it could enable renewable energy asset securitisation, thus releasing new sources of capital for development.
- » **Develop policy and guidelines for green bond issuance.** As discussed in Chapter 4, green bonds can allow more institutional investors to participate in renewable energy investments by improving market liquidity and scaling up issuance size. Following the examples set by China and India, more governments can develop policies and guidelines for issuing green bonds. A first step in creating such guidelines is for key stakeholders to define a vision and identify opportunities related to green bonds. Government authorities such as the securities' markets regulator and central banks would then define requirements on which projects are counted as 'green' and how green bonds would be certified and issued. Along with an enabling environment, governance structures such as a green bond development committee should be in place to facilitate the development.
- » **Engage in international dialogue on standardisation and expand the pipeline for project aggregation.** IRENA can facilitate discussions with key government officials to raise awareness of the need for standardised contracts. Working with legal experts and other stakeholders, this would entail a review of PPA contracts and an analysis of best practice in renewable energy project aggregation around the world. For in-country demonstrations and scaling up, IRENA's Marketplace can offer a project pipeline to select pilot transactions eligible for

standardisation and aggregation. IRENA would co-operate with other public initiatives and industry associations to explore the possibilities of applying such practices in emerging markets. These include the Green Infrastructure Investment Coalition, launched at COP21 by the Climate Bonds Initiative, UNEP Inquiry, Principles for Responsible Investment and the International Cooperative and Mutual Insurance Federation. These aim to bring together investors, governments and development banks to help improve understanding of the forward pipeline of green infrastructure investments and increase the flow of institutional investor capital around the world (International Cooperative and Mutual Insurance Federation, 2015).

6.5 Create facilities dedicated to scaling up renewable energy investment

The actions needed to mobilise capital require dedicated financing facilities to issue risk mitigation instruments and support the design and implementation of structured finance mechanisms specifically targeted at renewables. The facilities could fund transaction costs and ongoing guarantee fee elements through public concessional funding and offer technical assistance. While governments must support such facilities and eventually commit budgets, IRENA can work with DFIs to advance the concepts for such renewable energy risk mitigation facilities at a global or regional scale. Public climate finance sources such as the Green Climate Fund could be used to finance a risk mitigation facility of this type. More specifically, the facility could play the following roles:

- » **Deploy risk mitigation instruments and structured finance mechanisms.** The facility can directly issue risk mitigation instruments and implement structured finance approaches to help finance renewable energy projects during the construction stage. In particular, it could target new financial instruments such as an off-taker risk guarantee or a currency risk guarantee fund (discussed in recommendation 6.3), or facilitate local currency lending (Chapter 3). These mechanisms could be made available through local or international commercial banks or finance institutions willing to provide loans to local project developers and utility companies.

- » **Provide support for transaction costs and guarantee fees.** The facility could also cover transaction costs related to risk mitigation instruments through public concessional funding. A grant funding dedicated to renewable energy within this facility could finance fees associated with a guarantee (initial fee, commitment fee, upfront fee and stand-by fee) of commercial bank loans to renewable energy project developers at reduced or no cost.
- » **Provide technical assistance via grants.** The facility could use grant funding to provide technical assistance to developing countries, overcoming barriers during the project development stage and thereby helping countries build a strong pipeline of renewable energy projects.

Risk mitigation facilities dedicated to renewables could be set up in several ways, each of which may use a different funding source to achieve national, regional, or global renewable energy priorities:

- » **Create a global risk mitigation facility for renewables.** Coalitions of countries can lead the development of a global risk mitigation facility. This was demonstrated at the G20 Energy Ministers Meeting on 2 October 2015 in Istanbul, where energy ministers from the G20 countries affirmed their commitment to renewable energy and adopted a renewable energy toolkit. This provides G20 countries with the option to take a long-term, integrated and sustainable approach towards the enhanced deployment of renewable energy. One option in the toolkit is a global risk mitigation facility specifically aimed at renewable energy which would build on G20 country experience.
- » **Establish regional/national risk mitigation initiatives.** A regional guarantee fund or facility may be established to meet specific regional development needs and position renewable energy strategically in the regional agenda. For example, the European Fund for Strategic Investments⁴³ is providing EUR 21 billion under the EU Juncker plan for a guarantee fund expected to mobilise EUR 315 billion. By 2017, this will go into infrastructure projects in the EU, including renewable

⁴³ *The European Fund for Strategic Investments (EFSI) is a joint initiative launched by the European Investment Bank, the European Investment Fund and the European Commission to help overcome the current investment gap in the EU by mobilising private financing for strategic investments (EIB, 2016).*

energy projects (European Commission, 2016b). The EFSI plans to use the guarantee fund to support renewable energy projects bearing a higher risk profile than projects supported by the normal operations of the EIB. The initiative garnered strong support from many European national governments, which have pledged financial contributions. This regional approach could be applied to other regions or countries via partnerships between governments and public finance institutions.

- » **Fund a risk mitigation facility through climate finance.** Climate finance can act as a catalyst for the financing of renewable energy projects in developing countries. Several dedicated climate finance initiatives, such as World Bank's Global Environment Facility (GEF) and Climate Investment Funds (CIF), have already been channelling climate finance to developing countries. By the end of 2015, more than USD 10 billion had been pledged to the Green Climate Fund (GCF) created by the UN Framework Convention on Climate Change to help developing countries implement climate change adaptation and mitigation measures. The GCF's Private Sector Facility could be used to create a risk mitigation facility dedicated to supporting renewable energy either at a global scale or at regional levels.

The actions outlined in the recommendations above create a comprehensive agenda for accelerating investment in renewable energy, building on its strong business case and supporting public policy objectives. Investment can thus move quickly from niche to mainstream even in markets where it has been lagging behind. The global energy transition will depend on the ability of developing renewable energy markets to attract massive levels of investment. In coming years, policy makers, public finance institutions, developers and investors must seize the opportunities to unlock renewable energy investment at scale.

GLOSSARY

Concessional loan	A form of lending featuring more favourable terms than those available in the commercial market, typically provided by DFIs or governments.
Convertible grant	A grant that can be converted into loans on reaching certain milestones.
Convertible loan	A loan which can be converted into equity at certain events and at certain pre-agreed terms.
Currency hedging instrument	A financial contract that protects investors from negative financial impacts resulting from adverse changes in currency exchange rates.
Currency risk guarantee fund	A pool of capital that can provide local currency lending to projects through portfolio diversification or pay the difference between local and hard currency for tariff payment.
Export credit guarantee	A guarantee issued by an export credit agency that covers losses for exporters or lenders financing projects tied to the export of goods and services via export.
External liquidity facility	A tool or structure provided by third parties, usually banks, that offers a credit line from which SPVs can draw in the event of a cash flow shortfall.
Finance policies and public financing programmes	Public policies dedicated to building an enabling investment environment to develop, finance and operate renewable energy projects by filling financing gaps and removing perverse incentives.
Government guarantee	A guarantee required by many development funds to ensure lenders that the project is fully supported by the national government in the country where the project is taking place, including covering full default risk.
Guarantee	Contracts transferring agreed risks to reduce the risk of non-payment of outstanding principal, interest or other contractual payments to investors.

Hybrid structure	A financial instrument combining the key characteristics of two financial instruments, allowing projects to benefit from both.
Internal liquidity facility	A tool with cash reserves from which the SPV set up for the project can draw under certain circumstances.
Liquidity guarantee	A guarantee transferring the risk to the project developer that the lending bank will not have the liquidity to renew the loan after the initial short-term tenor matures.
Loan syndication	A lending process in which a group of lenders provide funds to a single borrower.
Local currency lending	A loan provided in local domestic currency rather than foreign currencies such as USD or EUR.
On-lending structure	Lending structure that combines elements of technical and policy support with financing capacity.
Partial credit guarantee	A guarantee that covers part of the debt service default by the borrower for a specific period of the debt term for a public investment, regardless of the cause of default.
Partial risk guarantee	A guarantee that covers private lenders against the risk of government failure to honour contractual obligations relating to private projects.
Political risk insurance	A guarantee against losses arising from political risk or adverse government action. Political risk insurance can cover the default by a sovereign or corporate entity but only if the reason for the loss is political.
Project development and preparation facility	Public programmes or initiatives typically providing grants and/or technical assistance services to support early-stage project documentation and preparatory activities.
Project initiation and facilitation tool	Online platforms aimed at bringing projects from development to financial closure by improving project visibility, investor connectivity and market liquidity.

Put option	A derivative instrument which gives the buyer the option but not the responsibility to sell assets at an agreed price on or before a particular date.
Subordinated debt	An instrument that falls between senior debt and equity in the capital stack. It requires payment of principal and interest after the senior debt is serviced and before the payment of any dividend to equity holders.
Tenor	Length of a loan – can be expressed in years, months or days.

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