BACKGROUND PAPER FOR THE EUROPEAN REPORT ON DEVELOPMENT 2015:
FINANCING SUSTAINABLE ENERGY SYSTEMS FOR DEVELOPING COUNTRIES
DECEMBER 2014

© Frankfurt School of Finance & Management gGmbH 2014

This publication is copyright, but may be reproduced in whole or in part in any form for educational or non-profit purposes without fee, provided that the source is acknowledged. Frankfurt School–UNEP Collaborating Centre for Climate & Sustainable Energy Finance would appreciate receiving a copy of any published work that uses this publication as source. For copying in any other circumstances, for resale, or for re-use in other publications, or for translation or adaptation, prior written permission must be obtained from the copyright holder, and a fee may be payable.

Disclaimer

The designations used in this publication do not imply the expression of any opinion whatsoever on the part of the Frankfurt School of Finance & Management concerning the legal status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers or boundaries. Moreover, the views expressed do not necessarily represent those of the Frankfurt School of Finance & Management, nor does the citing of trade names or commercial processes constitute endorsement.
# TABLE OF CONTENTS

1 INTRODUCTION .......................................................................................................................... 7

2 SOURCES AND USE OF SUSTAINABLE ENERGY FINANCE .......................................................... 8

   2.1 FINANCING NEEDS ................................................................................................................ 8

   2.2 INVESTMENT AND INSTALLATIONS .................................................................................. 9

       2.2.1 GLOBAL TRENDS IN INVESTMENTS AND INSTALLATIONS .................................. 9

       2.2.2 TRENDS BY COUNTRY GROUPINGS .......................................................................... 13

   2.3 MAIN INTERNATIONAL CLIMATE FINANCE FLOWS ......................................................... 16

       2.3.1 DEFINING CLIMATE FINANCE .................................................................................. 16

       2.3.2 ESTIMATING CLIMATE FINANCE ............................................................................... 16

3 RENEWABLE ENERGY AND ENERGY EFFICIENCY STRATEGIES AND POLICIES OF DEVELOPING COUNTRIES .................................................................................................................. 21

   3.1 MAIN INTERNATIONAL CLIMATE FINANCE RELATED SUPPORT POLICIES .................. 23

   3.2 CHANNELS FOR INTERNATIONAL CLIMATE FINANCE ..................................................... 26

4 INSTRUMENTS USED TO SUPPORT THE TRANSFORMATION .................................................... 30

   4.1 CHALLENGES FOR THE TRANSFORMATION ....................................................................... 30

   4.2 INSTRUMENTS ....................................................................................................................... 31

   4.3 ENABLING ENVIRONMENT ................................................................................................. 34
FINANCING RENEWABLE ENERGY SYSTEMS FOR DEVELOPING COUNTRIES

5 PRACTICE .................................................................................................................. 36
5.1 GET
FIT 36
5.2 GLOBAL CLIMATE PARTNERSHIP FUND 37
5.3 RENEWABLE ENERGY PERFORMANCE PLATFORM (REPP) 39
5.4 M–KOPA
SOLAR 40

6 CONCLUSION ................................................................................................................. 42
TABLE OF FIGURES

FIGURE 1: GLOBAL NEW INVESTMENTS IN RENEWABLE ENERGY BY ASSET CLASS, 2004–2013, $ BN........ 10
FIGURE 2: RENEWABLE POWER GENERATION AND CAPACITY AS A SHARE OF GLOBAL POWER, 2007–2013, %................................................................................................................................. 12
FIGURE 3: ENERGY INDICATORS IN THE POWER SECTOR, 2013 .................................................................... 12
FIGURE 4: GLOBAL NEW INVESTMENT IN RENEWABLE ENERGY: DEVELOPED V DEVELOPING COUNTRIES, 2004–2013, $ BN.................................................................................................................................. 13
FIGURE 5: GLOBAL NEW INVESTMENT IN RENEWABLE ENERGY: DEVELOPED V DEVELOPING COUNTRIES, 2013, AND TOTAL GROWTH ON 2012, $ BN........................................................................................................ 14
FIGURE 6: GLOBAL NEW INVESTMENT IN RENEWABLE ENERGY BY REGION, 2004–2013 $ BN............. 15
FIGURE 8: FLOWS OF CLIMATE FINANCE 2013 ................................................................................................. 17
## Abbreviations

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>AF</td>
<td>Adaptation Fund</td>
</tr>
<tr>
<td>AGECC</td>
<td>Advisory Group on Energy and Climate Change</td>
</tr>
<tr>
<td>ATI-ACA</td>
<td>African Trade Insurance Agency</td>
</tr>
<tr>
<td>BAPPENAS</td>
<td>National Development Planning Agency</td>
</tr>
<tr>
<td>bn</td>
<td>Billion</td>
</tr>
<tr>
<td>BNEF</td>
<td>Bloomberg New Energy Finance</td>
</tr>
<tr>
<td>CER</td>
<td>Certified Emission Reduction</td>
</tr>
<tr>
<td>CPI</td>
<td>Climate Policy Initiative</td>
</tr>
<tr>
<td>CSR</td>
<td>Corporate social responsibility</td>
</tr>
<tr>
<td>DFI</td>
<td>Development Finance Institution</td>
</tr>
<tr>
<td>EbA</td>
<td>Ecosystem–based Adaptation</td>
</tr>
<tr>
<td>EE</td>
<td>Energy Efficiency</td>
</tr>
<tr>
<td>EEEF</td>
<td>European Energy Efficiency Fund</td>
</tr>
<tr>
<td>EPC</td>
<td>Engineering, Procurement and Construction Contract</td>
</tr>
<tr>
<td>ERPA</td>
<td>Emissions Reduction Purchase Agreement</td>
</tr>
<tr>
<td>ESCO</td>
<td>Energy Service Company</td>
</tr>
<tr>
<td>EU</td>
<td>European Union</td>
</tr>
<tr>
<td>FiT</td>
<td>Feed–in–Tariff</td>
</tr>
<tr>
<td>GCPF</td>
<td>Global Climate Partnership Fund</td>
</tr>
<tr>
<td>GEEREF</td>
<td>Global Energy Efficiency and Renewable Energy Fund</td>
</tr>
<tr>
<td>GET FiT</td>
<td>Global Energy Transfer Feed–in Tariff</td>
</tr>
<tr>
<td>GHG</td>
<td>Greenhouse gas</td>
</tr>
<tr>
<td>GOI</td>
<td>Government of Indonesia</td>
</tr>
<tr>
<td>GSM</td>
<td>Global System for Mobile communications</td>
</tr>
<tr>
<td>GW</td>
<td>Gigawatts</td>
</tr>
<tr>
<td>IEA</td>
<td>International Energy Agency</td>
</tr>
<tr>
<td>ICCTF</td>
<td>Indonesia Climate Change Trust Fund</td>
</tr>
<tr>
<td>IFC</td>
<td>International Finance Corporation</td>
</tr>
<tr>
<td>IFI</td>
<td>International Financial Institutions</td>
</tr>
<tr>
<td>KCCAP</td>
<td>Kenya Climate Change Action Plan</td>
</tr>
<tr>
<td>KES</td>
<td>Kenya Schilling</td>
</tr>
<tr>
<td>kW</td>
<td>kilowatts</td>
</tr>
<tr>
<td>kWh</td>
<td>kilowatt hour</td>
</tr>
<tr>
<td>LCOE</td>
<td>Levelised Cost of Energy</td>
</tr>
<tr>
<td>m</td>
<td>Metre(s)</td>
</tr>
<tr>
<td>MEbA</td>
<td>Microfinance for Ecosystem–based Adaptation</td>
</tr>
<tr>
<td>mn</td>
<td>Million</td>
</tr>
<tr>
<td>----</td>
<td>---------</td>
</tr>
<tr>
<td>MW</td>
<td>Megawatt</td>
</tr>
<tr>
<td>NCF</td>
<td>National Climate (Trust) Fund</td>
</tr>
<tr>
<td>NCFI</td>
<td>National Climate Finance Institution</td>
</tr>
<tr>
<td>NEMA</td>
<td>National Environment Management Authority</td>
</tr>
<tr>
<td>NGO</td>
<td>Non-governmental Organisation</td>
</tr>
<tr>
<td>NIE</td>
<td>National Implementing Entity</td>
</tr>
<tr>
<td>OECD</td>
<td>Organisation for Economic Co-operation and Development</td>
</tr>
<tr>
<td>O&amp;M</td>
<td>Operation &amp; Maintenance Contract</td>
</tr>
<tr>
<td>OPIC</td>
<td>Overseas Private Investment Corporation</td>
</tr>
<tr>
<td>PFI</td>
<td>Public Finance Instruments</td>
</tr>
<tr>
<td>PCG</td>
<td>Partial credit guarantees</td>
</tr>
<tr>
<td>PPA</td>
<td>Power Purchase Agreement</td>
</tr>
<tr>
<td>PV</td>
<td>Photovoltaic</td>
</tr>
<tr>
<td>R&amp;D</td>
<td>Research and Development</td>
</tr>
<tr>
<td>RE</td>
<td>Renewable Energy</td>
</tr>
<tr>
<td>REAF</td>
<td>Renewable Energy Asia Fund</td>
</tr>
<tr>
<td>REFiT</td>
<td>Renewable Energy Feed-in Tariff</td>
</tr>
<tr>
<td>REPP</td>
<td>Renewable Energy Performance Platform</td>
</tr>
<tr>
<td>RPS</td>
<td>Renewable Portfolio Standard</td>
</tr>
<tr>
<td>SE4ALL</td>
<td>Sustainable Energy for All</td>
</tr>
<tr>
<td>SME</td>
<td>Small and Medium Enterprise</td>
</tr>
<tr>
<td>TCX</td>
<td>Currency Exchange Fund</td>
</tr>
<tr>
<td>twh</td>
<td>terawatt hour</td>
</tr>
<tr>
<td>UETCL</td>
<td>Uganda Electricity Transmission Company Limited</td>
</tr>
<tr>
<td>UK</td>
<td>United Kingdom</td>
</tr>
<tr>
<td>UNDP</td>
<td>United Nations Development Programme</td>
</tr>
<tr>
<td>UNEP</td>
<td>United Nations Environment Programme</td>
</tr>
<tr>
<td>UNFCC</td>
<td>United Nations Framework Convention on Climate Change</td>
</tr>
<tr>
<td>$</td>
<td>United States dollar</td>
</tr>
<tr>
<td>VAT</td>
<td>Value Added Tax</td>
</tr>
</tbody>
</table>
1 INTRODUCTION

Financing needs and current investment in renewable energy (RE) and energy efficiency (EE) vary significantly across countries and sectors. Nevertheless, in order to limit global temperature increases to 2°C above pre-industrial levels, significant public and private capital mobilisation for climate-friendly investments and capital reallocation from high-carbon to low-carbon technologies are required.

Traditionally, policy-makers and investors have tried to create the necessary incentives by regulating the relevant industrial sectors. Given the key role of sustainable energy in a post-2015 agenda, the use of RE and the reduction of carbon-intensive production underline the need to assess the role of sustainable energy in environmental transformation. This is also reflected in the enabling environment of financing sustainable energy, which is beginning to develop, along with a variety of instruments to support investment in order to make the transition towards a low-carbon economy.

This Background Paper, commissioned for the European Report on Development 2014/15, provides an overview of ways to use international sources to finance the energy transition and of policies and instruments countries adopt to support the transformation from high- to low-carbon economies, with a focus on developing countries. Section 2 provides an overview on the sources and uses of sustainable energy finance and Section 3 introduces national-level strategies and policies to achieve the transformation towards a low-carbon resilient economy. Section 4 details various financial instruments to support the transformation and some examples of good practice examples are provided in Chapter 5. Section 6 concludes.
2 SOURCES AND USE OF SUSTAINABLE ENERGY FINANCE

It is widely acknowledged that in order to limit global temperature increases to 2°C above pre-industrial levels, massive public and private investments will be required to reduce greenhouse gas (GHG) emissions. This section gives an overview of the estimated financial requirements to make the transformation towards a low-carbon economy and of current global investments in RE in developing and developed countries.

The financing gap can be identified by contrasting current investment with estimated financing needs, e.g. for the status quo and different future scenarios for scaling up investment by using the investment potential of the public and private sectors. Overall, the share of sustainable investment is too low to finance green transformation. To some extent this is due to imperfect market mechanisms (e.g. emission externality, technology spillovers or information asymmetries). It is crucial to analyse the reasons for under-investment in order to design the appropriate policies and instruments to mobilise the public and private investment potential. This is discussed in more detail in Sections 3 and 4.

2.1 FINANCING NEEDS

While there are different estimates of the required financing, the order of magnitude is of hundreds of billions of dollars per year of additional investment. The International Energy Agency (IEA) suggests that more than $1 trillion (tr) will be needed per year to decarbonise the world’s energy system by 2050 (IEA, 2014).\(^1\) Combined with the parallel need to finance adaptation measures, ‘climate financing’ in developed and developing countries alike is imperative.\(^2\)

In discussions about financing needs (difficult) estimates reflecting the incremental costs of a green energy system are mixed with (slightly easier to predict) required initial investment. Incremental costs refer to financing flows required to ensure the financial viability of a project, i.e. to ensure that, for example, a capital-intensive project generates sufficient cash flows to repay the up-front investment. Initial investment corresponds to the amount of investment required up-front. This can be repaid over the project’s lifetime. Renewable energy projects are typically more capital-intensive than conventional energy projects but usually have the advantage of low and highly predictable operational costs. A shift towards green generation assets will consequently increase the capital intensity of the energy sector and the capital it deploys. This requires a longer-term perspective on the development of the energy sector.

An increased application of green generation will of course also require greater investment in the upstream part of the RE value chain, which are engaged in research and development (R&D) and/or component manufacturing. Increased R&D spending will help to improve the efficiency of renewable energy. Manufacturing companies will require further capital to increase production facilities and to manage greater working capital requirements, and project developers will need early-stage investments until the projects are bankable. The upstream part of the value chain is driven less by national markets than by the development of globally installed generation capacity. As a consequence, increased deployment of RE only in Germany, for example, will not necessarily trigger the need for more financing needs in the upstream part of the value chain. Such investments should not, however, be underestimated in a global energy-transition scenario with a specific target for atmospheric CO\(_2\) levels. Besides the

---

\(^1\) The estimates vary due to different underlying assumptions such as geographical, sectoral, and activity coverage, the timescale and phasing, and the desired climate target.

\(^2\) REN21 (2014) provides the electrification rate data for 2011. It is worth noting that China announced plans to provide electricity to the remaining 2.7 million people without access by the end of 2015.
generation assets, there is a need for further investments in transmission, distribution and probably also storage facilities.

In 2013 the installed RE capacity worldwide was responsible for preventing the emission of around 1,220m tonnes of CO₂ (Frankfurt School–UNEP/BNEF, 2014). According to the IEA 12,954m tonnes of CO₂ were emitted by the power sector in 2011 and a 0.7% increase per annum was predicted. Using these data as a starting point and combining them with the previously mentioned assumption on the electricity mix, world emissions would have been some 14,356 mn tonnes if RE capacity had not been in place. The 2013 United Nations Environment Programme (UNEP) report on the emission gap found that even if nations meet their current climate pledges, GHG emissions in 2020 are likely to be 8–12 gigatonnes of CO₂ equivalent above the levels needed to remain within the 2°C global temperature increase. Without the new RE capacity installed in the past decade the gap would have been 12% higher (UNEP, 2013). This upward trend makes it increasingly attractive to invest in mitigation options. It also illustrates, however, that RE investments need to expand but will not be sufficient without additional EE measures.

2.2 INVESTMENT AND INSTALLATIONS

2.2.1 GLOBAL TRENDS

Most climate–friendly investments, around 74% of total climate finance flows, is currently directed to RE projects (CPI, 2013b). Global investment in RE amounted to $214 billion (bn) in 2013. While a positive trend has largely persisted over the past decade, it has waned somewhat since 2011 (see

---

3 This estimate assumes that the same mix of other technologies was used to cover the 8.5% not produced in 2013 by renewables excluding large hydro.

4 All investment data are taken from Frankfurt School–UNEP/BNEF (2014). All figures in this section, unless otherwise stated, are based on the Desktop database of BNEF database and include RE investments apart from large hydro–electric projects of more than 50MW, since this technology has been mature for decades and is at a very different stage of development and adoption than, for instance, wind or solar power.
Figure 1). Investments in RE declined for the second consecutive year in 2013, following a decade of strong growth – indeed, 2013 witnessed global investments declining by 14% from 2012 to $214 bn, 23% down from the peak of $279 bn in 2011 (CPI, 2013b).
While this downward trend is in part a consequence of adverse conditions such as policy uncertainty and retroactive reductions in public support in key markets, as well as the European fiscal crisis, it also reflects positive underlying developments. Chief among these was falling technology prices, particularly the cost of solar photovoltaics (PV), whose worldwide levelised cost of energy (LCOE) has dropped by 53% over the past five years. This means that while investment declined in dollar terms, installed generation capacity actually increased over the same period. This was especially pronounced in developed markets, which accounted for 66% of solar investments in 2013. As renewables develop a track record and are better able to compete on price with conventional generation, there may be a clearer path towards the transition to a clean energy future.

Investment in R&D in renewable technologies doubled between 2004 and 2013, while asset finance in utility-scale electricity projects – the largest contributor to overall growth in the sector – increased with a 33% annual compound growth rate from 2004 to 2011 (REN21, 2014). Another promising medium-term signal for renewable investment is the turnaround of clean energy stocks, which rallied in 2013 following an almost five-year decline. An index of almost 100 renewable energy stocks gained 54% over the course of the year – indicating that many wind and solar manufacturing supply chains are returning to profitability (FS–UNEP/BNEF, 2014). Further, there are promising signs that long-term institutional investors – i.e. commercial banks, pension funds, insurance companies and major corporations – are becoming more involved in financing RE projects. Renewable energies tend to offer investors diversification opportunities with manageable risks as the technical reliability has considerably increased.

5 Developed markets include members of the Organisation for Economic Co-operation and Development (OECD) excluding Chile, Mexico and Turkey (i.e. Australia, Austria, Belgium, Canada, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Israel, Italy, Japan, South Korea, Luxembourg, Netherlands, New Zealand, Norway, Poland, Portugal, Slovakia, Slovenia, Spain, Sweden, Switzerland, United Kingdom and United States of America).
and the investment expenses have declined markedly in recent years. In Europe, in the first nine months of 2013, institutional investors invested $3.3 bn in RE through private equity, infrastructure funds, project bonds, quoted funds and direct investment. In comparison, the total investment in the same region was only about $1 bn in 2008. Though institutional investment remains small when taking Europe’s $48.4 bn investment flow in 2013 into account, recent investment trends demonstrate institutional investors' interests in RE assets (FS–UNEP/BNEF, 2014). For instance, Allianz insurance companies invested about $500 mn in wind parks in 2013, increasing the group’s RE investment to about $2 bn (Allianz, 2014); between 2010 and 2013, PensionDanmark built a portfolio of wind farms which is valued at about $1 bn (PensionDanmark, 2013); and the global trading house Marubeni has a strategic focus on investment in RE, gaining a 25% stake (about $125 mn equity investment) from an Irish renewable power company in the same year (Mainstream, 2013). There is also an ongoing deepening of the climate–themed bond market, which has seen tremendous growth of new issuances in recent years, growing 12% in 2013 to $95 bn. Of the more than $500 bn of climate–themed bonds outstanding, about $75 bn is dedicated to the low–carbon energy sector, with wind and solar accounting for 18% and 15% respectively (Climate Bonds Initiative, 2014). Indeed, despite the two–year investment decline, evidence of strong demand from the first two quarters of 2014 suggests a broad–based upswing across sectors, markets and investment sources (BNEF, 2014b).

While overall investment declined in 2013, global installed capacity in the power sector increased by 8% from 2012 levels to 1,560 Gigawatts (GW). This increased capacity made up 56% of all net additions to the global electricity supply, meaning that renewable electricity accounted for approximately 22% of global electricity production at the end of 2013, though this figure falls to 8.5% when large hydro is excluded (REN21, 2014; FS–UNEP/BNEF, 2014).8

---


8 While renewables account for an increasing proportion of global renewable generation capacity, because of their intermittency and rapid growth in demand, the growth in their share of actual generation is slower.
Figure 2: Renewable power generation and capacity as a percentage of global power, 2007–2013

Note: Renewables figure excludes large hydro. Renewable capacity figures based on Bloomberg New Energy Finance global totals.
Source: FS–UNEP/BNEF (2014)

Hydropower (including large hydro) rose by 4% to approximately 1,000 GW, while the remaining renewables collectively grew nearly 17% to more than 560 GW (Figure 3). For the first time, solar PV added more power capacity than did wind power. Solar PV and hydropower accounted in 2013 for about 33% of new capacity (REN21, 2014; FS–UNEP/BNEF, 2014).9

Figure 3: Energy indicators in the power sector, 2013

<table>
<thead>
<tr>
<th></th>
<th>START 2004</th>
<th>END 2012</th>
<th>END 2013</th>
</tr>
</thead>
<tbody>
<tr>
<td>Renewable power capacity (total, not including hydro)</td>
<td>85 GW</td>
<td>480 GW</td>
<td>560 GW</td>
</tr>
<tr>
<td>Renewable power capacity (total, including hydro)</td>
<td>800 GW</td>
<td>1,440 GW</td>
<td>1,560 GW</td>
</tr>
<tr>
<td>Hydropower capacity (total)</td>
<td>715 GW</td>
<td>960 GW</td>
<td>1,000 GW</td>
</tr>
<tr>
<td>Bio–power capacity</td>
<td>&lt;36 GW</td>
<td>83 GW</td>
<td>88 GW</td>
</tr>
<tr>
<td>Bio–power generation</td>
<td>227 TWh</td>
<td>350 TWh</td>
<td>405 TWh</td>
</tr>
<tr>
<td>Geothermal power capacity</td>
<td>8.9 GW</td>
<td>11.5 GW</td>
<td>12 GW</td>
</tr>
<tr>
<td>Solar PV capacity (total)</td>
<td>2.5 GW</td>
<td>100 GW</td>
<td>139 GW</td>
</tr>
<tr>
<td>Concentrating solar thermal power (total)</td>
<td>0.4 GW</td>
<td>2.5 GW</td>
<td>3.4 GW</td>
</tr>
<tr>
<td>Wind power capacity (total)</td>
<td>48 GW</td>
<td>283 GW</td>
<td>318 GW</td>
</tr>
</tbody>
</table>

9 It is notable that while renewables account for an increasing proportion of global renewable generation capacity, because of their intermittency and rapid demand growth, the growth in their share of actual generation is slower.
10 Capacity data are from the beginning of 2004; other data, such as investment and biofuels production, cover the full year. Numbers are estimates, based on best available information.
11 The GSR 2013 reported a global total of 990 GW of hydropower capacity at the end of 2012; this figure has been revised down due to better data availability. Data do not include pumped storage.
2.2.2 TRENDS BY COUNTRY GROUPINGS

In 2013, there was a drop in absolute investments in both developed and developing countries (Figure 4). This bought to an end the steady trend of annual increases in absolute investments in developing countries over the last eight years (REN21, 2014). These trends are shown in Figure 4, which differentiates between annual RE investment in developed and developing markets. Overall trends were similar in developing countries, which accounted for 43% of global RE investment in 2013. Developing countries accounted for most onshore wind development, which has seen its LCOE fall by 15% over the last five years, though this is still less precipitous than for solar PVs (FS–UNEP/BNEF, 2014). These LCOE reductions, coupled with increases in coal and natural gas capital costs and fuel prices, have led to projects being developed in Latin America, the Middle East and Africa without any subsidy support, a very promising signal for future growth in those markets. This is not, however, to suggest that there are no significant remaining barriers to investment and project realisation.

Figure 4: Global new investment in renewable energy: developed and developing countries, 2004–2013, $bn

Notes: New investment volume adjusts for re-invested equity. Total values include estimates for undisclosed deals. Volumes for developed countries are based on OECD countries excluding Chile, Mexico and Turkey. Source: FS–UNEP/BNEF (2014)

While the overall trends between developed and developing markets have been similar in recent years, the landscape becomes more complex when we differentiate between RE technologies. While developing countries outpaced developed countries in new investments in both wind and small hydro assets, the opposite held for all other technologies, including solar, biomass/waste-to-energy, biofuels, geothermal and marine. All technologies witnessed significant overall negative annual investment growth, with the exception of geothermal (38%) and wind (~1%).

Source: REN21 (2014); Note: TWh = Terawatt hour
Figure 5 below breaks down the investment by technology and growth trends.
Notes: Total values include estimates for undisclosed deals. New investment volume adjusts for re-invested equity. Includes estimates for small distributed capacity, corporate and government R&D. Developed volumes are based on OECD countries excluding Chile, Mexico and Turkey.

Source: FS-UNEP/BNEF (2014)

It is important to note that regions of analysis can mask significant intraregional trends. For example, if we consider developing countries in Asia and sub-Saharan Africa (SSA), we see slightly different patterns than Figure 6 above would suggest. These regions have very different contexts and priorities in the energy and electricity sectors, as developing countries in Asia have an electrification rate of 83%, while less than one third of the population has access to electricity in SSA (REN21, 2014). As such, it is no surprise that the investment trends in the two regions have been somewhat different in recent years. In developing countries in Asia, new investment grew strongly between 2006 and 2010, before levelling off in the range of $6–7 bn per annum since. In SSA, on the other hand, growth has been dramatic since 2011, where investment quadrupled by 2012, before falling by 14% in 2013 to approximately $5.5 bn.12 Though the latter trend is quite promising for the region, it is worth noting that much of it has been driven by strong investment growth in South Africa.

---

12 These figures for developing countries in Asia exclude China, India, Japan and the Republic of Korea. The data account for biofuels, biomass, geothermal, marine, small hydro, solar and wind. They account for the following financing tools: asset finance, venture capital, private equity, corporate and government R&D and new and reinvested equity.
Figure 6: Global new investment in renewable energy by region, 2004–2013, $bn

Notes: New investment volume adjusts for re-invested equity. Total values include estimates for undisclosed deals.
Source: FS-UNEP/BNEF (2014)
The UN Secretary-General’s ‘Sustainable Energy for All’ (SE4ALL) initiative aims to initiate actions and to mobilise commitments to positively transform the world’s energy systems. The initiative has brought access to energy to the political forefront and aims to ensure universal access to modern energy services, combined with EE improvements and global energy mix to support the achievement of the goal of universal access to modern energy services by 2030 (SE4ALL, 2014). By early 2014, more than 80 developing countries had joined the initiative, which corresponds to about half of the target population even though neither China nor India has joined (REN21, 2014).

### 2.3 MAIN INTERNATIONAL CLIMATE FINANCE FLOWS

While researchers, development finance institutions (DFIs) and international organisations discuss ‘climate finance’, there is to date no internationally agreed definition of the term. It is used in a narrow sense to refer to transfers of public resources from developed to developing countries, in the light of UN Climate Convention obligations to provide ‘new and additional financial resources’; and, in a wider sense, to refer to all financial flows relating to climate change mitigation and adaptation. This complicates any consideration of the volume, distribution and uses of climate finance, as there are varying opinions as to what constitutes climate finance, and what does not.

#### 2.3.1 DEFINING CLIMATE FINANCE

There is a general consensus that climate finance refers to funding and financial instruments that address the mitigation/reduction of GHG emissions, or that support any of a range of activities that assist populations to adapt to the adverse consequences of climate change, including capacity-building and R&D, as well as broader efforts to enable the transition towards low-carbon, climate-resilient development. It includes international and domestic climate finance as well as relevant public, private and public–private flows.

The lack of a common definition of climate finance affects related data collection and the methods for reporting, reviewing and verifying climate finance flows. The different approaches to reporting on (e.g. Bloomberg New Energy Finance (BNEF), OECD–DAC, reporting by the multilateral development banks (MDBs) or International Development Finance Club Institutions) and aggregating climate finance vary significantly as the reporting serves various purposes and applies different methodologies. In order to properly account for current gaps and flows in required climate finance, it is essential to have a commonly accepted definition. In its absence, this Background Paper uses a broad definition of climate finance to take stock of the current landscape, considering its major actors, preferred financial tools and instruments, uses and global geographical trends.

#### 2.3.2 ESTIMATING CLIMATE FINANCE

An estimate of global annual climate finance flows in 2013 (SE4ALL, 2014), which support projects that reduce emissions, activities that support climate resilience and reforms and that create an enabling environment for further low-carbon investments is approximately $331 bn. This compares to $359 bn in 2012, mainly due to a significant drop in private investments due to falling PV prices.\(^\text{13}\) Climate finance flows were split almost equally between developed (OECD) ($164 bn) and developing (non-OECD) countries ($165 bn). These flows measure ‘capital flows targeting low-carbon and climate-resilient development with direct or indirect greenhouse gas mitigation or adaptation objectives/outcomes’ (CPI,

---

\(^\text{13}\) The actual decrease of climate finance may be even larger, as for 2013 the CPI expanded the data and included public finance for large hydro projects ($4 bn) and public R&D ($3 bn) in its estimates.
2014). While still large, this amount falls considerably short of the required levels of investment to stabilise global warming to 2°C. Figure 7 shows an attempt to track financial flows from public, private and intermediary sources through a variety of financial instruments and channels to reach different aspects of climate change mitigation and adaptation. The analysis includes grant commitments and upfront capital costs, but does not include additional policy-driven revenues (i.e. prospective guarantee payments or contingent risk-management tools that are not always used) (CPI, 2014).

Figure 7: Flows of climate finance in 2014

Note: Figures are indicative estimates of annual flows for the latest year available. Flows are expressed in $bn and rounded to the nearest whole number. Where ranges of estimates are available, the mid-point is used. All data relate to commitments in a given year due to the limited availability of disbursement data. Figure 7 captures upfront capital investment costs of low-carbon, climate-resilient activities plus grants, e.g. for capacity-building and enabling-environment activities.

Source: CPI (2014a)

Geographic distribution of climate finance flows

With regard to ‘North-South’ transfers, it is estimated that on average $34 bn\(^{14}\) flowed from OECD countries to non-OECD countries, with multilateral DFI contributions falling by $5 bn and private investment contracting by $2 bn, representing about 10% of total climate finance.

\(^{14}\) The methodology employed by CPI to estimate “North-South flows” is not designed to produce an estimate that can be compared to the annual $100 bn figure agreed upon by the parties to the UNFCCC. Further analysis will be
Almost 75% of total flows were invested in their country of origin in 2013. The first reason for why climate finance demonstrates a domestic bias is because it is more familiar and perceived to be less risky to key investment decisions. This highlights the importance of domestic policy frameworks in unlocking climate finance. In order to scale up private–sector involvement in flows to developing countries, new risk–mitigation instruments and improved policies will be needed to address investors’ risks, both real and perceived.

The second observation is that volumes spent in developed compared to developing countries (when considered as a binary system at the macro level) was split almost 50–50 as it was in 2012, but in absolute terms, investments in both regions fell.

Public and private actors engaged in climate finance

Some 42% of climate finance in 2013 came from the public sector, approximately maintaining the previous year’s absolute levels. These flows were primarily channelled through intermediaries, including national, bilateral and multilateral development banks, in addition to specialised climate funds. Development finance institutions remain with around $126 bn, or 38% of total climate finance. Of the flows to from developed to developing countries, public sources accounted for 94%.

Much like in previous years, the private sector contributed most global finance in 2013, providing 58% or approximately $193 bn. The decline since 2012 is mainly due to a significant drop in private investments due to falling PV prices, but also to lower deployment in the wind sector. Unlike the public sector, the bulk of private finance did not move through intermediaries such as asset management companies, private equity or commercial financial institutions, but rather through project developers (46% of total climate finance), corporates (24%) and households (13–15%). It is noteworthy that private investors had an especially strong domestic focus with $174 bn (90%) remaining in the country of origin.

Finally, while the private sector contributed more than half of all global climate finance in 2013, much of that explained by more modest public–sector investments, demonstrating the latter’s importance in leveraging and unlocking additional funding.

Instruments used to channel climate finance

Both public and private sources used a variety of financial instruments to fund mitigation and adaptation projects, some of which are easier to quantify than others and so play a critical role in enabling additional financing, although this is difficult to measure in dollar terms. Two such instruments, policy incentives (e.g. feed-in tariffs (FiTs), tradable certificates, tax incentives and clean energy subsidies) and risk management (e.g. guarantees), play central roles in investment decisions as they have a direct bearing on the risks and returns associated with a given project. Such mechanisms are increasingly used to leverage financing in developed and developing markets.

Approximately 3% of total climate finance in 2013 was in the form of grants, including non–repayable cash transfers and in–kind support. This is roughly the same as in 2012. Predictably, the public sector provided almost all grants. Playing a much larger role, low–cost loans, including loans with longer tenors, more generous grace periods and lower interest rates, constituted 23% of climate finance, while 98% of the low–cost loans came from DFIs. Together, these two instruments cover much of the incremental required to determine whether this goal has been reached or to estimate the shortfall. It is likewise difficult to determine the origin of many sources of finance, which often work through subsidiaries and/or intermediaries before being put to use (e.g. World Bank financing by donor countries, direct investment by a corporation with a local subsidiary/affiliate or institutional investors acting on behalf of large groups of individuals).
costs of investing in clean energy and other low-carbon activities (i.e. those above the business-as-usual or conventional investment against which they compete).

Finally, many providers of climate finance use capital instruments, with the expectation of achieving market returns on their investments. These tools, which accounted for $245 bn or 74% of the annual total, took the form of equity, various kinds of debt (e.g. loans and bonds) and hybrid instruments. The vast majority of this financing ($158 bn) came off private-sector balance sheets, raised at the sponsor level. This dropped to $40 bn in 2013 mainly due to the decline in private RE investment, the principal focus of balance-sheet financing. Project–level equity, worth $16 bn (5% of total climate finance), increased by more than a third.

**Use of climate finance investments**

In 2013, climate finance was overwhelmingly focused on mitigation, which accounted for 91% of total flows, while adaptation accounted for the remaining 7%.\(^{15}\) Among the mitigation financing, RE accounted for 71% of all funds and 100% of private-sector climate finance investment over the course of the year. Other mitigation activities included $30 bn in EE projects, and $46 bn in other projects, including sustainable transport, agriculture, forestry, land management and livestock management. Mitigation finance was driven primarily by private players, in particular project developers, corporate actors and commercial financial institutions. The public sector also played a key role in providing mitigation finance, channelling 79% of its finance funds to mitigation activities to support low-carbon development. Public funds accounted for 100% of EE projects over the course of the year. This was channelled mainly through targeted facilities funds, dedicated credit lines and programmes specifically aimed at the household level.

The $25 bn of climate finance for adaptation activities came exclusively from the public sector,\(^ {16}\) channelled mainly through DFIs (88%), but also through government bodies (9%; almost half of which was for adaptation) and climate funds (2%). Most of this finance was directed to developing countries, where it was spent on management of water supplies, climate–resilient infrastructure and coastal projection, disaster risk reduction (DRR) and agriculture, forestry, land use and natural resource management. While there have been calls for more private-sector engagement in adaptation, the lack of agreement about the definition of adaptation finance and interventions makes it difficult to measure.

Finally, around 1% of total climate finance supports activities with both mitigation and adaptation objectives. All of the finance for multiple purposes comes from public sources and is equally split between DFIs and other government bodies.

---

\(^{15}\) The remaining share targets activities with multiple purposes.

\(^{16}\) There are no reliable data for private project–level adaptation interventions.
Table 1: Breakdown of finance sources by final use of climate finance in 2013

<table>
<thead>
<tr>
<th></th>
<th>$M</th>
<th>PRIVATE</th>
<th>PUBLIC</th>
<th>TOTAL</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>ADAPTATION</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Agriculture, including livestock and fishing, forestry, land use management, natural resource management</td>
<td>NE</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>7%</td>
</tr>
<tr>
<td>Disaster risk management</td>
<td>NE</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>1%</td>
</tr>
<tr>
<td>Resilient infrastructure incl. coastal areas protection</td>
<td>NE</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>1%</td>
</tr>
<tr>
<td>Water supply and management</td>
<td>NE</td>
<td>14</td>
<td>14</td>
<td>14</td>
<td>4%</td>
</tr>
<tr>
<td>Cross-sector activities and others</td>
<td>NE</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>1%</td>
</tr>
<tr>
<td><strong>MITIGATION</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Agriculture, forestry, land use and livestock management</td>
<td>NE</td>
<td>6</td>
<td>6</td>
<td>6</td>
<td>2%</td>
</tr>
<tr>
<td>Energy efficiency</td>
<td>NE</td>
<td>30</td>
<td>30</td>
<td>30</td>
<td>9%</td>
</tr>
<tr>
<td>Process emissions in industry and fugitive emissions</td>
<td>NE</td>
<td>7</td>
<td>7</td>
<td>7</td>
<td>2%</td>
</tr>
<tr>
<td>Renewable energy</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Wind</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Solar</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Small hydro (&lt;=50MW)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Large hydro (&gt;50MW)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Biomass and biogas power</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Other technologies/ unclassified</td>
<td></td>
<td>0.3</td>
<td>30</td>
<td>31</td>
<td>9%</td>
</tr>
<tr>
<td>Transport modes resulting from modal shift</td>
<td>NE</td>
<td>17</td>
<td>17</td>
<td>17</td>
<td>5%</td>
</tr>
<tr>
<td>Cross-sector activities and others</td>
<td>NE</td>
<td>6</td>
<td>6</td>
<td>6</td>
<td>2%</td>
</tr>
<tr>
<td><strong>MULTIPLE OBJECTIVES</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>GRAND TOTAL</strong></td>
<td>191</td>
<td>141</td>
<td>331</td>
<td>100%</td>
<td></td>
</tr>
</tbody>
</table>

Source: CPI (2014a)
3 RENEWABLE ENERGY AND ENERGY EFFICIENCY STRATEGIES AND POLICIES OF DEVELOPING COUNTRIES

As in recent years, RE and EE technologies and interventions received a great deal of public support in 2013. This is due to the fact that many policy-makers considered the advantages of such interventions outweighed the potentially increased costs of such technologies. Such advantages include expanded energy services, reduced GHG emissions, improved energy access, potential job creation, economic development and poverty reduction. Broadly speaking, governments tend to adopt a mix of regulatory policies, fiscal incentives and public financing to support and encourage more investment in renewable generation capacity and EE projects. More specifically, many countries have adopted one or more of the following:

- Regulatory policies: e.g. preferential FiTs, renewable portfolio standards, net metering, tradable renewable energy certificates, tendering procedures and heat and biofuel mandates.
- Fiscal incentives: e.g. capital subsidies and rebates, investment and production tax credits and reduction in sales, energy, CO₂, value-added tax (VAT) and other taxes.
- Public financing mechanisms: e.g. energy production payments and public investments, loans, guarantees and grants (REN21, 2014).

By the beginning of 2014, 138 countries had adopted one or more of the above policies to support RE and a further 11 already had them in place in 2013. While the policy adoption rate appears to have decreased in recent years, the very high baseline is surely the primary cause. Further, this trend does not have a regional bias, as developing countries have expanded their RE policy support over the past decade, closing the gap with the developed country pioneers. In early 2014, 95 of the 138 countries that had adopted RE support policies were classified as ‘developing’ (based on the UN country groupings), a major increase since 2005, when they numbered 15 (REN21, 2014). While the recent focus in many developed markets has been on revising RE support policies rather than adopting new ones, Section 3.1 focuses on the adoption of new policies in developing and emerging economies with examples from Kenya, Tanzania and Indonesia and their regions.¹⁷ Some country background information is provided in

---

¹⁷ In the FS–UNEP/BNEF Global Trends Report, Indonesia falls within ASOC (Asia and Oceania excluding China and India), while Kenya and Tanzania fall within Middle East and Africa. In the REN21 Global Status Report, Indonesia comes under what it calls Developing Asia, while Kenya and Tanzania are part of SSA.
Box 1.
Box 1: Background information on Kenya, Indonesia and Tanzania

**Gross Domestic Product**

Indonesia and Kenya are both lower middle-income countries (LMICs) with annual GDP growth of 5.8% in 2013 in Indonesia and around 4.7% in Kenya. While its annual GDP growth was 7% in 2013, Tanzania is classified as low-income country (LIC) (World Bank, 2014).

**CO₂ emissions**

The development of CO₂ emissions per capita since 2000 for the three countries are illustrated in Figure 8: CO₂ emissions per capita. Although total CO₂ (excluding land-use change and forestry) emissions increased in Indonesia to 456,210 tonnes in 2012, emissions per capita are still far lower than in developed countries. The largest low-cost potential to reduce GHG emissions in Indonesia is in the forestry and related land-use sectors.

**Figure 8: CO₂ emissions per capita**

![CO₂ emissions per capita graph](http://data.worldbank.org/indicator/EN.ATM.CO2E.PC)


Carbon emissions in Kenya and Tanzania are even lower with 13,446 and 9,295 tonnes respectively in 2012 (Energy Information Administration, 2014). In Tanzania land-use and forestry are the source of 96% of its CO₂ emissions (Republic of Tanzania, 2003). According to SEI (2009) GHG emissions in Kenya are expected to more than double between 2005 and 2030, particularly due to agriculture and the rapidly growing transport sector. Kenya is already adopting measures and policies that are consistent with low-carbon development of the electricity sector, where carbon intensity is therefore predicted to fall.

3.1 MAIN INTERNATIONAL CLIMATE FINANCE-RELATED SUPPORT POLICIES

Many developing countries, as in the cases of Kenya, Tanzania and Indonesia, have recently placed strong emphasis on attaining the dual goals of energy access and sustainability. As illustrated in Figure 9 the electrification rate in increased in all three countries between 2010 and 2011. Despite this, in Kenya around 34 million people remained without access to electricity in 2011, approximately 39 million in Tanzania and 66 million in Indonesia (REN21, 2014), although capacities have increased more recently.

Figure 9: Electrification rate in Kenya, Tanzania and Indonesia (in %), 2010-2011


Developing countries recognise the difficulties and costs of expanding grid connections to rural areas and therefore focus on policy support for distributed renewable energy - both at the household and mini-grid levels. Countries have employed a variety of incentives, including capital subsidies, pre-paid metering allowances, grants to cover upfront costs, concessional loans and preferential tax treatment. Such policies have supported a proliferation of home solar systems in Indonesia and more than 9,000 biogas units in Kenya. While such initiatives used to be managed exclusively by the public sector and international development agencies, in recent years the private sector has recognised that the RE sector offers business opportunities and is participating in innovative public-private partnerships (PPPs) to provide financing for distributed assets (REN21, 2014).

Indonesia, Kenya and Tanzania have adopted some RE policies, with a mixed degree of success in attracting financing to new projects.
Table 2 below provides an overview of which targets, policies, incentives and financing mechanisms the three countries had adopted by 2014. The only revision was made in Indonesia, where the government recently expanded its Feed-in Tariff (FiT) regime to include solar PV projects with a 40% local content requirement. Subsequently, we offer a more detailed profile of these countries' RE policy support mix.
Table 2: Renewable energy targets, policies, incentives and financing mechanisms in Indonesia, Kenya and Tanzania

<table>
<thead>
<tr>
<th>Country</th>
<th>Regulatory Policies</th>
<th>Fiscal incentives and public financing</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>RE Targets</td>
<td>Feed-in-Tariff premium payment</td>
</tr>
<tr>
<td>Indonesia</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Kenya</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Tanzania</td>
<td>✓</td>
<td></td>
</tr>
</tbody>
</table>

Source: REN21 (2014)

One consequence of the policy support mechanism could explain the new investments in renewable energy (Figure 10).\(^{19}\)

Figure 10: New investment in renewable energy finance, 2010–2014, $bn

Indonesia

The government of Indonesia has set the following RE generation targets for 2025: renewables should account for 15% of generation, with 13 GW of capacity composed of 9.5 GW of geothermal, 970 Megawatts (MW) of wind and 870 MW of solar (by the end of 2013, Indonesia’s overall renewable generation capacity was estimated to be 3.3 GW). Biomass and small hydro are also expected to play an important role in achieving this overall target.

\(^{19}\) The new investment include closed deals of the prevailing year in solar, wind, biomass and waste, biofuels, small hydro (< 50 MW), geothermal and marine in the following asset classes; VC/PE, Public markets and Asset Finance. Not included are small Distributed Capacity & R&D (corporate & government). There are no data on small distributed capacity. Large hydro (> 50 MW) is excluded since this technology has been mature for decades and is at a very different stage of adoption.
In order to attract investments in projects that will make this possible, Indonesia has adopted a 20–year FiT of $0.1–0.185/kilowatt hour (kWh) for geothermal projects, with FiTs of $0.14–0.18/kWh for biomass and $0.07–0.16/kWh for other renewables with a generation cap of 10 MW. Geothermal project developers also benefit from off-taker guarantees, an early-stage exploration/development fund, tax rebates, accelerated depreciation and exemption from import VAT. With respect to solar, the government instituted a tender programme in 2013 in which the utility will receive $0.25/kWh maximum, with a small top-up for projects with a local content of 40%. Finally, the government supports RE projects by providing a viability guarantee for the utility (BNEF, 2014a).

The consequence of this policy support has been that new investments in small hydro, biofuels and geothermal generation assets have dominated the overall mix since 2010, particularly the latter. This pattern clearly matches the government’s policy to accelerate geothermal development, as the country has 40% of the world’s estimated geothermal resources (BNEF, 2014a). In 2012 and 2013, Indonesia saw $221 mn and $380 mn committed to renewable generation sectors.

Kenya

Much like Indonesia, Kenya has ambitious RE targets, striving under the Least–Cost Power Development Plan 2011–31 to achieve by 2030 almost 20 GW of electricity generation capacity, with renewables accounting for 51%. Of this, geothermal should account for 5.1 GW, wind for 2 GW and large and small hydro for 1 GW (the country’s total renewable generation capacity was approximately 400 MW in 2013). To provide incentives for developers, the country has adopted a twice-revised FiT, which provides preferential revenues, differentiated by technology, for 20 years. Currently, technologies include wind, hydro, biomass, solar PV and geothermal, with differentiated rates for projects above and below 10 MW. The government has extended VAT and import-duty exemptions for renewable generation and geothermal exploration projects, and the latest draft of the Energy Bill has proposed a net metering system for owners of generation assets under 20 kilowatts (kW) (BNEF, 2014c). The government has also introduced standardised power purchase agreement (PPA) templates, and guarantee priority purchase, transmission and distribution of electricity generated by renewable sources of less than 10 MW (the terms for larger generation assets are negotiated as part of the PPA)(Kenya Minstry of Energy, 2012).

Such policy support has resulted in Kenya having one of the most active RE markets in SSA, and the second largest investor after South Africa – although there is a stark difference, as Kenya’s investment volume of $249 mn in 2013 was only about 5% of South Africa’s at $4.9 bn in the same year. Investment was up from 2012, but far below the country’s peak of $1.7 bn in 2010 (FS–UNEP/BNEF, 2014).

Kenya relies on renewables for a large portion of its generation capacity, approximately 65% in 2011 (REPP, 2012). While hydro power is far and away the largest generation source, solar, wind and geothermal generation assets are being rapidly developed. Kenya has seen growth in local solar financing, with companies such as M–KOPA selling up to 1,000 systems per week, serving over 50,000 households to date, with innovative mobile payment plans (FS–UNEP/BNEF, 2014). The country is in the process of developing the high profile Lake Turkana Wind Power project, which is expected to add 300 MW to the national grid, an additional 20% of its current generation capacity (LTWP, 2014). Finally, Kenya is among the world’s fastest-growing geothermal markets, adding 36 MW to Olkaria III in 2013 and another 16 MW in early 2014. Ormat Olkaria III project expansion has gone forward without subsidies. Ormat Technologies Inc secured a loan of $180 mn to develop the 36MW Olkaria III Geothermal Project Expansion I (BNEF database). The country had a further 280 MW under construction by early 2014 (REN21, 2014).

---

20 These targets are being revised in 2014, with a new draft of the country’s National Energy Policy being published in late February.

21 See Section 5.4 for more details about M–Kopa.

22 While the expansion of Olkaria III did not receive direct subsidies, the project did benefit from MIGA guarantees and debt finance from development banks, including EIB, DEG/KfW and others.
Such rapidly expanding generation capacity bodes well for Kenya’s plan to greatly expand its overall electric capacity by 2016, with 794 MW of hydro, 1,887 MW of geothermal, 635 MW of wind and 423 MW of solar PV energy (REN21, 2014).

**Tanzania**

Unlike the other two countries, Tanzania has no specific targets for RE generation in terms of capacity (MW) or proportion (percentage) (Heinrich Böll Foundation, 2013). In 2009, the Electricity Act opened the power sector to private–sector participation and independent power producers (IPPs). The government has introduced non–technology–specific FITs based on an avoided cost principle and payable over 15 years. In practice, however, the standard PPA is seldom used and IPPs negotiate rates with the utility. The government has also exempted RE imports from customs duties, dramatically reducing the costs of solar panels. These policies notwithstanding, to date, few projects have materialised because tariffs are set too low – being based on the generating costs of 100 kW–10 MW small hydro plants – the national utility is financially strained and cannot guarantee timely payment to power producers and payments are denominated in local currency, exposing international developers to currency risk that is difficult for them to manage. Recently the government has stated its openness to a differentiated tariff structure and the utility has undergone management changes and posted surpluses, both positive steps for attracting more activity in the country’s renewable sector.

The result has been that in Tanzania, renewable generation was only 30 MW in 2013, with another 60 MW commissioned. To put this figure in context, in 2012 and 2013, Tanzania committed $13 m to renewable generation sectors. Overall, annual expenditure relevant to climate change was $383 mn from 2009 to 2012, or about 5.5% of the national budget (ODI, 2014).

### 3.2 CHANNELS FOR INTERNATIONAL CLIMATE FINANCE

The nature of North–South development and climate finance varies substantially. Development finance is often channelled through either multilateral organisations or bilateral channels. Multilateral development banks (MDBs) are a large source of development assistance and typically provide significant climate–related benefits and economy–wide support for sustainable development and emerging climate finance instruments. Bilateral financing is mostly channelled through DFIs based in the donor country and which have large–scale operations in developing countries and transition economies. These institutions are mandated by their respective governments to provide long–term financing to the public and/or private sector, with specific value–added development objectives but on a sustainable commercial basis (Dalberg, 2009). In contrast to development finance, the climate finance commitments, in particular the ‘$100 bn’, have been agreed top–down in a first step. The Global North has committed a certain amount to the Global South rather than to individual countries. This approach allows recipient countries to obtain direct access to funding and consequently have more ownership. This implies that recipient countries need to gain the institutional strength to obtain access to these climate funds, and national institutions with the mandate to access and manage climate finance become more relevant.

Ideally, programmes related to climate change require integrated policies and a body often a national climate finance institution (NCFI), to mobilise, manage and coordinate climate–related finance in the recipient country. As a consequence, a growing number of recipient countries have moved rapidly or are currently in the process of setting up a national climate finance framework and identifying a NCFI to obtain and manage available resources in a coordinated manner. The national context most often determines the design of the NCFI. Key factors that influence the institutional design and funding focus include political and macroeconomic frameworks, national goals and development plans and existing capacities among government ministries and agencies. Governments may establish new structures or use/transform existing structures at the national and sub–national levels to at as its NCFI. Consequently, institutional structures differ greatly according to national circumstances and needs, and with regard to their mandate, governance structure, accountability and financing criteria. NCFIs come in form of separate funds, dedicated climate finance units situated in a ministry, or national development banks that have diversified their portfolio.
NCFIs obtain international and/or national funding to fund the projects and programmes that fall within their remit. For establishing or managing an NCFI, multilateral organisations often support the secretariat or administrator initially in order to promote donor trust and ensure fiduciary standards. They usually monitor and evaluate climate change projects and programmes and provide direct or indirect capacity-building support. With a well-designed NCFI, governments can increase their ability to acquire funding from international donors, blend various sources and leverage private-sector investments.

Kenya, for example, has developed a national climate finance framework to clarify the coordination, roles and responsibilities of climate finance at the national level. The government nominated the National Environment Management Authority (NEMA) to serve as the National Implementing Entity (NIE) for the Adaptation Fund (AF) and is in the process of establishing the Kenya National Climate Fund for obtaining, receiving and disbursing domestic and international climate funds (MEMRF, 2012). (For more information, see Box 2.)

Box 2: National climate finance framework and institutional in Kenya

A major step for Kenya in realising its vision to become a low-carbon, climate-resilient growth economy was the launch of the Kenya Climate Change Action Plan 2013–2017 (KCCAP) at the end of March 2013. The Ministry for Environment and Mineral Resources (MEMR) had the lead role in developing the Plan, supported by the National Climate Change Committee, which is responsible for policy guidance. A provisional Climate Change Secretariat was established in the MEMR to oversee delivery of the KCCAP. A National Climate Change Council is being set up in the Office of the President to provide executive support to the Secretariat. The KCCAP was developed over 18 months in close consultation with government agencies, the private sector and civil society. The Plan represents a comprehensive and holistic roadmap for dealing with climate change and contains eight technical sub-components, one of which is climate finance. A multi-sectoral, cross-departmental task force has overseen the work of the sub-components.

From the three options for obtaining climate finance – project-level donor funding (status quo), channelling international finance to the national budget, or a dedicated climate fund – the KCCAP calls for the establishment of a Kenya Climate Fund. The Fund is to be the Kenyan institution with core expertise in climate finance and will become the primary vehicle for sourcing, receiving and disbursing domestic and international climate funds.23 Although it would be a new institution, the Fund is not meant to displace other climate finance activities, but rather complement them and build on their experience.

The Fund would have three main functions: (1) overall coordination of climate-related financing issues; (2) channelling multilateral and bilateral climate finance (including private finance); and (3) capacity building in mobilising and spending climate finance.

According to the KCCAP, the Fund will allow external financial flows to be streamlined (at least 15 different agencies support climate change activities, each with its own costs, rules and processes) and better aligned with national priorities. The government will put in seed money, but capitalisation is expected to be through bilateral donors and the international climate funds with supplementary domestic financial sources.

Source: MEMRF (2012)

Indonesia has already taken significant actions to respond to the threats posed by climate change, although it does not yet have a comprehensive national climate finance institutional framework. Consequently, as the government has already realised, there are opportunities to make climate finance more effective by clarifying the coordination, roles and responsibilities of different national agencies.

23 GoK MEMR Climate Change Action Plan.
and institutions (CPI, 2014b). In 2009, the Indonesia Climate Change Trust Fund (ICCTF) (see Box 3), which is designed as a National Climate (Trust) Fund (NCF), (more details Error! Reference source not found.) has been developed, in addition to the Clean Technology Fund, the Indonesia Green Investment Fund, and the planned REDD+ Fund. These national funds have the potential to play an increasing role in the Indonesia climate finance landscape once they are fully operational and integrated into the national framework. Nevertheless, with such a range of funds, it is even more important to have clear roles and functions set out in the national climate finance framework to ensure that the finance is used in an efficient and effective manner.

Error! Reference source not found. Box 3: Indonesia Climate Change Trust Fund (ICCTF)

The ICCTF is designed as a National Climate (Trust) Fund and is one initiative among many in Indonesia to support the economy’s transition towards low–carbon growth (Brown and Peskett, 2011). The ICCTF aims to develop innovative ways to link international finance sources with national investment strategies to attract, manage and mobilise financial investments in climate change mitigation and adaptation. The policy groundwork for the foundation was laid in the Yellow Book (July 2008 edition) (Republic of Indonesia, 2009). The ICCTF was jointly launched by the Government of Indonesia (GOI), the Minister of National Development Planning and the Minister of Finance on 14 September 2009.

The ICCTF operates across three priority areas: (1) Land–based mitigation; (2) energy; and (3) resilience and adaptation, with an overarching investment strategy to guide projects and ensure compliance with development policies.24

<table>
<thead>
<tr>
<th>KEY PARAMETERS</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Foundation</strong></td>
</tr>
<tr>
<td><strong>Owner</strong></td>
</tr>
<tr>
<td><strong>Fund Management</strong></td>
</tr>
<tr>
<td><strong>National Trustee</strong></td>
</tr>
<tr>
<td><strong>Objective</strong></td>
</tr>
<tr>
<td><strong>Financing mechanism</strong></td>
</tr>
<tr>
<td><strong>Eligible borrowers</strong></td>
</tr>
</tbody>
</table>

The ICCTF is one of Indonesia’s key vehicles to achieve the reduction of GHG emissions and meet its goals of a low–carbon economy and greater resilience to climate change. The ICCTF acts as a financial portal to receive and distribute funds from international finance, other governments, aid agencies and other climate change funding mechanisms (e.g. Adaptation Fund, European Union (EU) Global Efficiency and Renewable Energy Fund) (Republic of Indonesia, 20111). To date, the total funding available to and disbursements from the ICCTF have been modest. In 2011, it disbursed approximately $2 mn from total fund capitalisation of $11 mn to line ministries and government agencies. As the ICCTF is currently in the transition process of appointing national trustee

24 Interview with Amin Budiarjo (2011).
(UNDP was the interim trustee) significant funding is not expected until the process is complete (CPI, 2014b).

Source: Based on FS–UNEP (2012)

Overall, the concept of NCFIs is relatively new and only a few have been established 25 and in view of the limited number of institutions that are accredited by and have direct access to international climate funds (Adaptation Fund (AF) or Global Environment Fund (GEF)),26 it can be assumed that required capacities are not yet in place.

---

25 There is no official mechanism to capture or register NCFIs.
26 As of August 2014, 17 NIEs had AF accreditation. In case of direct access to the GEF, in 2012 only 11 agencies were approved to progress to Stage II of the accreditation process, of which only four are national institutions.
4 INSTRUMENTS USED TO SUPPORT THE TRANSFORMATION

As mentioned previously, the SE4ALL goals to achieve universal access to modern energy services, double the global rate of improvement in EE and to double the share of renewable energy in the global energy mix will require massive investment each year until 2030. Addressing the twin challenges of climate change and lack of access to affordable energy for the world’s poorest people will require concerted government and private-sector cooperation.

4.1 TRANSFORMATION CHALLENGES

The creation of a stable and attractive environment in developing countries is essential for private-sector involvement. Discussions about the type and volume of investment in RE and EE required in order to avoid dangerous levels of anthropogenic climate change often refer to ‘barriers’ to investment which need to be ‘overcome’ through policies. The term ‘barrier’ (for which the synonyms include obstacles, hindrances, impediments or frictions) is used in different contexts in finance and economics. Both assume that barriers prevent markets from functioning efficiently. In recent years, however, the term has increasingly been used in relation to climate and the environment, but in a more descriptive manner, as barriers that put ‘low-carbon technologies at an economic, regulatory, or institutional disadvantage relative to other forms of energy supply’. Since identifying barriers is frequently used in policy design and sometimes refers explicitly to policies, we suggest that defining barriers requires at least an implicit reference to the social optimum. One simple consequence of such a definition would be that if barriers preclude the social optimum then overcoming all barriers logically means advancing towards the social optimum. We suggest a definition that adds, at least implicitly, the investor’s perspective: ‘A barrier to investment in renewable energy is one that prevents the realisation of projects that are desirable from the perspective of the whole society’.

Based on our definition, the RE and EE investment barriers in the literature are broken down between the macroeconomic perspective and investor perspective (see Table 4).

Table 3: Macroeconomic and investor perspectives

<table>
<thead>
<tr>
<th>Macroeconomic perspective</th>
<th>Investor perspective</th>
</tr>
</thead>
<tbody>
<tr>
<td>Are the barriers the result of so-called market imperfections?</td>
<td>How does the barrier appear in the investor’s analysis of risk, return and other potential issues?</td>
</tr>
<tr>
<td>Market failures for investments: emission externalities,</td>
<td>Crucial decision factor: risk and return and other institutional issues (e.g. traditional restricted investment and lending policies).</td>
</tr>
<tr>
<td>technological spillover, imperfect financial market,</td>
<td></td>
</tr>
<tr>
<td>29 asymmetric information and other potential unjustified</td>
<td></td>
</tr>
<tr>
<td>market distortions.30</td>
<td></td>
</tr>
</tbody>
</table>

Source: Frankfurt School of Finance & Management (2014)

In addition, the barriers may be classified as referring to RE/EE investments in general and barriers that are characteristic for all kinds of investment in new technologies. Summarising the breakdown and analysis of the RE and EE investment barriers yields the following conclusions:

- Most barriers are of general nature for all investments: reduced returns for foreign compared to national investors, regulatory and policy risk, legal risk, currency risk, liquidity, different levels

---

28 This definition strongly resembles that of Ekholm et al. (2013).
29 Three types of capital market imperfections that typically occur in relation to RE/EE financing are (i) the lack of a (liquid) market for long-term debt; (ii) imperfect credit markets; and (iii) the monitoring externalities.
30 Market distortions subsume all factors that distort the decisions of market actors and yield a sub-optimal level from a social perspective.
of lack of information (of the investor), traditionally restricted lending and investment policies or investment practices of institutional investors.

- RE/EE investments face additional barriers that are typical for new technologies in general: lower (but rising) maturity of technology, technology-specific learning curve or increased planning and operational risk due to lack of experience in a new environment.

- Few barriers are specific to RE/EE investments: reduced relative return of RE/EE compared to fossil fuels due to a lack of carbon price or fossil-fuel subsidies or traditional indices (low share of RE/EE) used as investment benchmark.

As a consequence, barriers to RE/EE investment tend to be more complex, i.e. comprising more ‘elementary’ barriers than conventional projects. Shifting private investment towards low–carbon emissions therefore requires addressing a range of barriers, including but not restricted to those specific to RE/EE. The barriers identified above represent the strict investor’s perspective and are broken down according to their underlying market imperfections. This could be used to inform policy design aimed at mobilising commercial climate-friendly investment and to identify at least two general options to address each barrier – either seeking to correct the market failure (e.g. through introducing a price on carbon if this is lacking), or to compensate the investor for the disadvantages faced (e.g. through public investment support mechanisms).

### 4.2 INSTRUMENTS

Public and private-sector actors offer instruments that attempt to assist the transition towards a low-carbon economy. The main interventions can be classified as instruments that improve the framework of RE/EE projects, public finance mechanisms and institutional support instruments. Typically, public finance instruments (PFIs) aim directly or indirectly to mobilise or leverage commercial investment for investments in RE/EE infrastructure and can be classified in two major categories (i) risk–mitigation instruments and (ii) capital support instruments which have an indirect risk–mitigation effect.

#### Framework of RE/EE Infrastructure projects

There are policies or instruments that support RE/EE infrastructure projects directly by reducing output price risks and offering resources that reduce financing risks (i.e. tax credit/equity). Revenue support policies to reduce the revenue risk are provided mainly by public actors. The output price risk is adequately tackled by power purchase agreements (PPAs) to ensure the quantity and the price of the power that the project will sell to an off-taker. Similarly, Engineering, Procurement and Construction Contracts (EPC), Operation & Maintenance Contracts (O&M) and Emissions Reduction Purchase Agreements (ERPA) are bilateral contractual agreements to mitigate the operational, technological, output price and volume risk. Finally, these risks are as well mitigated through clear process standards (incl. quality standards).

**Risk–mitigation instruments**

Risk–mitigation instruments are used to transfer risks from one entity to another that is specialised in pooling risks. Private actors often offer instruments that aim to mitigate a specific risk, such as insurance, foreign-exchange swaps and price the risk in exchange for a premium and on verification of the claim, or risk–mitigation instruments covering broader risks. Insurance is mainly provided by private companies that are specialised in pooling risks and take over the risk from a client on payment of a premium. The private sector is familiar with quantifying a wide range of risks associated with different stages of the RE/EE infrastructure projects. An exception is the exploration risk of deep geothermal wells, which in most cases is at least partly covered by public funds because of the reluctance of the private sector to engage at this level. One example of a public–private risk–mitigation instrument is the ‘Geothermal Fund’, which was set up in 2011 in Indonesia to fund exploration services and drilling (for more details see Box 4).

---

31 See also Climate Policy Initiative (2013a).
Box 4: Geothermal Risk Fund Indonesia

Exploratory drilling, not only geothermal but also for oil, is risky because of the difficulty of balancing the likelihood of success against the cost of failure. Only around half of the geothermal exploratory drilling is successful (IFC, 2013). Risk hedge funds are used to hedge the exploration risk in capital-intensive geothermal projects. If the drilling proves unsuccessful, some of the costs will be refunded, while if the outcome is positive a risk premium is repaid to the fund.

Based on a study funded by the German Government and KfW a model for risk mitigation and promotion of geothermal energy in Indonesia was developed. After considering various models a ‘Risk Fund’ was considered to be the most appropriate. In 2011, a revolving fund (‘Geothermal Fund’) was established to fund exploration and drilling in previously defined concession areas with an equivalent volume of $145 mn at the national level. The exploration studies and the financing of the drilling are financed by the Fund and should provide potential investors with sufficient information about the quality of possible drilling sites. If successful, the project developer will have to reimburse the costs of the exploration study and drilling. Thus, depending on the success of the project, there is a financial flow back to the Fund, thus ensuring its sustainability (Wahjosoeobijbo and Hasan, 2012).

A private insurance model was not considered to be suited to Indonesia because the geological conditions make it impossible to establish the likelihood of success for geothermal drilling in Indonesia. Private insurance companies require this information in order to assess the risk and to calculate a risk premium.

Source: Seipp (2012)

Private–sector developers may face risks that appear to them unmanageable. The public sector can respond by developing appropriate guarantee schemes to take over this unmanageable risk element. Typically, only creditworthy public sector actors are able and willing to take on such risks (Matsukawa and Habeck, 2007) as they inherently have a very high default limit; their pricing comes in significantly lower. These guarantees mainly improve the quality of loans/bonds issued by the projects, through mitigating the borrower’s financial risk and enhancing coverage of debt–service obligations.32

A loan guarantee is an obligation of the guarantor to assume the borrower’s obligations in the case of default. Loan guarantees can cover the full amount of debt outstanding or a defined portion (so-called Partial Credit Guarantees). Loan guarantees are used in specific cases when a private–sector lender can provide the required capital but does not want to absorb the credit risk. Such PCGs are sometimes attached to on-lending facilities, i.e. the commercial lender receives capital for on-lending but does not become fully liable if the ultimate loan to the RE project fails. The objective of the PCG is to improve both the borrower’s market access and the terms of commercial debt (e.g. by extending maturity and/or reducing the interest rate costs) through sharing the borrower’s credit risk between the lenders and the guarantor. Traditionally developing country governments or public entities use PCGs to borrow from international banks or to support a bond offering in international capital markets. One example is the Asian Development Bank (ADB), which provided a PCG for bond issued by a Philippines government body in Japanese yen.

Capital support instruments

Capital support instruments are financial tools that provide public capital (direct financing/co-investment) and have an indirect risk–mitigation effect. The provision of capital at more attractive interest rates (due to the cheaper refinancing of DFIs/International Financial Institutions (IFIs)) can also help to improve the financial viability of RE and EE investments.

32 Political risk guarantees usually cover losses resulting from currency inconvertibility and transfer restriction, expropriation, war/terrorism/civil disturbance, breach of contract and non–honouring of financial obligations. Off-taker risk guarantees cover the independent power producer’s losses resulting from late or non–payment of the single off–taker. Political, regulatory and off–taker risk guarantees are less important in the EU context. A portfolio insurance hedges a portfolio of stocks against market risk by short–selling stock index futures and covers therefore all risks.
**Direct financing/co-investment:** Donors via the national DFI or governments through their national development or climate finance banks can provide direct loans to green projects. Direct financing can comprise equity, mezzanine capital or senior debt. In particular, with regard to equity, DFI financing is usually restricted to a share in the total capital to ensure that ‘project ownership’/the controlling stake remains with the private-sector partner. The investment is limited to co-investment. When it comes to senior debt tranches and the project has already acquired private-sector capital, DFIs/IFIs are less concerned about risks and can often cover up to 100% of the required amount. Usually, DFIs/IFIs are happy to create a senior debt tranche (with a potentially shorter tenor) for private-sector investors and are also willing to accept a subordinated debt investment in certain cases, depending on the promotional purpose. Co-investments by the public sector offer indirect risk mitigation and often provide a quality signal to the private-sector lender/investor. Usually, however, the primary goal of direct lending is to address the lack of supply of long-term capital in less developed financial markets. One example is the Global Energy Efficiency and Renewable Energy Fund (GEEREF), which provides co-financing, equity finance to small and medium size RE and EE projects and enterprises in developing countries and transition economies. The objective of the GEEREF is to support projects and enterprises that lack capital financing despite offering potentially attractive returns. Complementary technical assistance is offered to improve and facilitate the development of investible projects.\(^{13}\) The GEEREF has provided funding for the Renewable Energy Asia Fund (REAF), which focuses on RE investment and is best placed to help Asia to bridge its current electricity supply/demand gap (primarily with wind, small hydro and solar energy).

**Interest subsidy:** The primary objective of direct investment by DFIs/IFIs or on-lending schemes is the provision of (long-term) capital in environments in which the financial sector cannot supply it. Usually, the financing costs for DFI/IFI capital come in below local market rates as DFIs/IFIs aim to support green or development-driven projects with subsidised capital. Even without this element of concessionality, DFIs/IFIs benefit from low refinancing rates driven by their strong balance sheets and ratings and can offer attractive rates. Consequently, DFI/IFI financing can also help to bridge gaps in financial viability.

**Box 5: South Africa Green Credit Line**

The South Africa Green Credit Line project provided by the French Development Agency (AFD) offers a credit facility of €120 mn to three South African banks – ABASA, IDC and Nedbank (€40 mn each) – to finance small RE and EE projects with a maximum project size of R100 mn. The objective is to reduce CO\(_2\) emissions and the pressure on fossil fuels by enhancing energy efficiency and increasing share of the renewable energy in the economy (AFD, 2001). The local banks obtain funds from AFD at a concessionary rate and use the benefit as rebates to their clients. Taking the credit line at ABASA as an example, the qualified RE/EE projects with a payback period of three to seven years get rebate of 7% of the principal (ABSA, 2014). Assuming a 1 MW solar installation with a required investment of R17 mn to be repaid in five years with a financing rate of 9.25%, the 7% rebate will lower the effective interest rate to 6.18% (ABSA, 2014a). One of the businesses that have benefited from the project is a fruit farm in the Western Cape, which has obtained a rebate of over R1 mn by installing a 1 MWh solar PV rooftop to partially power the refrigeration compressor rooms on the farm (ABSA, 2014b).

**Grants** address the limited financial viability of projects. Upfront grants also address the lack of funding by reducing the required investment capital. The timing and conditionality of grants can vary from traditional upfront grants to results-based support over several years.

**Institutional support instruments**

The adoption of refinancing instruments is often complemented by capacity-building efforts for the financial institutions involved. In a broader sense institutional support instruments also mitigate risks through improving the knowledge and management skills, or offering increased access to information. Institutional support instruments include public, non-financial, interventions that usually target multiple

---

\(^{13}\) Global Energy Efficiency and Renewable Energy Fund homepage.
risks. This category includes, e.g. technical assistance and capacity-building activities such as to improve the institutional processes as well as improving databases or tracking-tool methodologies.

Box 6: Institutional support for Microfinance for Ecosystem-based Adaptation (MEbA)

Dealing with climate change is an important element of fostering development and poverty eradication. One way to do so is to focus on the health of ecosystems and the services they provide, as the ecosystem-based adaptation concept (EbA) aims to do. It has identified 40 options such as crop diversification, fog catchers, solar dehydrators, firebreaks, bio digesters and conservation agriculture.\(^{34}\) EbA helps to reduce disaster risks and increases crop resilience to ensure more stable and sometimes higher incomes, and so helps to guarantee food security. The UNEP-led project ‘Microfinance for Ecosystem-based Adaptation’ (MEbA), funded by the German Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety, incorporated EbA strategies and methods as major elements in green microfinance.

In general, the terms of agricultural micro loans have to be adjusted to agricultural seasons, reflecting crop-specific cash flows and ideally inherent risks facing specific farmers. An evaluation of credit risk and a customer-service approach in targeting EbA requires access to reliable information such as agroclimate data as well as the capacity to handle such information. Therefore, institutional support through training as well as technical assistance needs to go alongside micro loans, in order to ensure that most EbAs achieve success.

Public and private-sector actors offer instruments that attempt to mitigate investment risk in RE and in EE infrastructure. The impact of risk-mitigation instruments can appear in various forms: (i) a more attractive risk profile can attract lenders and increase the loan portion in the capital structure; (ii) it can extend the loan tenor; (iii) it can reduce the requested risk margin and consequently the overall interest rate; and (iv) equity investors might reduce their expectations of returns.

4.3 ENABLING ENVIRONMENT

Private-sector activity in new markets is generally burdened by higher development costs. Investing in new markets is commercially attractive only if – at least in the mid to long term – business in the new markets is equally or more attractive (or is the only means to grow) than in existing markets. Otherwise the opportunity costs would hinder the allocation of resources to new markets.

Since initial due diligence costs related to new markets are a major factor, the visibility of the future project pipeline becomes extremely important. If a financial institution believes in a government’s mid-term RE targets and its continued support for private-sector investments, it will be more easily convinced to make the ‘investment’ of familiarising itself with a new PPA and developer community. Government, or more broadly public sector, action that creates an environment conducive to private-sector investment – a so-called enabling environment – includes a high level of transparency and longevity of government decisions, and visibility of future developments.

A strong regulatory framework ensuring predictable and sound support for RE projects and equal treatment of project developers/fair competition is important for an enabling environment in climate finance. Rather than providing support on a case-by-case basis, donors can also support the creation of enabling environments by strongly aligning their programmes to the regulatory framework in the aid-recipient countries. This approach has been adopted in the Get Fit project (Section 5.1). Besides the implementation of supportive regulatory frameworks many governments show their commitment to RE by publishing a specific RE target (

\(^{34}\) An extensive list and description is available at www.pnuma.org/meba.
Table 2), often expressed as a percentage of RE electricity generation in total electricity generation (or based on installed capacity). Such a target, if valid and ambitious, can make future projects in the RE sector more visible for investors and mitigate concerns about opportunity costs, such as initial additional due diligence, as an investment in an attractive future market.

It is worth noting that developed and developing countries face distinct challenges. Developed countries have established capacities. A transformation to increase the share of RE is in general achieved by replacing existing capacities when a plant becomes unprofitable. In contrast, most developing countries are still building up capacities. This means that developing countries can simultaneously increase the electrification rate and the share of RE in the energy mix by using RE for new capacities.
5 PRACTICE

This section offers four examples from the public and private sectors. We do not use the term ‘best practice’, restricting ourselves to describing current practices. We present three examples with private and public involvement (GET FiT, the Global Climate Partnership Fund and the Renewable Energy Performance Platform) and one exclusively funded by the private sector (M-Kopa Solar).

5.1 GET FiT

In 2010, the Advisory Group on Energy and Climate Change (AGECC) of the UN Secretary-General asked private–sector financiers to present new concepts for promoting RE investments in developing regions and to clarify how to facilitate stronger private–sector involvement. GET FiT – Global Energy Transfer Feed–in Tariffs – was developed by experts of Deutsche Bank Climate Change Advisors in response to this request and was presented in April 2010.

The objective of GET FiT is to combat climate change and shortfalls in access to energy by supporting private–sector investment in RE sources in emerging economies and developing countries. In the light of budgetary constraints as well as a lack of investor confidence in the prevailing conditions in developing countries, GET FiT accepts the need for international support to scale up RE generation capacities. It proposes an innovative approach whereby donors, rather than supporting individual projects, create a sustainable enabling environment, thereby increasing the visibility and reducing transaction risks for private–sector project developers and financiers.

The GET FiT concept requires strong will on the part of developing country governments and/or electricity regulators, and of the domestic public sector, in order to facilitate private–sector investment in RE generation assets. A first step is to adopt appropriate regulatory schemes for RE generation. Fixed payments for generated electricity as well as priority treatment/feed-in of renewable energy are crucial for facilitating private–sector investment. Donors can provide technical assistance in setting up or improving the regulatory framework, although the lack of confidence in the stability of the regulatory system can reduce the impact of public–section action in the country in question. An ‘upgrade’ by the public sector in developed countries can help to maximise the impact. It creates transparency, longevity and certainty for private–sector investors and consequently mitigates actual and perceived risks, which the developing country government alone could not accomplish. In order to achieve this they need to absorb partially the political, regulatory and credit risks in relation to the single off-taker of electricity (counterpart risk guarantee). Bilateral and multilateral donors might also offer financial support for FiT payments (burden sharing). Following this upgrade, investments in RE generation assets should provide attractive investment opportunities for the private sector, which is expected to become active in project development and implementation, including financing. It absorbs all manageable risks, in particular technological and operational. In another form of innovative PPP, Deutsche Bank and KfW jointly designed a programme to pilot this concept in Uganda. The pilot was launched with the support of the German, Norwegian, United Kingdom (UK) and Ugandan governments as well as the World Bank. The European Commission added its support. The development of GET FiT from research to implementation shows the power of an unbiased and constructive dialogue between thought leaders in the private and the public sectors, and between developed and developing countries.

Uganda, not the most obvious partner in climate cooperation, was selected for various reasons. First, Uganda has been at the forefront of reforms to the energy sector, including unbundling and privatisation. It was also one of the African pioneers of the Renewable Energy Feed in Tariff (REFiT) scheme. International support was required to kick-start the realisation of many projects under the FiT scheme. There was also a strong initial ‘pull’ for GET FiT from the Ugandan regulator (rather than a push from donors). Second, energy scarcity is still a serious problem in Uganda, since mega-solutions, such as the proposed 600 MW Karuma hydro power plant, are far from completion. GET FiT in Uganda supports medium–scale RE generation capacity, which is eligible under the existing REFiT scheme. Given the constant rise in energy demand, private–sector involvement will be crucial in order to realise the potential in medium–scale energy generation assets, irrespective of plans for large government–initiated hydro power. Third, KfW and the initial GET FiT donors have been active in the country for many years. In
particular, KfW’s strong network and long–standing contacts in the Ugandan public sector and developers’ community were arguments for the anticipated rapid and successful implementation.

GET FiT in Uganda was launched in May 2013 following an 18–month preparation period. KfW worked intensely with the Ugandan regulator to standardise and re–balance the rights and responsibilities of the parties in the Power Purchase Agreement (PPA), which is supplemented by an Implementation Agreement with the Ugandan government. These standardised documents are now available for all independent power producers (IPPs) eligible for the REFIT. Project developers and investors have confirmed that the signing of the PPA has become a smooth and rapid process, a building block for a strong enabling environment. The World Bank has agreed – at the request of the Government of Uganda – to offer partial guarantees covering political, regulatory and off–taker risk. By reducing the risk profile of the RE investments, the guarantees have the power to close approximately 50% of the existing gap between the initially available FiT and the level required to make an investment financially viable. Allocating risks that the private sector cannot manage, in particular the risks described above, is efficient since the cost of the risk is lower for the public sector. This ‘smart risk allocation’ will also help to keep generation costs of RE affordable for customers while not reducing scalability.

Top–up payments supported by donors, initially for river hydro and biomass/bagasse projects, increase the revenues per kWh for investors and ensure the financial viability of the projects (after reduced financing costs resulting from the standardised contracts and guarantees). Project developers need to respond to a Request for Proposals in order to receive the premium payments from the GET FiT programme. The decision is based on minimum criteria with regard to technical and economic viability as well as international environmental and social standards. The level of top–up payments does not exceed the targeted price level of certified emission reductions (CERs) when the Clean Development Mechanism (CDM) was set up. Consequently, the top–up payments could also be seen as a replacement of an efficient and functioning carbon market and a required move from a failed implementation of an economic instrument towards investment support.

To date, 12 projects, representing 103 MW of newly installed capacity, have been approved in two rounds of Requests for Proposals. These projects were initiated and developed by private–sector players and have attracted private–sector equity financing. This is a huge success with regard to private–sector involvement in Uganda’s energy sector. GET FiT is also committed to increasing the private sector’s role in debt financing. Projects have to comply with international environmental and social standards (E&S) to receive GET FiT support. The GET FiT E&S experts have worked intensively with developers to increase awareness and improve E&S risk management in the projects. We are confident that in the mid–term the Ugandan regulator will increase E&S requirements for the REFIT to further improve its sustainable impact. With increased confidence in the REFIT scheme, the regulator decided to increase base FiTs in 2013, reducing the amount of top–up required. This strong signal increases the sustainability of GET FiT efforts after phasing out the top–up payments having reached the initially agreed volume. A more fundamental review of REFIT levels is due at the end of 2014 and might result in another increase of base FiTs and adjustments to top–up levels.

GET FiT is not a cure–all. Efforts to improve EE, upgrade transmission systems and expand the grids to remote areas need to be made to further improve sustainable access to electricity in Uganda. However, GET FiT has become a key building block of successful donor activity in Uganda and serves as a useful example of innovative and efficient approaches in international climate cooperation. Whether GET FiT will be a long–term success now very much depends on the transparency of government action. Investors will be able to say this was a success only when their investment has been amortised over the 20–year lifetime, which means that they now have to generate electricity and the Uganda Electricity Transmission Company Limited (UETCL) needs to pay them. GET FiT was an excellent kick–start for more IPP activity in Uganda and we encourage all parties to contribute to the successful operation of 170 MW of clean and reliable energy over its lifetime.

### 5.2 GLOBAL CLIMATE PARTNERSHIP FUND (GCPF)

The Global Climate Partnership Fund (GCPF) was set up by the German Federal Ministry for the Environment, Nature Conservation and Nuclear Safety and KfW Entwicklungsbank with the aim of
financing RE and EE projects in developing countries. The GCPF is a PPP open to institutional investors, professional investors and other well-informed investors within the meaning of the Luxembourg SIF law. Particularly targeted investors are donor agencies, governments, IFIs and professional private investors.

GCPF aims to provide commercial returns to its investors. The returns of its shares follow a waterfall principle and allow investments in three categories:

- C-Shares bear the highest risk (‘First Loss’) and can be recognised as Official Development Assistance (ODA). They serve as a risk buffer for the more senior share categories.
- B-Shares are above C-Shares and have the highest remuneration calculated on a 6m Libor + Spread basis. Depending on the Fund’s profitability, complimentary dividends are possible.
- A-Shares are above B-Shares and are also remunerated on a 6m Libor + Spread basis, but at a lower level than B-Shares to allow for risk/return adjustments. Depending on the Fund’s profitability, complimentary dividends are possible.

In addition, notes can be issued. These rank senior to shareholders, but junior to all other creditors of the Fund. The final beneficiaries of GCPF mainly comprise households, home-owner associations, leasing companies, small and medium enterprises (SMEs) (including Energy Service Companies (ESCOs) and small RE companies) as well as municipal entities that require financing in order to improve EE performance of their (or their clients’) buildings or processes, or to produce renewable energy.

The rationale for the Fund is to mobilise private finance in an ever-increasing demand for funds in RE/EE projects globally. Large-scale RE projects in developing countries are usually financed by a mix of public funds and ODA. There is not much private–sector participation because the private investors perceive RE projects, especially those using new technology, as highly risky and economically unattractive. Public funding alone may not be sufficient to meet financing needs for RE projects. The aim of the Fund is thus to create a risk–mitigation mechanism that matches the risk of RE projects with the risk appetite of private investors as a means to attract private finance. Risks for the private investors are mitigated, first because ‘risk buffers’ are created through and B- and C-Shares. A-Share holders have senior claiming rights over B- and C-Shares and are repaid first in the case of default. Second, private investors perceive the investment as less risky than the involvement of public funds (C-Shares). Government funds often signal that if something goes wrong, the public money will side with the private investors.

To reach its final beneficiaries, the GCPF can either (i) directly invest in financial institutions that finance the targeted projects through on-lending structures, such as local commercial banks that finance RE/EE projects or (ii) directly invest in the projects through project developers, ESCOs, small/medium–scale RE and EE service and supply companies. Regarding the structure of the projects, the GCPF can invest only in ‘bankable’ risk structures. Direct investments should reveal the local banking market and demonstrate that there are bankable projects that could be interesting for local banks. Ideally, the GCPF will co-finance direct investments with local banks. This is because local banks usually know the domestic market well and cooperating with them also helps to reduce crowd-out effect, e.g. if invested directly in projects, local banks will lose the project company as a customer since they cannot compete on price with the GCPF. In addition, after the cooperation, the local bank will have gained lending experience and may continue RE/EE lending even after the cooperation stops.

The advantages of the GCPF is that splitting into into tranches makes it possible to lower the risk and that different investor classes with different risk–return appetites can invest their funds in the tranche which best fits their needs. The disadvantages of the instrument are the difficulties during the set-up stage.

After three years of operation, the GCPF has proved to be a financing mechanism with high growth potential. It attracted its first private investor in 2012 with an investment of $30 mn. According to the 2013 GCPF Annual Report, the fund has achieved a 45% increase in total investments (including disbursed capital and committed capital) to $228 mn. The Federal Environment and Building Ministry has increased its investment to $55.5 mn. The UK’s Department of Energy and Climate Change, a newcomer to the Fund, invested $50 mn in 2013 (GCPF, 2013). The geographical coverage has expanded to 12 partner banking institutions in ten developing countries. The Fund mainly supports banks that finance
sustainable energy projects with a total financing demand for $5–30 mn. Partner banks that obtained GCPF funding in 2013 include Banco Pichincha in Ecuador, which provides $4 mn in loans to finance EE household appliances; Sekerbank in Turkey, which provides finance for insulation upgrade; and Banco Pine in Brazil, which offers a $5 mn loan to ceramic tile manufacturers to improve their technical efficiency.

There are similar structured funds aimed at low-carbon investments in the European Union (EU), such as the European Energy Efficiency Fund (EEEF), which was developed jointly by the European Investment Bank (EIB) and the European Commission. Like the GCPF, the EEEF follows a waterfall approach, using A–, B– and C–Shares.³⁵

5.3 RENEWABLE ENERGY PERFORMANCE PLATFORM (REPP)

The Renewable Energy Performance Platform (REPP), jointly developed by the EIB and UNEP, is an innovative approach to mainstreaming existing instruments. REPP aims to help governments and the private sector to overcome investment hurdles for small/medium scale first-mover projects operating under new supportive regulatory regimes across SSA. Although governments have made significant efforts in that direction, e.g. by enacting dedicated policies such as FiTs, considerable risks remain. In particular, first movers on the market are subject to high political, regulatory, off-taker and often currency risks. Structural challenges remain mainly in obtaining long-term and affordable finance. In addition, small- and medium-scale projects find it difficult to access existing risk-mitigation and other support instruments, primarily due to high transaction costs related to the various support programmes.

REPP aims to overcome such barriers by incorporating different elements through primarily existing support instruments in a one-stop-shop providing project developers with access to a cost-efficient combination of instruments and addressing the challenges for RE financing in three areas:

(i) Provision of existing risk-mitigation instruments to reduce risk-margin requirements: As existing risk-mitigation instruments are designed predominantly for large projects, making the transaction costs and collateral requirements unrealistic for most smaller projects, REPP bundles projects and standardise procedures to reduce transaction costs. Instruments offered by the World Bank, the US Overseas Private Investment Corporation (OPIC), and the African Trade Insurance Agency (ATI–ACA) tackle in particular political, regulatory and off-taker risks. In addition, the Currency Exchange Fund (TCX) will cooperate with regard to currency-hedging structures. Risk-mitigation instruments are closing a large portion of the gap to projects’ financial viability in significantly improving the cost and availability of debt and by reducing expected risk margins, extending loan tenors and increasing the debt component of total financing. This will result in a considerably better financial profile for the projects and will lower the public financial support required to ensure financial viability.

(ii) Provision of long-term lending: To address bottlenecks in the supply of long-term finance from the commercial banking sector, REPP assists in identifying appropriate lending facilities. The REPP Lending Platform, proposed to be supported by the GCPF, will provide mezzanine lending where the local banking market cannot provide long-term tenors and/or can supply only senior debt financing (see next section).

(iii) Provision of results-based financial support if economic viability cannot be achieved with risk-mitigation instruments and long-term loans. This support line includes results-based cash payments after the construction phase or PPA top-ups, above market acquisition of carbon-emission savings, and “forfeiting” of long-term FiTs, i.e. a frontloading of revenues per kWh, also to reduce payback periods and to create shorter tenor debt–financing opportunities for less experienced local lenders. This means that REPP will top up base FiTs in the initial years and the project will pay back the top-up amount in due course.

---

³⁵ For more information regarding the EEEF, also see http://www.eeef.eu/
5.4 M–KOPA SOLAR

M–Kopa is a private mobile technology company based in Kenya that offers green energy to local households. M–Kopa was incubated by Signal Point Partners, a mobile payment advisory group, with financial support from Shell Foundation, CGAP, FSD Trust and the D.O.B. Foundation. After two years’ piloting, it started the commercial sale of M–Kopa Solar products in October 2012. During the start–up phase, M–Kopa secured equity and debt financing through a Series A investment round from investors such as Gray Ghost Ventures (USA), D.O.B Foundation (NL) and Acumen Fund (USA). It was also awarded R&D and development funding by the African Enterprise Challenge Fund, which is funded by the Department for International Development (DFID) in the UK, the Department of Foreign Affairs and Trade (DFAT) in Australia and the Ministry of Foreign Affairs of the Netherlands (MFA). Traditionally, underserved households burn Kerosene at home, which proves to be costly, inefficient, unhealthy and dangerous. With M–Kopa, the local customers have a ‘pay–as–you–go’ option to install solar systems on their rooftops with a small upfront fee of Kenya Shillings (KES) 2500 (approximately $29). Customers then make daily repayments of KES 40 (around $0.45) for to use electricity until they own the solar panels outright. Solar electricity is a low–cost alternative to Kerosene for obtaining electricity. It is estimated that a Kerosene user spends about KES 50 daily for lighting and KES 20 three times a week to charge a phone at a local hardware store (Hughes, 2013). A substantial amount can be saved by using solar panels. Mobile technology is another important aspect that enables this change, alongside the innovative financing arrangement. M–Kopa customers pay for the solar systems via M–Pesa, a mobile money–transfer platform that is used by two out of three adults in Kenya. Mobile phones are not only a means for transferring money, but also enable M–Kopa to monitor customers’ repayment behaviour. M–Kopa has control over the SIM card embedded in the solar panels through M–Kopanet. M–Kopa remotely disables the solar system for customers in arrears. The system is reactivated if the customer resumes repayments. The company reports that the default rate was only 5% and most defaulted customers asked for more time and continued the payments.

At present M–Kopa have two products for lighting and charging uses. The future trend is to develop solar energy generators for small household appliances such as televisions. Similar products are offered by Mobisol, which serves larger systems ranging from 30 to 200 Wp with a three–year repayment period in Tanzania and Kenya and Off Grid Electric, which supplies solar energy as a service in Tanzania. Beyond home appliances, the financing arrangement can also be applied to irrigation pumps (Hughes, 2013).

M–Kopa offers some valuable lessons for similar businesses. To begin with, consumer demand is the basis for the business. A market characterised by high share of Kerosene, charcoal and wood used for lighting purposes usually has high demands for affordable small–scale energy generators. Second, advanced technology is necessary to deliver products in similar businesses. The mobile–based payment platform is a convenient repayment method and GSM technology has allowed M–Kopa’s control centre to remotely monitor the solar panels when customers default. From a general perspective, it is worth noting that M–Kopa uses the remote monitoring as a threat, rather similar to ‘collateral’, which means the loan is less risky. Third, the M–Kopa products are focused and simple. Customers can easily understand that they can save money by using solar panels instead of Kerosene. Finally, the underserved customer segment has small and volatile income so the product design should have a small upfront cost and flexible payment plan that suits their cash flow.

The scale–up of M–Kopa and similar initiatives remains a challenge. Since about 32 million people in Kenya have no access to electricity, it is expected that more efforts will be put into electrification. The

---

36 Shell Foundation is an independent charity, CGAP is a global partnership organisation, FSD Trust is an independent trust in Kenya and the D.O.B. Foundation is a Dutch growth capital investment foundation.
38 Estimated from World Bank Data (2011).
solution may lie in the reduction of costs in mobile technology and more efficient business operations, which can make it affordable for most people to own a mobile phone. In addition, financial literacy education among the customers and better agent training may improve adoption.
6 CONCLUSIONS

Financing of RE and EE varies considerably across sectors and countries. The same is true for the state of the financial market. There is no question that massive investments in the order of hundreds of billions of dollars per year will be required to reduce GHG emissions in order to limit global temperature increase to 2°C above pre–industrial levels. The type of investment in infrastructure that is required varies across developed and developing countries. Developed countries mostly require retrofit or replacement of solar PVs, whereas in developing countries, new build capacities to reduce peri–urban and rural areas that lack electricity.

Currently, most climate–friendly investments are in RE projects. Overall, new investment in RE has waned somewhat since 2011. In 2013, absolute investment in developed and developing countries decreased in part as a consequence of adverse conditions such as policy uncertainty and retroactive reductions in public support in key markets, as well as the European financial crisis. Falling technology prices, particularly the cost of solar PV panels, however, imply that while investment declined on in absolute terms, installed generation capacity suffered less or even increased (in the case of PV) over the same period. Differentiating by RE technologies it becomes obvious that developing countries outpaced their developed counterparts in new investments in both wind power and small hydro assets, while the opposite was the case for all other technologies.

Interestingly, almost 75% of total flows were invested in their country of origin in 2013. This domestic bias indicates that more familiar projects are preferred as they are perceived to be less risky to key investment decisions. Consequently, domestic policy frameworks are important for unlocking greater climate finance flows. Furthermore, new risk–mitigation instruments are needed to address investors’ risks in order to scale up private–sector involvement in flows to developing countries. Almost 75% of climate finance flows were invested through balance–sheet financing, project–level equity and project–level market–based debt in the expectation of earning commercial returns. The remaining public investment has been in the form of grants, low–cost debt and project–level market–based rate debt. In 2013, most climate finance supported mitigation activities, while adaptation activities were exclusively supported by the public sector.

The field of financing sustainable energy is undergoing dynamic development. There is already a variety of instruments to support investment in order to drive the transition towards a low–carbon economy. Governments worldwide have adopted a mix of regulatory policies, fiscal incentives and public financing to support and encourage increased investment in renewable generation capacity and EE projects. Governments have developed and introduced a variety of incentives, including capital subsidies, pre–paid metering allowances, grants to cover upfront costs, concessional loans and preferential tax treatment, among others. Many developing countries are placing the emphasis on attaining the dual goals of energy access and sustainability.

The creation of a stable and attractive environment in developing countries is essential for private–sector involvement. To optimise the engagement of the private sector and commercial investors these instruments need to strike the right balance between being simple and straightforward for private investors, while being adapted to the project, sector and country context.

One trend appears to be an increased role of the public sector in risk–taking in addition to its traditional role in providing low–cost capital. To gain more ownership, recipient countries have moved rapidly or are currently in the process of organising themselves to set up national climate finance institutions to integrate policies, with the goal of obtaining funding, managing available resources in a coordinated manner and monitoring and evaluating climate–related projects and programmes. A well–designed NCFI supports the government in obtaining funding from international donors, blending various sources and leveraging private–sector investment. Across the different instruments the details of actual implementation critically determine the efficient use of public funds as well as the attractiveness to commercial investors. This is a challenge faced by developing and developed countries, as is their obligation to use public funds in an efficient and consistent manner.
REFERENCES


