REEEP

POWERING PROSPERITY BEYOND THE GRID

Annual Report 2018

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01

ABOUT REEEP

The Renewable Energy and Energy Efficiency Partnership develops innovative, efficient financing mechanisms to advance market readiness for clean energy services in low- and middle-income countries.

REEEP designs and implements tailor-made financing mechanisms, utilising targeted injections of public funding to build dynamic, sustainable markets and ultimately make clean energy and energy efficiency technology accessible and affordable to all. REEEP invests primarily in disruptive approaches led by small- and medium-sized enterprise (SME) players in low- and middle-income countries, facilitating market- and community-led energy transitions.

REEEP is a pathfinder: we design our programmes to demonstrate how countries can effectively and efficiently advance market readiness for clean energy, energy efficiency and energy access, for the benefit of the most vulnerable populations. REEEP's work contributes to global efforts under the United Nations 2030 Agenda for Sustainable Development to advance energy access; combat climate change and improve resiliency; reduce damage to the environment; improve livelihoods and facilitate economic growth where it matters most. The 2015 Paris Agreement on Climate Change remains the second major guiding force in REEEP's work.

REEEP's strength lies in the combination of extensive on-the-ground experience with a high-level global network. REEEP has the ability to leverage partnerships with governments and international organisations to implement focused interventions directly where they have the largest potential impact: in communities.

Market transformation is complex and multidimensional. REEEP monitors, evaluates and learns from its programmes to understand better the systems we work in, identify opportunities and barriers to success and lower risk for market actors. We share the insights and knowledge we gain with government and private sector stakeholders, helping to improve policy and investment decisions. This knowledge also informs the continuous adaptation of our methodologies to build scale within and enable replication of our programmes across markets.

Since 2016, REEEP has been the executing partner, and together with the United Nations Industrial Development Organization (UNIDO) the host of the Private Financing Advisory Network (PFAN). A network of more than 100 clean energy investment experts, mostly based in low- and middle-income countries, PFAN identifies promising climate adaptation and clean energy projects, provides them with no-cost coaching and offers investment facilitation services. In the years to come, the combined expertise and networks of PFAN and REEEP will allow us to reach more SMEs, scale high-potential solutions faster and work more effectively towards a low-carbon energy transition that benefits all.

Left: Mr. Sokhom inspects his longan orchard in Battambang Province, Cambodia. Thanks to a loan from the Clean Energy Revolving Fund (see p.35), he was able to buy a solar-powered pump for irrigation. **Credit:** Jeremy Meek for REEEP.

FOREWORD

Hon. Sylvia Bambala Chalikosa, MP

Minister,
Office of the Vice President, Zambia

Under the 2015 Paris Agreement, Zambia has committed to ambitious targets that will increase our peoples' prosperity and resilience in the face of climate change, while helping to reduce greenhouse gas emissions.

This plan includes, among other measures, bringing off-grid renewable energy to non-electrified rural communities and replacing isolated diesel generators with clean technology solutions. Expanding energy access to those without has long been a Zambian Government priority; access to energy has long been recognised as a precondition for prosperity growth, and our 7th National Development Plan identifies a lack of access to energy as one of the main barriers to economic development in rural areas. Yet only recently have the technologies and business models necessary for providing clean energy at scale become readily available.

As off-grid clean energy technologies and the models for their roll-out become more efficient and affordable almost by the day, now is a great time for businesses to enter this sector. To help them succeed and bring reliable, clean and affordable electricity to the majority of Zambians, especially in rural areas, still without access to electricity, we need suitable incentives and financing for off-grid energy companies to expand within or into Zambia.

On 1 November 2017, I had the pleasure to launch the Power Africa: Beyond the Grid Fund for Zambia. This initiative is supported by the Swedish Government and managed by REEEP. The Fund delivers a big step in the right direction: by improving communications and coordination between the public and private sectors, and bringing significant new investment into the country's rural energy markets, the funds will help Zambia reach our electrification goals while contributing to economic growth in rural areas.

In order to improve knowledge sharing and collaboration between government agencies and other stakeholders involved in the off-grid energy sector, the Government recently launched the Off-Grid Energy Taskforce. This taskforce, with a secretariat embedded in the Ministry of Energy and administered by REEEP with support from the Swedish Government, gathers representatives from a range of government ministries, including the Office of the Vice President, the private sector and cooperating partners actively supporting the off-grid market. Together, we could not be better equipped to identify and address barriers and opportunities for the uptake of clean energy technologies in Zambia, and move ever closer to our goal of bringing clean energy-powered prosperity growth within reach for all Zambians.

I am looking forward to seeing this project develop further.

REPORT HIGHLIGHTS

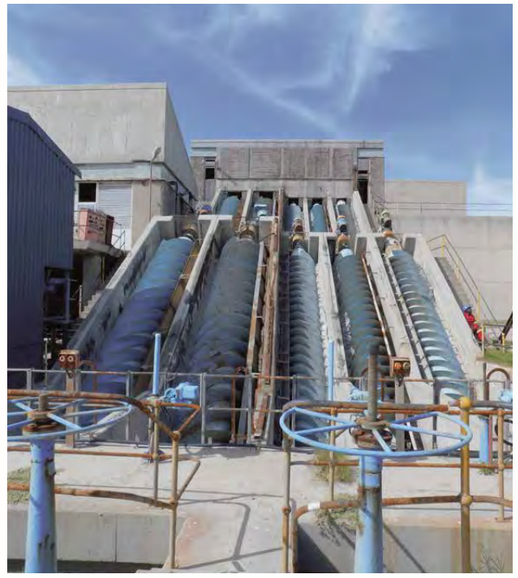
REEEP's vision is of a world where people everywhere, regardless of income, have access to affordable low carbon energy services provided by a range of players in sustainable markets.

This Annual Report highlights how and where we have worked towards achieving this vision in 2017-2018:

In Zambia, four clean energy service providers supported by REEEP through the Sweden-funded Beyond the Grid Fund for Zambia have provided clean, high-quality, affordable and reliable energy services to more than 25,000 households in rural and peri-urban areas, reaching over 130,000 beneficiaries in total. Under the programme, we expect at least another 1.5 million Zambians will have gained access to clean energy services by 2021. See p.21.

In South Africa, REEEP is providing capacity building and technical assistance, combined with intensive stakeholder engagement, with the aim of empowering two municipalities to improve energy efficiency and implement clean energy technology in their water infrastructure.
The ultimate goal of this programme, funded by the EU and implemented with UNIDO, is to develop a model pathway which will allow other municipalities all over the country to replicate the results. The potential to reduce costs and therefore pressure on municipal budgets, mitigate greenhouse gas emissions as well as improve service delivery is enormous. See p.27.

In 2017, the **Private Financing Advisory Network** (PFAN) leveraged close to USD 70 million of investment for 15 clean energy and energy efficiency projects, ranging from household biogas to utility-scale solar, in countries including Bangladesh, the Philippines, Vietnam and Nigeria. Find out how on p.42.



From top to bottom: Shops are lit up at night in Mugurameno Village, Zambia (Standard Microgrid); The decomissioned inlets at Fishwater Flats Wastewater Treatment Works, Nelson Mandela Bay, South Africa (Maria van Veldhuizen for REEEP); The Second Global Investment Forum organised by PFAN in Vienna, Austria, May 2018 (Katja Prokofief for UNIDO).

DONORS

REEEP's activities are generously funded by:

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Government of Ireland

Government of Japan

Government of Norway

Government of Sweden

Government of the United Kingdom

Deutsche Gesellschaft für Internationale Zusammenarbeit GmbH (GIZ)

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INTRODUCTION

Maher Chebbo
Chair, REEEP
Governing Board

In late April this year, I accepted the position as REEEP's Chair of the Governing Board, succeeding Henry Derwent.

I would like to thank Henry for his engagement and support over the last years. REEEP is at an exciting point in its development as an organisation; in the past year, it has started to grow its portfolio significantly, and gone through an extensive strategy process. Based on more than 15 years of experience, REEEP's new strategy is bold enough to explore new pathways and new creative business models. It will be my pleasure to support its implementation by leveraging clean energy best practices and digital innovations.

What does this mean? REEEP will work on increasing its outreach to enhance the value and impact of its work throughout its ecosystem. We will engage with REEEP's 359 Members, which include 46 governments and 12 government ministries as well as many NGOs, businesses and multilateral organisations. We will strengthen our strategic partnerships. We will increasingly focus on leveraging these networks to collaborate more effectively, to learn from others, to encourage application of our learnings and replication of our activities. The climate change and development challenges are simply too great for any organisation, as innovative as it may be, to work in a silo. 1.2 Billion people on our planet still live without electricity, and solving this problem is a priority for us all.

An exciting prospect for the years to come is to develop REEEP's direct engagement with industry. As clean energy technologies and energy efficiency measures become ever more affordable, their application in industrial settings becomes more profitable. Industry in developing countries holds enormous untapped potential for energy efficiency gains, yet materializing these gains still requires considerable effort, despite the fact that it could bring considerable cost savings, improvement of air quality and labour conditions, not to speak about CO_2 emission reductions.

A great deal of work is already underway in REEEP – as you will find in the pages of this Annual Report. I look forward to guiding REEEP's efforts in the coming years. With our unique model, we can expect outstanding outcomes!

"Based on more than 15 years of experience, gained through concrete projects, REEEP's new strategy is bold enough to explore new pathways to accelerate investment in clean energy."

Martin Hiller
Director General,
REEEP

Is there a sustainable way to finance energy access? How do we get the private sector and private financiers involved?

How do we make sure the money goes where the impact needs to be achieved, and how do we measure that impact? How can energy efficiency gains in industry drive investment in lower and middle-income countries? These are some of the most fiendish puzzles faced by the international climate and development community.

REEEP works on blended finance solutions to solve these puzzles. We demonstrate that a small, strategic injection of public money can trigger serious private investment. In Zambia, public money from Swedish development agency Sida is being invested through the Beyond the Grid Fund for Zambia as incentive into four off-grid energy service providers, to allow them to grow into rural areas, crowd in private investment and build a market for clean energy technology where before there was none. In South Africa, we use public funding from the European Commission to build capacity in municipal technical managers, empowering them to find investment and procure technology for energy efficiency interventions in municipal water infrastructure. PFAN, finally, employs public funding to find consultants who coach clean energy and climate adaptation projects to financial viability and expose them to investors.

The impact of REEEP funding is only the starting point; we pave the way for investors to make an impact on the ground. The four companies contracted in Zambia have sold affordable energy service subscriptions to 25,000 customers, translating to more than 130,000 beneficiaries in total; at the same time they attracted an aggregated 20m USD of investment on the back of Beyond the Grid. The USD 1.25 billion invested, largely by private financiers, in PFAN's projects so far has led to greenhouse gas emission reduction of 3.3 million tonnes per year, equivalent to taking 700,000 average cars off the road.

We are also working to crack the puzzle of measuring impact. REEEP's programmes are designed to gather data to develop market parameters, such as consumer willingness and ability to pay, and national laws and regulations governing the off-grid sector. These data do not end up in our drawers, or only in our Annual Reports (though you will find some of it here!); they are most valuable when shared with decision makers, whether they are government departments writing new legislation, or investors assessing the risks faced by businesses in a frontier market. Together we can turn data into insight, and insight into action.

"REEEP uses blended finance solutions to demonstrate that a small, strategic injection of public funding can trigger serious private investment."

02

SETTING THE SCENE

REEEP's approach to market transformation is informed by our 15 years of experience working at the intersection of climate change mitigation, adaptation, and poverty reduction.

There has never been a more important time to leverage this experience to move the needle on a low-carbon energy transition that brings prosperity for all.

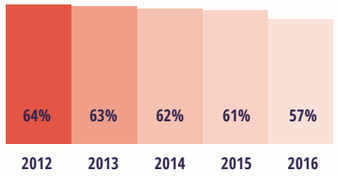
REEEP's mission and activities are framed by the 2015 Paris Agreement on Climate Change and the United Nations 2030 Agenda for Sustainable Development. Under the Paris Agreement and the Sustainable Development Goals, the world needs to reduce greenhouse gas (GHG) emissions quickly and steeply to avoid the worst impacts of climate change. At the same time, we need to "end poverty in all its forms everywhere", "achieve food security" and "ensure access to affordable, reliable, sustainable and modern energy for all" by 2030, or in just twelve years. These and the other SDGs are only compatible with climate change mitigation if that mitigation is designed to benefit the most vulnerable populations. At REEEP, we know that when it is done right, climate change mitigation can offer new economic opportunities and enhance the resilience of those vulnerable populations.

Energy access is widely recognised as one of the main conditions for prosperity growth. One billion people worldwide still lack access to electricity, and for household uses such as lighting and cooking have to resort to using kerosene lamps and firewood. Kerosene fumes and wood smoke can cause severe health problems, especially indoors, and collecting firewood can take hours every day. These traditional fuels also pose a fire risk and cause significant GHG emissions, as well as damage to the environment through local pollution and deforestation.

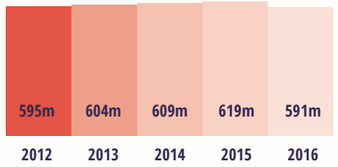
SUB-SAHARAN AFRICA

THOUGH THE PERCENTAGE OF PEOPLE IN SUB-SAHARAN AFRICA WITHOUT ENERGY ACCESS HAS DECREASED ALMOST EVERY YEAR SINCE 1990, THE ABSOLUTE NUMBER ONLY STARTED SHRINKING IN 2016.

PERCENTAGE WITHOUT ELECTRICITY ACCESS



NUMBER OF PEOPLE WITHOUT ENERGY ACCESS



Source: World Bank Data

"REEEP works in frontier markets, to demonstrate the social, environmental and economic benefits of clean energy and energy efficiency solutions and cooperate with partners to build strong, dynamic and sustainable clean energy markets."

Clean energy solutions have great potential to provide electricity to those without. Basic solar home systems can provide clean, safe lighting and phone charging, and upgraded versions can power radio's, televisions, refrigerators and even larger equipment for productive use. Mini-grids, powered by solar photovoltaics, hydro or biogas installations, can provide a level of service similar to the central grid, including for businesses.

The benefits of expanding energy access with decentralised clean energy solutions rather than by expanding the central grid are manifold. Firstly, clean energy mini-grids are much faster to deploy and much less expensive per connection than grid expansion projects - especially since in most countries the areas that remain off-grid are remote and sparsely populated. Furthermore, in many low- and middle-income countries, clean energy installations are many times more reliable than the central grid, and, as small, independent systems with limited transmission infrastructure, mini-grids also have proven to be more resilient to storms and other extreme weather events. Finally, solar and hydro installations provide free energy without requiring any inputs after the initial capital investment, and of course clean energy mini-grids do not generate any GHG emissions.

Despite the benefits of clean energy mini-grids, most governments still view central grid expansion as the default option for providing energy access to off-grid communities. Clean energy solutions are mostly provided by private sector companies. In so-called 'frontier markets', where viable business models for clean energy services do not yet exist, market intelligence is scarce and investors have yet to be convinced of the economic potential of clean energy, clean energy solutions may not be available at all.

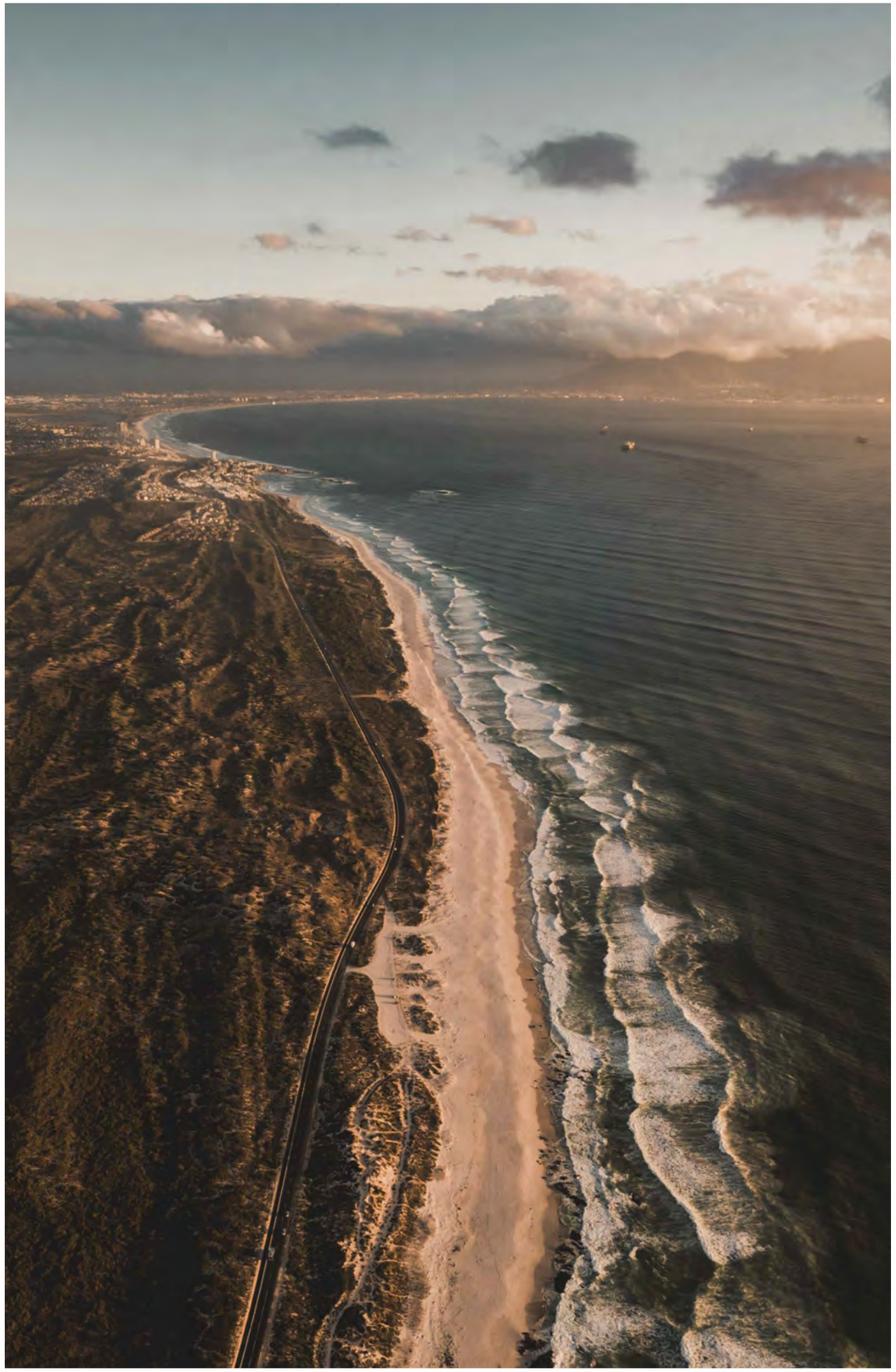
It is in these frontier markets that REEEP has chosen to focus its operations, to demonstrate the social, environmental and economic benefits of clean energy and energy efficiency solutions to customers, businesses, financiers and the government, and work with all of those stakeholders to build strong, dynamic and sustainable clean energy markets.

Left: Mr. Sokhom on his longan farm in Battambang Province, Cambodia. **Credit:** Jeremy Meek for REEEP.

Left: A Futurepump customer irrigates his cabbages in Kenya. **Credit:** Futurepump.

We also work in frontier markets for energy efficiency solutions. Though it is often neglected in favour of more 'glamorous' clean energy interventions, energy efficiency is increasingly recognised as the equivalent of a cheap resource, which is available in untapped abundance in many industrial installations.

This is the case, for example, in small and medium-sized enterprises operating in textiles, food, mining, and many other sectors, and in large-scale infrastructure, for instance in wastewater treatment facilities. However, even in cases where tested energy efficiency solutions exist and could generate large energy and cost savings, many businesses and other operators have difficulty determining the appropriate solution for their situation, and viable models for raising the required upfront investment are missing. By providing capacity building and facilitating engagement with private sector businesses in the energy efficiency space, financiers and regulatory authorities, REEEP helps these businesses and other operators tap into this underutilised resource.



03

HOW REEEP WORKS

MARKET READINESS - THE REEEP APPROACH

In order to advance market readiness for new, low carbon, energy efficient technologies and solutions, REEEP partners need tailored solutions: solutions that are geographically appropriate, technically sophisticated, and financially innovative.

Our overarching methodology for tackling market readiness at country-level includes a number of distinct stages. Each stage includes a defined set of activities that REEEP has experience in and can draw on to tailor a specific solution pathway.

This 'REEEP Approach to Advance Market Readiness' is a 5-year process, integrating the following elements:

01 ASSESS baseline market readiness

02 DESIGN and TEST appropriate measures to stimulate the sector

03 Install a LEARNING FRAMEWORK

04 IMPLEMENT the proposed measures

05 LEARN throughout the process, extracting intelligence from all practical experiences for the benefit of the market (not for the drawers in REEEP's office)

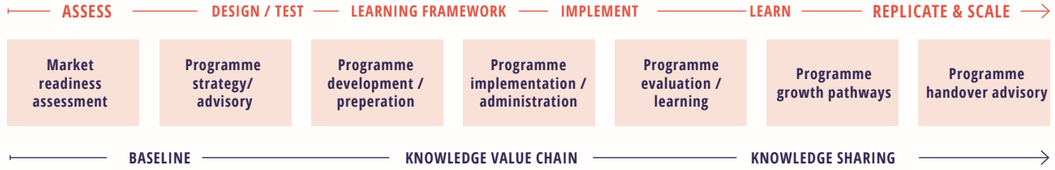
and finally, based on lessons learned,

06 SCALE and REPLICATE successful concepts and approaches.

Tackling the three components simultaneously - climate change mitigation, the expansion of energy access and poverty reduction - requires a whole-of-system approach.

On the demand side, our programmes demonstrate the benefits of clean energy technology for both household and productive use. At the same time, we work with SMEs on the supply side to develop viable business models and improve the accessibility, affordability and quality of a range of clean energy services, to give customers different options and security for their purchase.

Throughout our programmes, we work with local and national governments and consult with strategic in-country and international partners to help create an enabling policy environment, crowd in outside investors and ensure the sustainability of the market beyond the duration of REEEP's intervention.



WHAT IS MARKET READINESS?

REEEP demonstrates how countries can, effectively and efficiently, advance market readiness for clean energy and energy efficiency solutions.

Market readiness describes a situation where:

- Households and productive users have access to affordable Clean Energy Services;
- This access is provided largely by the market, by a range of Clean Energy Service providers which are profitable;
- Affordable finance is available for Clean Energy Service providers and end users;
- Relevant market information is available, and awareness, stakeholder networks and capacity are in place;
- Policies help create a vibrant business ecosystem and provide the right incentives for innovation, competition and market growth while safeguarding consumer rights.

MONITORING, EVALUATION AND LEARNING

Learning and sharing information are central to REEEP's mission - as a pathfinder organisation, we need to leave a trail that others can follow.

First implemented in our *Powering Agrifood Value Chains* programme (see p.32), REEEP's enhanced Monitoring, Evaluation and Learning (MEL) Framework utilises a number of proven approaches, including Theory of Change, Logical Framework Approach, Outcome Mapping (for stakeholder analysis) and Most Significant Change to build a tailored approach for each programme. Through this MEL framework, REEEP gains a deep understanding of and familiarity with a range of business models being applied in our focus sectors, while at the same time maintaining a high-level picture of the overall market.

In the case of Powering Agrifood Value Chains, the MEL framework provided REEEP with a unique impact narrative of how its grant funding grew businesses, and - more importantly - gave a current picture of the barriers and opportunities in the markets and countries the businesses operate in. Lessons from the use of these mixed methods have been integrated into the development of the MEL frameworks for all subsequent REEEP programmes.

60

THE NUMBER OF COUNTRIES WHERE REEEP HAS WORKED

PRIORITY COUNTRIES AND REGIONS

REEEP's priority regions are Eastern and Southern Africa and South and Southeast Asia.

Within these regions, we work where we encounter specific interest, committed partners, and tangible opportunities. We focus on low- and middle-income countries as defined by the World Bank, with a per capita GDP of up to USD 4.000. Exceptions can be made when a country has, for instance, the function of a trailblazer in the region.

Current priority countries include South Africa, Zambia, Cambodia, Nepal, Tanzania, Kenya and India. REEEP has thus far implemented projects in 60 countries.

"As a pathfinder organisation, REEEP needs to share learnings so that others can follow."

PRIORITY SECTORS

REEEP specifically targets three distinct sectors in which we have been actively involved since 2013, and in which we have gained substantial technical experience and expertise:

CLEAN ENERGY IN AGRICULTURE:

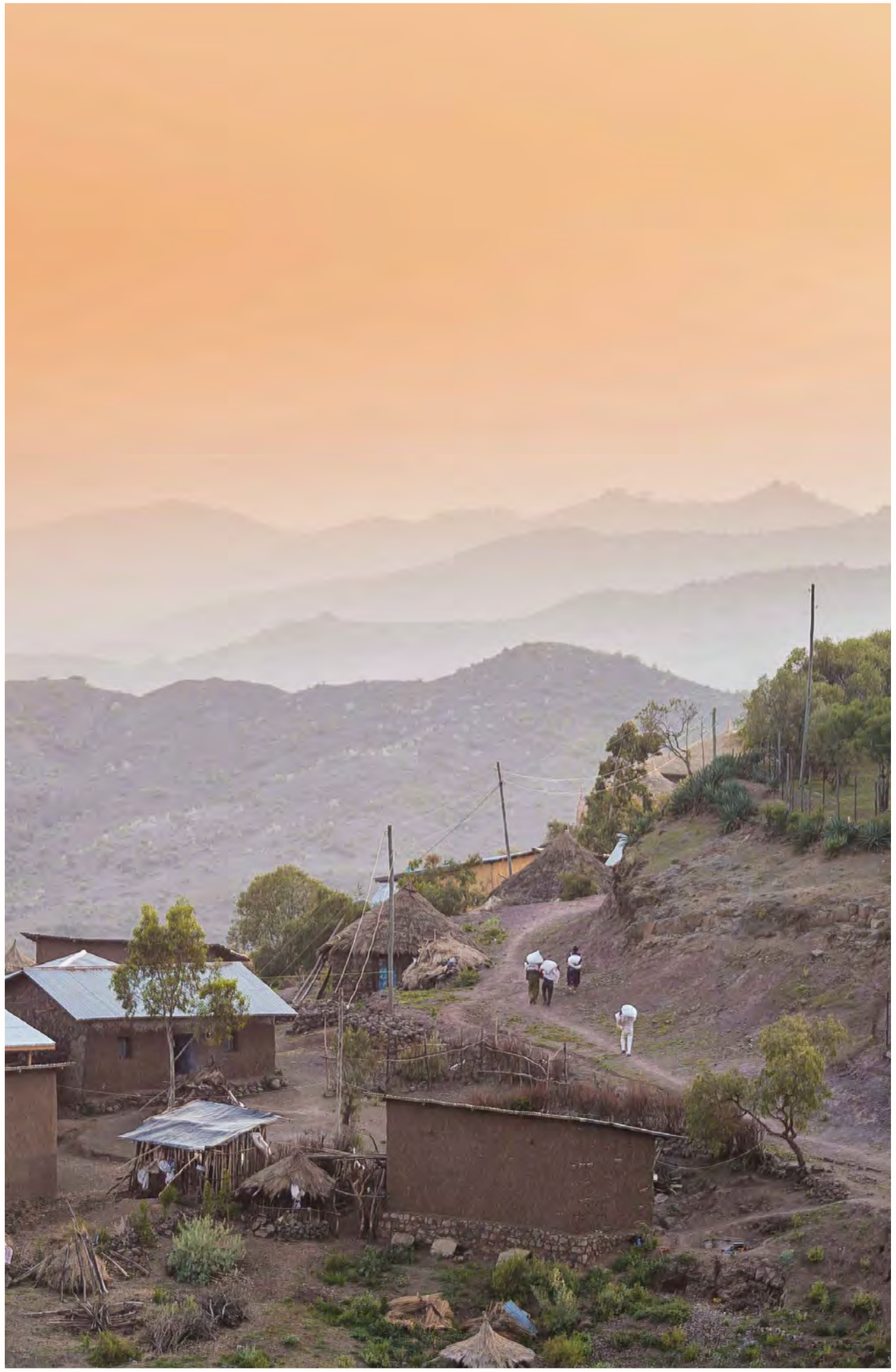
The development and deployment of renewable energy and energy efficiency solutions that increase agricultural productivity at particular stages in an agricultural value chain in low- and middle-income countries. The value chain approach allows us to deploy specific SME-level interventions while taking into account interconnections within and impacts on the value chain as a whole.

CLEAN ENERGY IN OFF-GRID AND DISTRIBUTED SMALL-SCALE POWER:

Development and deployment of renewable energy generation and distribution in low- and middle-income countries to provide high quality, modern access to power to underserved/energy-poor communities in rural and peri-urban areas.

CLEAN ENERGY IN MUNICIPAL WATERWORKS:

Development and deployment of renewable energy and energy efficiency solutions that improve the reliability, resilience and performance of municipal water supply and sanitation services in urban areas in low- and middle-income countries.



04

REEEP IN 2018: PROGRAMMES AND INTERVENTIONS

This section shows how we are putting REEEP's strategy to work, in Zambia, South Africa, Cambodia and beyond.

BEYOND THE GRID FUND FOR ZAMBIA

The Power Africa: Beyond the Grid Fund for Zambia (BGFZ) is an ambitious multi-year programme, created and funded by the Swedish Government and implemented by REEEP, aiming to increase energy access, improve livelihoods and catalyse economic activity in rural and peri-urban areas. The BGFZ will bring modern energy services to at least one million Zambians - or 9% of those currently without access - by 2021.

Far from a traditional challenge fund or private sector concessional financing scheme, the BGFZ approach targets primarily the framework conditions of the off-grid energy market, lowering barriers to entry and scale for the private sector; catalysing investment and economic activity; and maximising impact for money of public sector financing. In doing so, it provides a vital structural foundation for market-led growth of modern, clean energy services to underserved rural and peri-urban areas.

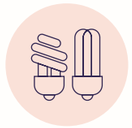
THE ENERGY ACCESS GAP IN ZAMBIA

Ninety-five percent of rural Zambians (and over 70% of all Zambians) have no access to modern energy. With a highly dispersed population (around 20 people per km^2), expansion of the national utility grid to rural areas is in the near term neither economically nor technically feasible.

At the same time, with over 60% of the population living under the poverty line and the value of Zambia's currency having declined precipitously over the past year, the market for rural energy has struggled to take off, lacking in investment and in capacity of energy service providers able to deliver energy to rural areas. BGFZ has acted as a trailblazing investor into the off-grid sector in the country, and has already resulted in a cascade of new investment into the country's off-grid energy space.

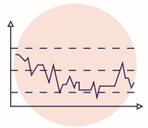
95%

OF RURAL ZAMBIANS HAVE NO ACCESS TO MODERN ENERGY



PROCUREMENT OF PUBLIC GOOD

New affordable, sustainable, modern renewable energy conditions



MARKET INFORMATION & ANALYTICS

EDISON Data Tool provides real time evidence based market data

PLATFORM FOR MARKET CHANGE

Stakeholder forum for addressing market imperfections

SOCIAL IMPACT PROCUREMENT

The core of BGFZ is a tailored, results-based incentive scheme for private sector early movers in risky frontier markets. The approach is phased, beginning with a direct incentive scheme to temporarily bridge the demand gap. This is the results-based *public social impact* procurement that forms the backbone of BGF. Based on an analysis of current market conditions, a tender process is developed to "procure" the deployment of a public good: a service or commodity that provides high value to society but which, under existing circumstances, is not sufficiently profitable to be supported purely by commercial activity.

The major difference between the BGFZ and a traditional procurement lies in what we are procuring, and in how we evaluate, investigate, monitor and verify our projects. Rather than a distinct physical asset or service, the BGFZ is procuring a public good with enormous social impact: the provision of energy services for Zambian consumers. The Fund is not buying the energy services on behalf of customers; rather the fund closes the "viability gap", on a per-connection basis, incentivising rollout and scaling up in areas that would - in the absence of BGFZ - not represent viable markets for companies.

To ensure that these energy services meet the needs of the Zambian market and Zambian consumers, we have developed a series of criteria defining Energy Service Subscriptions - or ESS - of various types.

Because delivery of energy services at scale will take time, REEEP puts special emphasis on evaluating and testing the capabilities, track records, and business plans of bidders, so as to minimise the risk of failures throughout the programme period. We monitor each participating firm closely throughout the programme lifecycle, and track the deployment of every single ESS electronically to ensure compliance with the procurement.

Left: A micro-grid installed in Mugurameno Vilage, Zambia.
Credit: Standard Microgrid.

BEYOND THE GRID ENERGY SERVICE SUBSCRIPTION (ESS) MULTI-TIER MATRIX

	TIER 1	TIER 2	TIER 3	TIER 4	TIER 5	TIER 6
Household	H1	H2	H3			
Institutional	I1	I2	I3			
Productive	P1	P2	P3	P4	P5	P6

HOUSEHOLD	WATTS PER ESS	AVAILABILITY (hrs/day or Wh/day)	LIGHTING	APPLIANCES	VALUE WEIGHT
H1	Min. 5 watts	Min. 20 Wh/ day +5/24h	2 lights	1 phone charge point	0.5
H2	Min. 20 watts	Min. 80 Wh/ day +5/24h	3 lights	2 appliances	1
H3	Min. 50 watts	Min. 190 Wh/ day +6/24h	5 lights (or mix of lights and phone charge points)	3 appliances	2

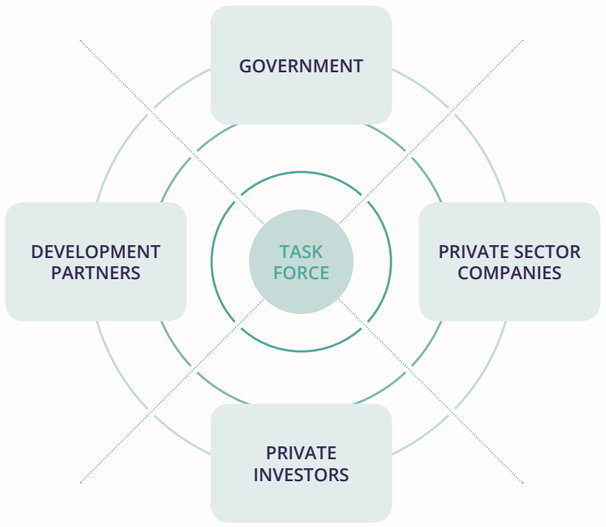
INSTITUTIONAL	WATTS PER ESS	AVAILABILITY (hrs/day or Wh/day)	LIGHTING	APPLIANCES	VALUE WEIGHT
I1	Min. 150 watts	Min. 550 Wh/ day +8/24h	eg. small school lighting + fan + television	eg. small school lighting + fan + television	3
I2	Min. 800 watts	Min 3 kWh/ day +16/24h	Reporting on lighting and appliances used	Reporting on lighting and appliances used	4
I3	>2 kW	Min. 8 kWh/ day +23/24h	Reporting on lighting and appliances used	Reporting on lighting and appliances used	5

PRODUCTIVE	WATTS PER ESS	AVAILABILITY (hrs/day or Wh/day)	LIGHTING	APPLIANCES	VALUE WEIGHT
P1	Min. 5 watts	Min 20 Wh/ day +5/24h	2 lights	1 phone charge point	0.5
P2	Min. 20 watts	Min. 80 Wh/ day +5/24h	3 lights	2 appliances	1
P3	Min. 50 watts	Min. 190 Wh/ day +6/24h	5 lights	3 appliances	2
P4	Min. 150 watts	Min. 550 Wh/ day +8/24h	8 lights	3 appliances	3
P5	Min. 800 watts	Min. 3 kWh/ day +16/24h	Reporting on appliances/machines that define the productive use	Reporting on appliances/machines that define the productive use	4
P6	>2 kW	Min. 8 kWh/ day +23/24h	Reporting on appliances/machines that define the productive use	Reporting on appliances/machines that define the productive use	5

Based on the SE4ll Multi-Tier Framework for Measuring Energy Access - see World Bank (2015)

Above: Solar panel instalation in Uganda.
Credit: Fenix Intl.

OFF-GRID ENERGY TASKFORCE (ZAMBIAN PLATFORM FOR MARKET CHANGE) STAKEHOLDERS



THE PLATFORM FOR MARKET CHANGE

Whereas the incentive scheme is inherently temporary, closing at the end of the project period, BGFZ works in parallel to improve market ecosystem conditions utilising a combination of capacity building and technical assistance, stakeholder outreach and market intelligence development, in a "Platform for Change" approach. This Platform can be leveraged to resolve, for example, issues related to unclear taxation regulations or enforcement, recycling systems for e-waste or new forms of licencing for renewable mini-grids that have to be developed to support a new type of market. When considering these issues, a whole-of-system approach should be taken, including technical assistance to support necessary reforms and capacity building. The Platform for Change is a work package dedicated to addressing key issues by:

- Providing key stakeholders in government, donor agencies, and the private and non-profit sectors with crucial data and intelligence on market conditions, policy frameworks, barriers and opportunities;
- Influencing and mobilising action to reduce barriers and improve coordination among actors;
- Building capacity and informing parallel capacity building efforts in key local government and regulatory agencies to address identified policy gaps;
- Building awareness and publicizing value and impact of off-grid energy services.

WHAT IS AN ENERGY SERVICE SUBSCRIPTION?

Impact is, logically, at the centre of the BGFZ's "social impact procurement". But in practical terms, what is it exactly we are procuring?

The answer is that we are procuring the delivery, to a paying end-user over a minimum period of time, of a modern, affordable, high-quality *Energy Service Subscription*, or ESS for short. Because there are so many energy-related products on the market, both in Zambia and worldwide, BGFZ developed a set of minimum criteria for each ESS, which allows us to exclude products of insufficient quality from the Fund. The ESS concept and the criteria are based on the SE4All Multi-Tier Framework for Measuring Energy Access, which has been adapted to match the needs of BGFZ.

The most important criteria of the BGFZ are quality, warranty and minimum service. Other criteria include power output and availability, as well as the numbers and types of lighting and appliances that can be powered by the service.

In Zambia, this Platform for Change has been formalised by the Government in the shape of an Off-Grid Energy Taskforce, which includes stakeholders from government, development partners, the private sector and the finance sector. This Taskforce meets regularly to coordinate activities and collaborate in uncovering solutions to barriers faced by the growing off-grid sector.

USD 11.5m
THE AMOUNT BGFZ COMMITTED TO 4 ESPS

USD 37
THE COST OF DEPLOYMENT FOR ONE OFF-GRID CONNECTION UNDER BGFZ

TARGETS AND ACHIEVEMENTS SO FAR

PROJECTED MARKET IMPACT

Under its first round, BGFZ has contracted 4 firms to provide modern energy services to 1.6m Zambians (300,000 households) in rural and peri-urban areas over the next four years. These 1.6m people would account for 14% of all Zambians without access.

FINANCE LEVERAGE

In the first funding round, BGFZ committed around USD 11.5m to 4 ESPs. These companies have already leveraged an additional USD 20m of co-financing and a further USD 23m are under negotiation – which means that public finance has leveraged 3 - 4 times of additional – mostly private – finance. Nine new third-party financiers now provide finance to the 4 companies and the off-grid energy market in Zambia.

FIRST SUCCESSES IN THE MARKET

Demand for high quality, modern energy solutions is evident and take-up has been rapid. Implementation under the first BGFZ round began in July 2017; thus far, the 4 contracted companies have surpassed their goals and have sold approximately 25,000 ESS in the first 10 months of implementation. The four companies also hired 130 local staff for their Zambian operations and recruited over 400 commission-based sales agents, including 30% women.

COSTS PER ELECTRICITY CONNECTION

On average, the deployment of one off-grid connection under BGFZ requires USD 37 in public funding (public funding ranges from USD 28 for Solar Home System connections to USD 157 for mini-grid connections).

PLATFORM FOR MARKET CHANGE

In Zambia, REEEP and the Swedish Embassy in Lusaka, in close coordination with other donors in the sector, spearheaded the Task Force for Off Grid Energy, a dedicated task force codified and anchored by the Government of Zambia. The task force convenes development partners, businesses, financiers, as well as relevant Zambian Government departments, and aims to improve markets for off-grid energy provision in the country. The task force forms the implementing and coordinating body for the Platform for Change approach in the Zambian context.

MARKET INFORMATION AND ANALYTICS

In addition, BGFZ combines detailed market analysis with data and information on deployments gathered via a rigorous monitoring and evaluation framework, yielding valuable insights and metrics on this frontier market. This information is utilised to help key market stakeholders improve investment and other development-related decision making and delivered to the market via the Platform for Change (see previous section). REEEP's Monitoring and Evaluation framework is supported by a dedicated automated system (the Energy Data and Information System for Off-grid Networks, or EDISON), which extracts relevant data about energy service deployment from contracted Energy Service Providers (ESPs). This system is of tremendous value for monitoring and verification of ESS deployment, demonstrating impact to the public, and modelling and analysing business models and market trends to define next steps for further programme roll out.

The Beyond the Grid approach can be viewed as a cornerstone initiative for market development, greatly complementing - and complemented by - other initiatives in the off-grid energy space.

BEYOND THE GRID: A FUND FOR AFRICA

The development and application of the Beyond the Grid Fund approach in Zambia has demonstrated that there is potential to expand this approach to a targeted group of high-need, high-potential countries in Sub-Saharan Africa. To respond to this potential, REEEP is currently designing, together with key partners, a Beyond the Grid Fund for Africa.

The Beyond the Grid Fund for Africa is an ambitious multi-year, pan-African programme with three overarching objectives:

- To rapidly accelerate the deployment of modern energy services to millions of unserved and underserved people in rural and peri-urban Africa now;
- To transform the way local and global public and private sector players work together toward achieving the delivery of this public good in the near future;
- To stimulate a sea change in how frontier market data and information are utilised for the benefit of societies and citizens in Africa over the next decade and beyond.

Keep checking reeep.org for news and information regarding this ambitious expansion of the BGF approach to confronting the energy access challenge in Africa.

CLIMATE CHANGE, CLEAN ENERGY AND URBAN WATER IN AFRICA

PROMOTING MARKET-BASED DEPLOYMENT OF CLEAN ENERGY TECHNOLOGY SOLUTIONS IN MUNICIPAL WATERWORKS: PILOT INITIATIVE IN SOUTH AFRICA

Water and wastewater systems form the core infrastructure that underpins delivery of water and sanitation services in cities. With pumps and other equipment running 24 hours a day, they are also among the largest consumers of electricity in municipalities - and therefore generate substantial costs and GHG emissions. As cities, particularly in the developing world, continue to grow rapidly, demand for water and wastewater services will continue to rise, increasing the pressure on underlying infrastructure. Decisive action is required to manage both the environmental and financial impacts of providing water and sanitation as essential services to growing urban populations.

"Clean energy and energy efficiency interventions can dramatically improve efficiency and reduce GHG emissions in urban water and wastewater infrastructure."

Left: The Fishwater Flats Wastewater Treatment Works process 70% of the wastewater of Nelson Mandela Bay Municipality's 1.15 million inhabitants.
Credit: Maria van Veldhuizen for REEEP.

"As a small Municipality with a 38% revenue collection rate due to the high unemployment we are very optimistic about the potential of these energy efficiency interventions to save on our electricity bills. This project will improve service delivery to our communities for decades to come."

Desmond Dolopi, Technical Manager
!Kheis Local Municipality

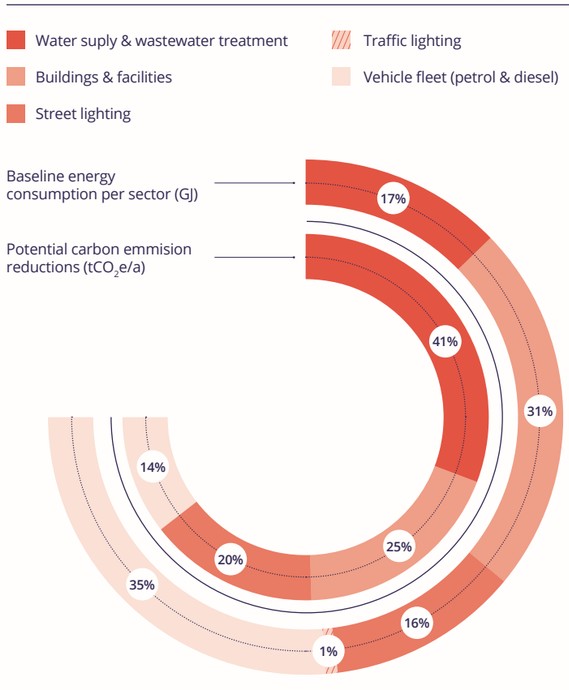
Clean energy technologies and energy efficiency interventions can dramatically improve efficiency and reduce GHG emissions in urban water and wastewater infrastructure, and do so cost-effectively, with investment payback periods of often only a few years. However, municipalities often lack both the capacity and financial means to plan, fund and implement such interventions.

This 2.5-year pilot project seeks to catalyse commercial activity to reduce GHG emissions in municipal water and wastewater infrastructure. It does this by creating pathways to empower municipalities to build capacity, identify appropriate interventions, access finance and ultimately deploy clean energy technologies and systems in their water and waste water infrastructure.

The project is financed by the European Commission, with UNIDO as Implementation Partner and REEEP as Execution Partner. It works directly with two host municipalities in South Africa, and aims to create a solid base for replication across South Africa and Sub-Saharan Africa.

During the project's inception phase, which ran until July 2017, the two pilot municipalities were selected and engaged. REEEP and its local partners developed technical assistance plans in consultation with both municipalities, which led to the identification of project sites for proposed clean energy interventions. Then, energy audits were carried out within the municipalities to develop a solid baseline for future interventions. The National Cleaner Production Center (NCPC) collaborated closely with REEEP to facilitate the energy audits and provide accredited energy training to the municipalities' technical teams - a country first for South Africa.

SOUTH AFRICAN MUNICIPALITIES: BASELINE ENERGY CONSUMPTION PER SECTOR (GJ) VS POTENTIAL CARBON EMMISION REDUCTIONS (tCO_2e/a)



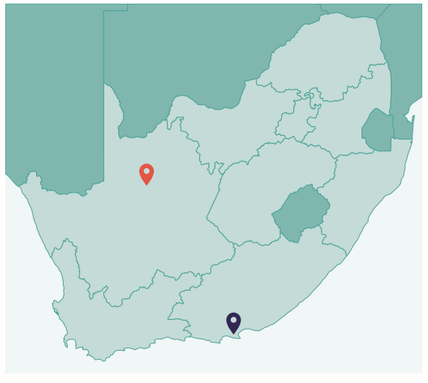
Source: South African Cities Network (2014)

Above: Aeration ponds near Groblershoop in !Kheis Local Municipality. **Credit:** Thomas Duggan for REEEP.

PARTICIPATING MUNICIPALITIES

!Kheis Local Municipality

Nelson Mandela Bay Metropolitan Municipality



The two host municipalities participating in this pilot project are !Kheis Local Municipality and Nelson Mandela Bay Metropolitan Municipality.

Our work with these municipalities has revealed that despite vast differences between them in terms of population size, geography and climatic conditions, in important respects they face similar challenges in their attempts to upgrade their water and wastewater infrastructure. This suggests that a pathway that is useful to our technical collaborators within both municipalities may also be useful to the large number of other South African municipalities that have expressed interest in the project.

(CENSUS DATA 2011)	!KHEIS LOCAL MUNICIPALITY	NELSON MANDELA BAY METROPOLITAN MUNICIPALITY
Population	16,637	1,152,115
Population Density, people per km^2	1	588
% Agricultural Households	29%	4%
% of households with running water	17%	74%

In the project's implementation phase, which commenced in August 2017, REEEP is assisting each municipality to procure and implement a technological intervention to enhance energy efficiency in selected project sites.

In parallel with the technical work, REEEP has been running an intensive stakeholder engagement programme, including as of June 2018 four stakeholder roundtable events. These roundtables bring together, often for the first time, representatives of different departments in municipalities, the finance sector, private sector technology providers, key industry bodies and national government officials.

Below: A raw water abstraction pump, drawing water from the Orange River for drinking water provision in !Kheis Local Municipality. **Credit:** Thomas Duggan for REEEP.

Discussion topics have included barriers to greater engagement between municipalities and the private sector, the procurement pathways municipalities must navigate to implement energy efficiency measures in their water infrastructure, and sourcing appropriate finance for clean energy interventions. Lessons learned at these roundtables are integrated into a model pathway, that is: a series of actions to help guide the municipal sector to implement clean energy solutions in its water and wastewater infrastructure. The stakeholder engagements serve to test assumptions and ensure that project interventions will be of use to municipalities across the country. Learnings will also be leveraged in policy recommendations to the South African government, which will highlight project learnings to inform policy reform efforts to make it easier for municipalities to procure and fund clean energy improvements to their water and wastewater infrastructure.

During the remainder of project implementation, we will continue to work closely with both pilot municipalities to implement fit-for-purpose energy efficiency interventions therein and continue our capacity building efforts. We will also publish lessons learned, refine our policy recommendations through ongoing project learnings and host tailored events to help other municipalities across South Africa replicate successful project outcomes.

Above Right: !Kheis Local Municipality Technical Manager Desmond Dolopi speaks at the 4th Stakeholder Roundtable Event in Johannesburg in April 2018 **Credit:** Maria van Veldhuizen for REEEP.

STAKEHOLDER ROUNDTABLES

The first roundtable was attended by key finance stakeholders active in the clean energy sector. They discussed how to tackle the lack of 'bankable' projects presented by municipalities, and how to engage with municipalities more effectively. The second roundtable focused on procurement, and found that the lack of bankable projects is at least partly the consequence of a lack of capacity in municipalities for the writing of investment-ready requests for proposals. Another barrier is the lack of baseline technical data available in many municipalities, including data on current energy and water usage. In roundtables three and four, more barriers were identified, followed by a brainstorm to find solutions. The proposed key actions to ensure a successful project include finding a high-level project champion early on, setting up a crosscutting team in the municipality (including at the very least both the water and the energy departments) and organising capacity building.

POWERING AGRIFOOD VALUE CHAINS: REEEP'S 10TH CALL

Federal Ministry Sustainability and Tourism

OFID Uniting against Poverty

REEEP

Powering Agrifood Value Chains was REEEP's 2015-2017 investment portfolio, funded by the Government of Austria and the OPEC Fund for International Development, comprised of eight high-potential SMEs active in the water-food-energy nexus in Asia, Eastern Africa and Central America.

The goals of this programme were to provide these early-stage businesses with grant funding and coaching to de-risk their businesses and help them become more attractive to private investors. The overarching goal of Powering Agrifood Value Chains has been self-sustained growth of the businesses in the portfolio as well as the markets for renewable energy solutions in the countries where they are active.

Throughout the programme, REEEP monitored the businesses closely, supporting them to continuously adapt to unforeseen barriers and opportunities in these nascent markets and concentrate efforts where they proved most effective. The organisational learning derived through this intense MEL process was applied not only to the benefit of the Powering Agrifood Value Chains programme itself, but REEEP also transferred lessons from the programme to other projects, such as the Beyond the Grid Fund for Zambia (see p.21), PFAN (p.42), the Climate Change, Clean Energy and Urban Water in Africa programme (p.27) and the Greening India's Dairy Value Chain project (p.37).

Below: Workers at a pepper farm in Preah Vihear province, Cambodia. A loan provided by the Clean Energy Revolving Fund (CERF) paid for a solar-powered pumping system. **Credit:** Jeremy Meek for REEEP

Left: Chy Lyhong manages his father's pig farm in Pursat Province, Cambodia. The solar panels, used for water pumping, were purchased with a loan from CERF. **Credit:** Jeremy Meek for REEEP.

Below: A worker harvests mangos at a farm in Battambang Province, Cambodia. The farm is equipped with a solar irrigation system bought with a CERF loan. **Credit:** Jeremy Meek for REEEP.

LESSONS LEARNED

REEEP's work on the Powering Agrifood Value Chains portfolio overall was assessed by independent external evaluators and considered a success. Outcome data is presented below; see the next page for the achievements of the individual projects. Lessons learned include:

— Off-grid projects offer businesses greater control and flexibility than grid-connected projects, which are subject to more constraints, especially in countries that lack detailed clean energy policies.

— A local presence and good relationships with a range of local and national stakeholders are crucial for any business in this sector.

— Any business that wants to provide technology for the agrifood sector in low- and middle-income countries needs to offer a complete solution, including financing and innovative digital services such as mobile payments, as most smallholder farmers lack access to financial services.

— The business model should be kept as simple as possible, among other measures by reducing the number of intermediaries. To achieve long-term sustainability on commercial terms, businesses should identify and seek to increase the economic benefits their clean energy technology can provide to the end customer.

OVER **4,000** NEW CUSTOMERS REACHED IN **7** COUNTRIES

THE POWERING AGRIFOOD VALUE CHAINS PROGRAMME IS CONSIDERED A SUCCESS

CO_2E EMISSIONS AVOIDED:

3,859 tons TO DATE

An additional 15,803 tons PROJECTION UP TO 2020

CLEAN ELECTRICITY PRODUCED:

4.6 GWh TO DATE

An additional 18.5 GWh PROJECTION UP TO 2020

CO-FUNDING LEVERAGED:

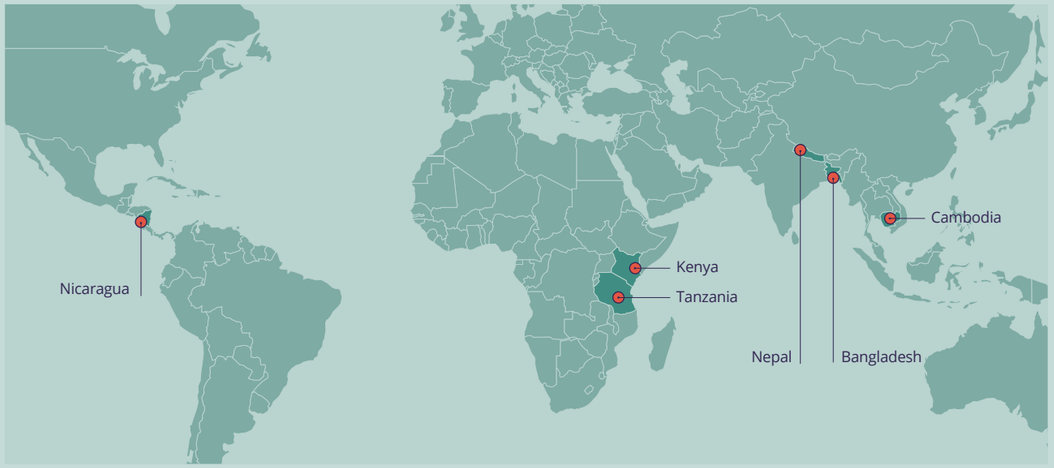
EUR 9.6 million

NEARLY 5.6 TIMES REEEP'S FUNDING OF

EUR 1.7 million

2,000 New jobs created
PROJECTION UP TO 2020

THE PORTFOLIO



KENYA:

Futurepump completed the development of its distribution model and sold more than 3,500 solar-powered irrigation pumps worldwide. The business reached full commercial viability in 2017.

Sunculture developed a highly successful customer-oriented, full-value chain approach, providing the buyers of its solar-powered irrigation pumps with financing, training, maintenance and links to distributors to bring their produce to market.

TANZANIA:

Redavia explored the potential for deploying its containerised solar PV solutions in the SME agrifood processing market, but eventually decided to return to its original focus on larger clients in the mining sector.

BANGLADESH:

Enerplus entered into a partnership with PRAN, one of the country's largest food processing companies, to pilot solar PV and other clean energy solutions in four of its Dairy Hubs and village-level Milk Collection Centres. The two partners have committed to rolling out the pilot to the full network of over 100 facilities.

NEPAL:

NMB Bank, together with SNV, provided credit and capacity building to install 13 pico-hydro improved water mills to power agri-food businesses, shops and households for 571 families in remote communities.

CAMBODIA:

NEXUS for Development launched the Clean Energy Revolving Fund, which provides affordable loans to farmers for the purchase of clean energy technology. With a portfolio of 15 projects, including solar energy and irrigation for fruit, pepper and pig farms, the fund is fully operational and revolving.

NICARAGUA:

iDEal Technologías offers gravity-driven irrigation systems and capacity building for sustainable farming methods to smallholder farmers, and during the REEEP project expanded its business to new regions and entered into strategic collaborations with farmer cooperatives. The company also branched out into solar-powered pumps.

Tecnosol developed a line of clean energy products to promote innovation in the cattle sector, including solar-powered electric fencing and water pumps. The company successfully rolled out a sales network and sold more than 350 systems.

MR. SOKHOM'S LONGAN FARM

Mr. Sokhom worked as a bank manager in Phnom Penh until, about ten years ago, he decided to change careers and start cultivating longan fruit in Cambodia's north-western Battambang Province. Longan fruit is related to the lychee and very popular in Cambodia and in East and Southeast Asia in general; in dried form, it is a much-loved ingredient in Chinese cuisine. Mr. Sokhom's 3,000 longan trees can produce fruit three times a year, but need irrigation. Though the farm is connected to the grid, power cuts are frequent. Mr. Sokhom used to irrigate using three diesel-powered pumps which required him to invest USD 140 to 300 in diesel every month, depending on the season.

A loan of USD 10,000 from the Clean Energy Revolving Fund allowed Mr. Sokhom to buy a solar-powered pump. He now no longer needs to worry about his fuel supply, and this new pump is also less costly to maintain. The success of Mr. Sokhom's farm has allowed him to hire seven farm workers, most of whom used to illegally cross the border into Thailand looking for work. They now live on the longan farm and are provided with room and board as well as a decent salary.

3,500

SOLAR-POWERED IRRIGATION PUMPS SOLD WORLWIDE BY FUTUREPUMP

FEATURED PROJECT OUTCOME:
CLEAN ENERGY REVOLVING FUND, NEXUS FOR DEVELOPMENT, CAMBODIA

Federal Ministry Sustainability and Tourism · REEEP · Nexus · blue moon FUND

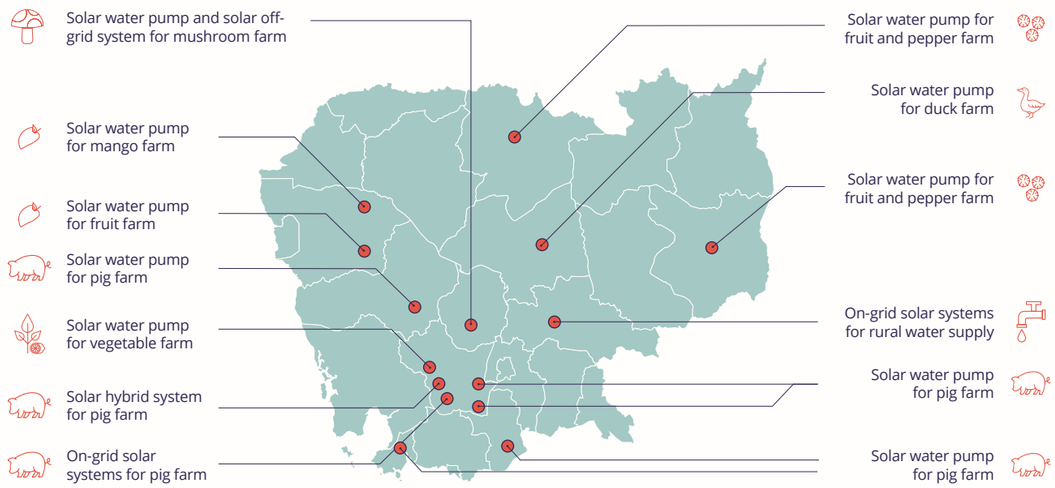
Nexus addresses an important barrier to the uptake of clean energy solutions in the agricultural sectors of low- and middle-income countries: the lack of access to finance for SME-level operators. This barrier is especially difficult to overcome in Cambodia, which has a relatively young financial system marked by risk-averse banks, and where businesses need to be particularly robust to withstand frequent shocks in the fragile agricultural sector. With funding from the Austrian Government and the Blue Moon Fund provided through REEEP, Nexus has established the Clean Energy Revolving Fund (CERF). CERF targets different segments of the agrifood sector, offering concessional loans to enable SMEs to purchase clean energy technology for use on farms.

Through the innovative finance it offers and on the basis of a relationship-based lending approach, CERF works as a de-risking mechanism for the local financial market, paving the way for financiers to crowd in once the viability of the model has been demonstrated. CERF is also building capacity among its SME agri-food borrower clients, educating them about clean energy technologies and assisting them to build a credit history.

In 2018, the fund is fully operational and supports a healthy pipeline of SME-scale loans. Fifteen loans have been disbursed, most of them for the purchase of solar-powered water pumping equipment. With the exception of one default, all loans made from CERF are being repaid in full and on schedule.

Demand for CERF loans is strong, with potential borrowers clearly responding to the gap the loans address in the Cambodian finance market. As a next step, Nexus and REEEP are looking to identify a local financing institution, such as a bank, to provide CERF-style loans across Cambodia and through a broader distribution network than that of Nexus. We are also looking at opportunities to replicate the CERF lending approach, modified as necessary for local market conditions, in other countries in the region.

CLEAN ENERGY REVOLVING FUND INVESTMENTS - SNAPSHOT JUNE 2018



GREENING INDIA'S DAIRY VALUE CHAIN

giz Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH REEEP

In 2016-2017, REEEP, with funding and support from GIZ, carried out a study to identify potential entry points for clean energy cooling solutions in the dairy value chains of India and Kenya. In those countries, as in all low-income countries, most milk is produced by smallholder farmers, who often live in rural areas with no or limited access to electricity or cooling equipment. Milk at ambient temperature, especially in warm climates, provides an ideal environment for bacterial growth. Raw milk in Southern and Eastern Africa has often been found to contain E. coli and other pathogens, with one study concluding that the raw milk sampled on the Tanzanian market was "hazardous for human consumption".*

STAKEHOLDER WORKSHOPS

Throughout these two research projects in India and Kenya, REEEP and GIZ organised three workshops involving a wide range of local stakeholders, including government, the private sector, dairy farmers and co-operatives, to test assumptions on the need and appetite for interventions and to further the design of appropriate technical measures. During the initial project in 2016-2017, workshops organised also facilitated cross-regional exchange between dairy sector stakeholders from India and Kenya. This intensive stakeholder engagement has been crucial to ensure that the findings of these studies are accurate and useful to local stakeholders, and that the results of any follow-on interventions are fit for purpose. It also helped secure local buy-in for the projects.

OVER 70 litres
OF MILK PER CAPITA CONSUMED PER YEAR

155.5m
TONS ANNUAL MILK PRODUCTION (2015)

70-80%
OF MILK PRODUCED BY SMALL FARMERS WITH 2-3 COWS

* Swai & Schoonman, 2011

Left: Participants at a workshop with dairy sector stakeholders in New Delhi, India, 17 April 2018.

Cooling milk slows down bacterial growth and reduces spoilage, thereby increasing the volume of milk farmers can sell on the market. However, most farmers lack access to affordable cooling solutions. REEEP carried out extensive desk research, site visits and interviews with stakeholders at different points along the value chains, and found that though similarities exist, the situation in India and Kenya was very different. In both India and Kenya, privately owned dairies and famer cooperatives collect milk from smallholder farmers through centralised village collection centres. In India, the system is extremely efficient, with twice-daily collections ensuring that both morning and evening milk reach a chiller within 3.5 hours after milking. In Kenya, however, only morning milk is collected, and it takes longer to reach a collection centre with cooling facilities. This leads to losses of up to 40%, by some estimates.

The findings of the study showed that in India, substantial cost savings as well as GHG emissions reductions can be achieved by increasing the energy efficiency and adding renewable energy capacity at different points in the value chain, from village collection centres to dairy plants. In Kenya, the greatest gains in terms of farmer income and consumer safety could be made by making cooling equipment available directly to farmers.
A number of private sector technology providers are currently carrying out pilots with pay-as-you-go solar refrigerators.

This follow-on project, Greening India's Dairy Value Chain, aims to develop concrete opportunities for clean energy interventions in India's dairy sector, based on an extended study, energy audits of selected dairies and ongoing stakeholder engagement and consultations. This project also looks at the use of refrigerants in the sector.
In March 2018, REEEP and GIZ conducted a series of site visits and engagements across three Indian states, as part of the research project and to gauge the level of interest of different stakeholders. Organisations including the governmental Bureau of Energy Efficiency and the India Dairy Association expressed their enthusiastic support for the project.

In April 2018, a workshop was held in New Delhi which gathered stakeholders to co-design a concrete, technical intervention based on the outcomes of the two research projects. As a basis of this workshop, the REEEP team presented results of two sample energy audits of a private and a cooperative-owned dairy in Uttar Pradesh and Rajasthan. The feedback from participants validated the results of those audits, and helped the team identify opportunities for quick gains as well as longer-term efforts necessary to accelerate a switch to energy-efficient technologies across the value chain.

SCALE AND SUSTAINABILITY:
TOWARD A PUBLIC-PRIVATE PARADIGM IN POWERING INDIA

The ROCKEFELLER FOUNDATION REEEP

Though the Indian Government announced in April 2018 that it had achieved 100% village electrification, many millions of homes within those villages remain unconnected to the grid, and millions more have unreliable access to power, with one study showing that over 50% of electrified households in six Indian states have fewer than 12 hours of electricity supply per day[1].

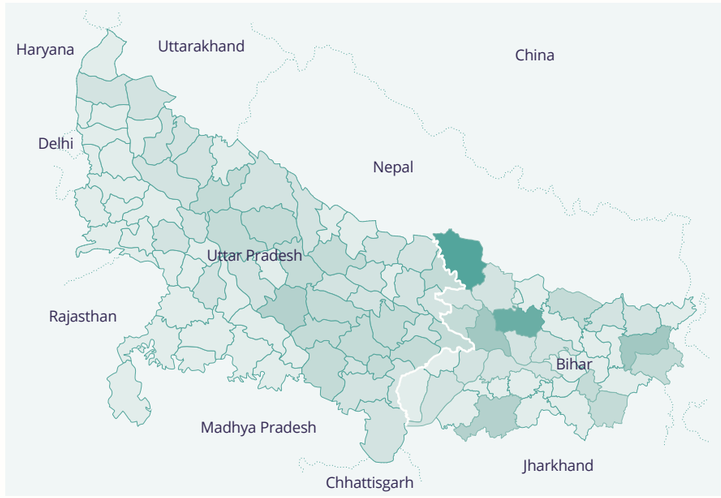
REEEP has long supported market-based decentralised renewable energy (DRE) solutions as an alternative to grid expansion. DRE mini-grids are often more reliable than the central grid, faster to deploy, cheaper to construct and maintain and more resilient to extreme weather events and other disruptions. They are now also powerful and robust enough to provide a long-term - rather than just an interim - solution for electricity supply, including for high-intensity "productive" applications. Furthermore, they generate far fewer GHG emissions after construction than alternatives. Challenges connected to customer behaviour, such as theft and non-payment, have largely been overcome by operators.

Despite the benefits DRE offers, companies in the sector are still struggling to achieve commercial viability in many countries, including India. One of the main difficulties they face is the need to compete on price with government-subsidised public utility companies, whose customers benefit from subsidised electricity tariffs and do not need to pay directly for infrastructure.

In December 2017, REEEP published the report 'Scale and Sustainability - Toward a Public-Private Paradigm in Powering India', produced with funding from the Rockefeller Foundation. The report seeks to assess the market for DRE in India, looking at the supply, demand and framework conditions for the sector, and identify potential approaches to levelling the playing field.

Right: A street scene in Uttar Pradesh. **Credit:** Quinn Reifmesser for REEEP

1 Council on Energy, Environment and Water, 2015.



Source: REEEP Analysis

VILLAGE-LEVEL MINI-GRID READINESS IN UTTAR PRADESH AND BIHAR

As part of its study, REEEP developed a series of threshold criteria to determine whether a particular village would be able to sustain a commercially run mini-grid. These included the presence of a market to provide commercial clients, a population of between 150 and 1000 households and fewer than 10 hours per day of summertime electricity access through the central grid. Based on these criteria, we found that in the states of Uttar Pradesh and Bihar alone, around 15,500 villages can be deemed mini-grid ready.

The report argues for a public-private partnership approach to strengthening the DRE sector. The Government should reduce risks for investors in mini-grid companies by offering appropriate incentives and by developing a clear policy for coexistence or integration of mini-grids and the central grid, so that assets in remote areas are not lost when the central grid arrives.

Since the launch of the report in late 2017, Smart Power for Rural Development (SPRD), the Rockefeller Foundation's last-mile energy access initiative, has integrated the public-private partnership approach into its activities in India.

"Mini-grids powered by DRE, and operated by distributed energy service companies, which provide a utility-like service on a for-profit basis, can offer a long-term solution for the underserved, which can expand rapidly and easily along with demand. DRE-powered mini-grids are quickly deployed and reasonably priced. Furthermore, if done in the right way, such mini-grids can be integrated with the main grid at a later date. Equally significant, DRE power is environmentally cleaner than coal – or diesel-generated alternatives."

SWITCH AFRICA GREEN

The aim of this SWITCH Africa Green project, which ran until January 2018, was to support South Africa in its transition to an inclusive green economy, promoting a shift toward Sustainable Consumption and Production (SCP) practices and patterns.
The project was funded by the European Union and implemented by the United Nations Environment Programme (UNEP) in collaboration with UNDP, UNOPS and the South African Department of Environmental Affairs (DEA). It involved REEEP and SANEDI laying the groundwork for South African SMEs and eco-entrepreneurs in the agricultural and agricultural waste management sectors as they begin and manage this transition. By providing training programmes and direct capacity building to 93 SMEs, the project increased awareness, up-take and successful implementation of SCP practices and sustainable energy opportunities in SMEs in agricultural food value chains in South Africa.

At the training workshops, participants were introduced to the opportunities offered by renewable energy and energy efficiency technologies, and shown how these could lead to cost savings and more reliable energy access. Follow-up workshops identified local case studies and worked through practical solutions for addressing energy issues in agriculture, taking into account the important links to water and food production.

ABRAHAM'S CLEAN ENERGY BUSINESS

Abraham Metsing attended two SWITCH Africa Green training sessions, which he travelled to on foot as he could not afford public transport. Inspired by the training, he has since founded his own business, selling clean cook stoves and LED lamps to his community.

He also assists his neighbours with energy audits, advises them on lighting and helps with the selection of solar PV systems. Abraham was one of the beneficiaries who presented at the SWITCH Africa Green project close out event in Pretoria in January 2018. Other presenters included Nomasonto Mosia, who installed a solar water pump to irrigate her farm and provide energy for her home, Lengau Mothiane, who implemented a number of energy and water efficiency measures after joining a training session, and Deirdré Egelaar, who most appreciated the networking opportunities provided by the training. The contacts she gained helped her carry out energy audits, renegotiate her energy tariffs with Eskom and effectively install and use solar PV at her farm.

Above: SWITCH trainees in attendance at the project close-out event in January 2018, (left to right): Abraham Metsing, Nomasonto Mosia, Patrick Sekwatlakwatla, Lengau Mothiana and Deidré Egelaar.

A survey carried out at the end of the project found that the beneficiaries had found the trainings very useful, and most would like to receive more training, especially on the installation and maintenance of solar photovoltaics systems and biodigesters. More than 50% of those surveyed had in the year since purchased renewable energy technology and/or carried out energy efficiency interventions. Of the rest, a majority had investigated renewable energy and energy efficiency measures but not yet implemented them. Many of the beneficiaries said they had shared the knowledge they gained with their families and wider communities.

The project also established a stakeholder platform, the Energy Agriculture Platform, which has been integrated into SANEDI's operations and remains active. The platform seeks to provide knowledge sharing, strengthen networks, offer technical assistance and input into policies and regulations, and leverage funding for SMEs via an external funding mechanism. It focuses on technology applications and keeps an inventory of initiatives and projects.

"Renewable energy and energy efficiency make life simpler, and the training I received was like a power line for sharing knowledge."

Abraham Metsing
Business Owner and SWITCH Africa Green Trainee

CLIMATE TAGGER

The volume of climate change information available on the internet is overwhelmingly large and still growing rapidly. This makes it difficult for decision makers to find exactly the information they need, when they need it. At the same time, it can be difficult for organisations to keep their resources organised, to help their users find them and to ensure their researchers do not duplicate efforts of others with new publications.

Climate Tagger helps tackle these challenges. It assists knowledge-driven organisations in the climate and development arenas in streamlining and organising their data and information resources. The tool is powered by REEEP's multilingual climate smart thesaurus, generated and vetted by experts in their fields. It automatically scans, sorts and tags content, and can connect it to resources with similar keywords using Linked Open Data - within the same platform or organisation, and also across third party platforms. It effectively breaks open information silos and has the potential to create a web of climate-relevant knowledge that spans the globe.

For users of climate information, Climate Tagger makes it easier to navigate large resource libraries. The high level of detail in the thesaurus enables the Tagger to label resources with very specific keywords, and allows users to search for precisely the information they need. By connecting resources across platforms, Climate Tagger helps users access content relevant to their interests even if it was published by an organisation they are unfamiliar with.

From the beginning, Climate Tagger has been a collaborative project. At different stages in the development of the tool and subsequent expansions of the thesaurus, it has been supported by, among others, the US National Renewable Energy Laboratory (NREL), the Stockholm Environment Institute (SEI), the Institute for Development Studies (IDS), the Caribbean Community Climate Change Centre (CCCCC), the Secretariat of the Pacific Regional Environment Programme (SPREP) and the International Renewable Energy Agency (IRENA).

Climate Tagger supports the REEEP mission by making it easier for REEEP itself and other organisations to share relevant climate change information. By improving the accessibility of climate change information, the tool has the potential to contribute to better decision making for a climate-resilient future.

LEO TAGGER

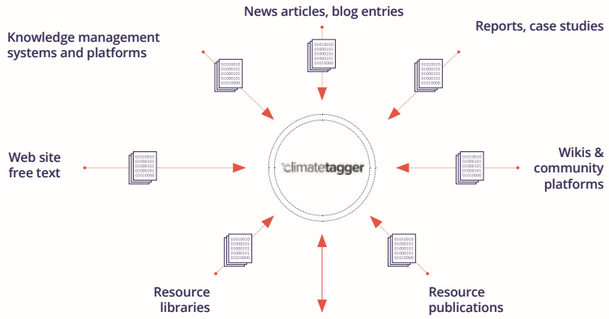
In collaboration with UN InforMEA, we are currently demonstrating the usefulness of the Climate Tagger to initially four individual MEAs (Multilateral Environmental Agreements) including UNFCCC, CITES and Ramsar.

Based on their vocabularies we developed a plan for the development of a specific "LEO Tagger" (LEO stands for Law and Environment Ontology) for their content, initially on the level of the InforMEA platform. In collaboration with the individual MEAs and taking into account their very specific vocabularies, sometimes already curated in great depth, we worked with UN InforMEA to design a long-term strategy to ensure useful auto-tagging for them as well as individual MEAs. We hope that more efficient and consistent tagging will allow stakeholders involved in the COP process to retrieve relevant information more easily from the wealth of documents and resources available from individual MEAs as well on the InforMEA platform.

HOW CLIMATE TAGGER WORKS

STEP 01

Climate Tagger is installed for use with unstructured content in databases, websites or document bundles from anywhere in the world in French, English, German, Spanish or Portuguese.



STEP 02

Climate Tagger scans the unstructured information and identifies specific terms and concepts used in the sources, covering multiple sectors relevant to climate compatible development.

STEP 03

Climate Tagger tags the content based on suggestions from the 4000-term Climate Tagger Thesaurus, linking it to similar resources and making it searchable online.

05

PFAN

The Private Financing Advisory Network is a global network of financing consultants, who provide free business coaching and investment facilitation to entrepreneurs developing climate adaptation and clean energy projects in low- and middle-income countries.

PFAN Accelerating Investment for Climate and Clean Energy

UNIDO

REEEP

Donors:

Australian Government
Department of Foreign Affairs and Trade

Federal Ministry
Digital and
Economic Affairs

METI
Ministry of Economy, Trade and Industry

Norwegian Ministry
of Foreign Affairs

Sweden
Sverige

USAID
FROM THE AMERICAN PEOPLE

PFAN aims to build clean energy markets one business at a time, mitigate climate change and mobilise private investment in support of the Paris Agreement on Climate Change and the Sustainable Development Goals.

While PFAN's ultimate aim is to combat climate change, in its day-to-day work the network is driven by a desire to help entrepreneurs succeed. PFAN's consultants know that getting a project off the ground is difficult, and they are aware of the barriers to finding investment that project developers face. Helping entrepreneurs overcome those barriers to fulfil their potential and contribute to climate change adaptation and mitigation is what drives them.

PFAN originates projects through open calls for proposals. Selected projects are assigned a coach who provides one-on-one support, helping with the development of a solid business plan, financial structuring and growth strategy, until the project is deemed investment-ready. At that stage, a project may receive an invitation to pitch directly to investors at a PFAN Investment Forum and Business Plan Competition, or receive direct Investment Facilitation from the Investment Facilitation Team.

Below: The jury of the Business Plan Competition at PFAN's second Global Investment Forum in Vienna, 16 May 2018, (from left to right): Godfrey Mwindaare, InfraCo Africa; Winnie Odhiambo, I-DEV International; and Ignace van Synghel, BIO Invest.
Credit: Katja Prokofief for UNIDO.

Left: A woman uses a solar drier provided by Aastha Engineering Solutions.
Credit: Aastha.

"By bridging the gap between the developers of climate friendly technology and private financiers, PFAN plays an important part in making sure that private climate finance moves towards the targets we need to reach."

Mette Møglestue
Chair, PFAN Steering Committee;
Norwegian Agency for Development Cooperation

SUCCESS STORY

GREEN VILLAGE ELECTRICITY PROJECTS, LTD.

GVE constructs mini-grids in off-grid areas in Nigeria, currently serving more than 5,200 customers. After receiving PFAN coaching and pitching at the 2017 Global Clean Energy & Climate Investment Forum in Vienna, the company raised USD 5 million in investment to scale up its operations.

"[PFAN] provided validation for our business model and business plan. PFAN helped us market the platform internationally. We've increased our confidence and that of subsequent investors."

Ifeanyi Orajaka
Founder/Chief Executive, GVE Projects Ltd.

SUCCESS STORY

AASTHA ENGINEERING SOLUTIONS, NEPAL

Aastha provides farmers in Nepal with solar drying units, which they can use to dry their crops, adding value, preventing wastage and giving farmers more time to find a good buyer. Following PFAN coaching, Aastha raised USD 140,000 in investment to scale up its business.

"PFAN provided me with international exposure. Working with PFAN has resulted in creating better and more realistic business plans. PFAN has also connected me to international vendors; PFAN provided a platform where I can explore more possibilities than before."

Kamala Dhakal
Chairperson, Aastha Engineering Solutions.

NUMBER OF PROJECTS CLOSED

102

NUMBER OF PROJECTS IN PIPELINE

502

TOTAL INVESTMENT LEVERAGED

US$1.25bn

POTENTIAL

>US$10.4bn

TOTAL CO_2E EMISSIONS AVOIDED

3.3mt/yr

POTENTIAL

>24mt/yr

2017: PROJECTS CLOSED

15 PROJECTS

US$68.6m INVESTMENT LEVERAGED

705,000t/yr

CO_2E EMISSION MITIGATION POTENTIAL

06
REEEP IN NUMBERS

REEEP LEGAL STATUS

REEEP is an international multilateral partnership, registered in Austria and recognised under Austrian law as a Quasi-International Organization (QuIO), a category of international organization introduced in 2015 to accommodate international organizations with multi-stakeholder institutional structures similar to those of inter-governmental organizations, but also allowing membership of non-government actors.

REEEP qualifies as an international NGO for official development assistance (ODA) contributions according to the Organization for Economic Co-Operation and Development (OECD).

FINANCIAL INFORMATION

In April 2018, Grant Thornton Unitreu conducted the annual audit of REEEP's financial statements and performed assurance services - including verification of compliance - conform the requirements of the Austrian Association Act.

The audit found REEEP's accounting system to be fully in accordance with generally accepted accounting procedures and an internal control environment.

The Audit determined that:

— No objections to REEEP financial procedures were found.

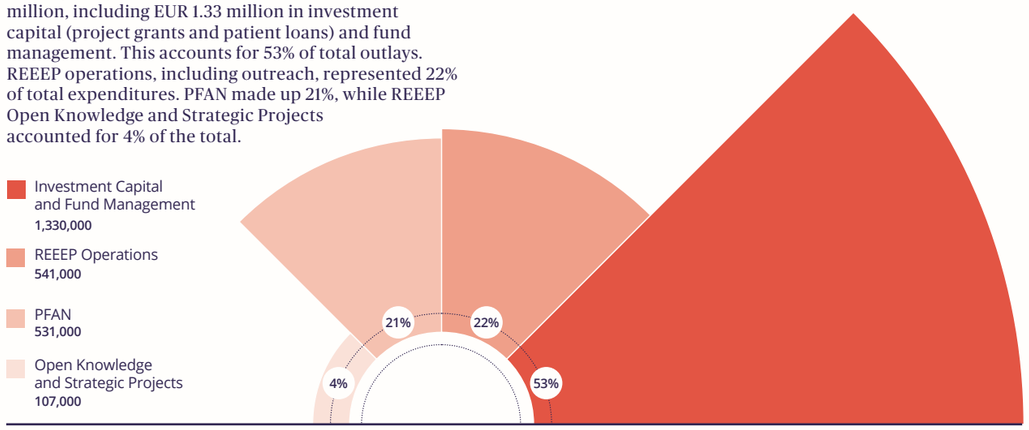
— REEEP financial statements comply with legal requirements, are consistent in all material respects, and give a true and fair view of its financial position and performance for 2017/2018.

— REEEP funds were used in accordance with its statutes.

— No unusual income or expenses were noted.

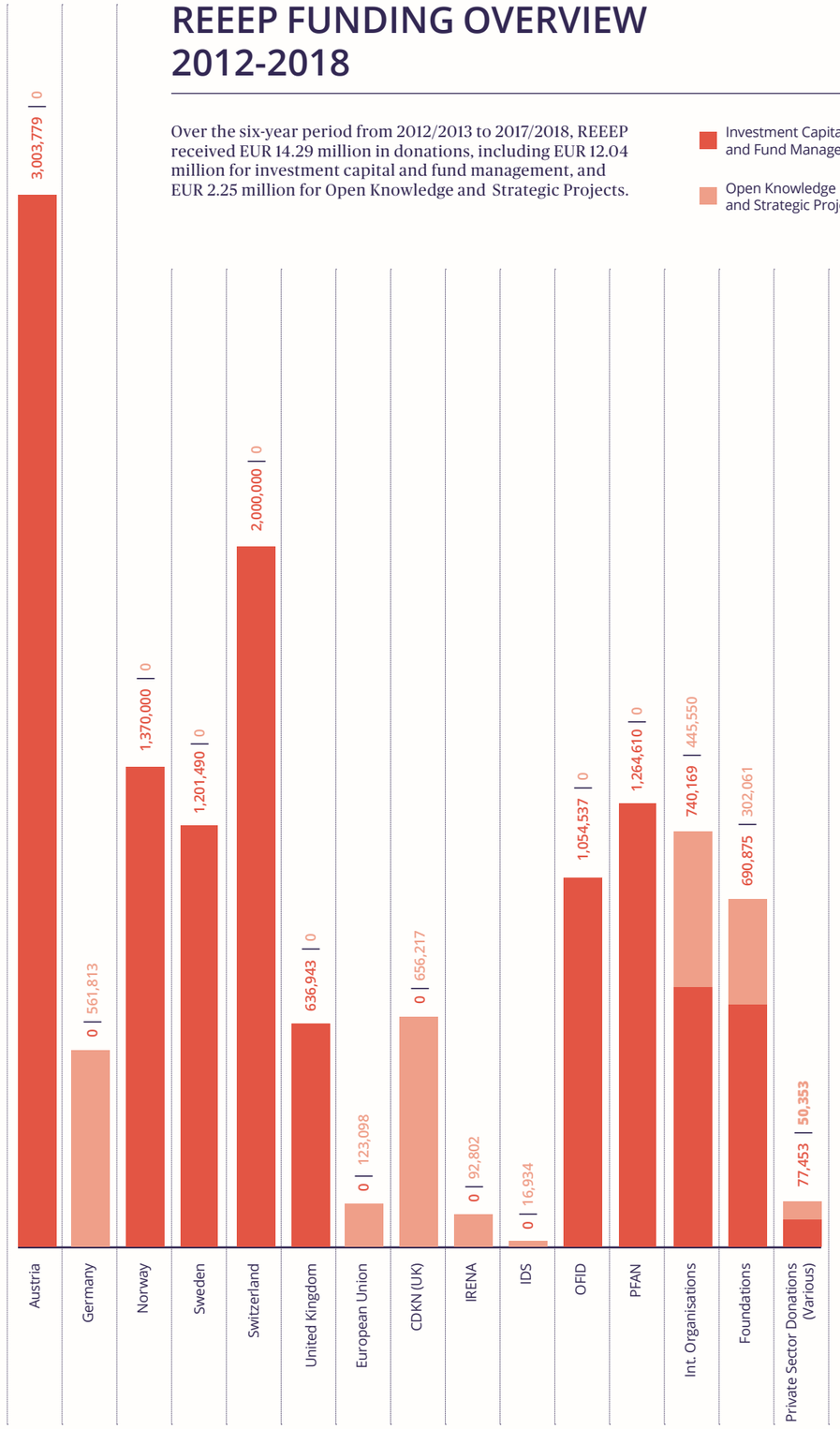
REEEP OUTLAYS 2017/2018

In 2017/2018, REEEP outlays amounted to EUR 2.509 million, including EUR 1.33 million in investment capital (project grants and patient loans) and fund management. This accounts for 53% of total outlays. REEEP operations, including outreach, represented 22% of total expenditures. PFAN made up 21%, while REEEP Open Knowledge and Strategic Projects accounted for 4% of the total.



REEEP FUNDING OVERVIEW 2012-2018

Over the six-year period from 2012/2013 to 2017/2018, REEEP received EUR 14.29 million in donations, including EUR 12.04 million for investment capital and fund management, and EUR 2.25 million for Open Knowledge and Strategic Projects.



OVERVIEW OF ASSETS AND LIABILITIES

This table summarizes REEEP's consolidated assets and liabilities as of 31 March 2018:

	31 Mar 18 kEUR	31 Mar 17 kEUR	31 Mar 16 kEUR	31 Mar 15 kEUR	31 Mar 14 kEUR	31 Mar 13 kEUR	31 Mar 12 kEUR	31 Mar 11 kEUR
ASSETS								
Fixed assets								
Intangible assets	4	20	49	80	115	152	65	25
Tangible assets	5	5	3	5	9	18	27	17
Current assets								
Inventory	60	196	0	0	0	0	0	0
Accounts receivable	0	33	88	114	8	30	99	91
Cash	4,260	4,084	4,875	5,920	9,135	11,998	11,953	12,881
Prepaid expenses	17	22	5	9	13	7	6	1
	4,346	**4,360**	**5,019**	**6,128**	**9,281**	**12,204**	**12,150**	**13,015**
LIABILITIES								
Equity	1,337	1,299	1,323	1,377	1,797	2,249	2,341	1,908
Provisions	113	578	621	868	1,104	1,066	786	628
Liabilities on account of earmarked funds	2,704	2,373	3,001	3,659	5,989	8,312	7,946	9,219
Liabilities								
Accounts payable	132	53	12	35	92	181	282	164
Other liabilities	59	57	64	189	299	395	814	1,096
Deferred Income	0	0	0	0	0	0	0	0
	4,346	**4,360**	**5,019**	**6,128**	**9,281**	**12,204**	**12,150**	**13,015**
NET FINANCIAL ASSETS								
Current assets and pre-paid expenses	4,337	4,335	4,968	6,043	9,156	12,035	12,058	12,973
Provisions and liabilities	3,009	3,061	3,698	4,751	7,484	9,954	9,828	11,107
	1,328	**1,274**	**1,270**	**1,292**	**1,672**	**2,081**	**2,230**	**1,866**

OVERVIEW OF INCOME AND EXPENSES

The following table summarises REEEP's consolidated income and expenses for the years ended 31 March 2018, 2017, 2016, 2015, 2014, 2013, and 2012:

	2017/18 kEUR	2016/17 kEUR	2015/16 kEUR	2014/15 kEUR	2013/14 kEUR	2012/13 kEUR	2011/12 kEUR	2010/11 kEUR
Non-earmarked contributions	98	150	507	70	70	712	85	79
Earmarked contributions	3,055	1,733	1,618	268	1,679	3,805	2,729	4,685
Allocation to liabilities on acc.	-331	628	658	2,330	2,323	-366	1,273	-386
Allocation to work in progress	-137	196	0	0	0	0	0	0
Other income	30	39	5	15	27	5	0	0
Expenses for projects	-1,306	-1,446	-1,683	-1,694	-3,083	-2,734	-2,267	-3,067
Expenses for regional secretariats	0	-2	-7	-217	-288	-630	-377	-307
Cost of staff	-1,124	-1,046	-903	-851	-763	-720	-707	-546
Depreciation	-22	-36	-39	-53	-54	-47	-27	-81
Other operation expenses	-212	-244	-215	-308	-381	-450	-368	-372
Subtotal	**52**	**-28**	**-59**	**-440**	**-471**	**-154**	**341**	**5**
Financial result	-14	5	8	27	25	83	122	86
Operating Surplus/Loss	**38**	**-23**	**-51**	**-413**	**-446**	**-71**	**464**	**91**
Taxes on income	0	-1	-3	-7	-6	-21	-31	-22
Annual Surplus/loss	**38**	**-24**	**-54**	**-420**	**-452**	**-91**	**433**	**70**

GOVERNANCE

REEEP's governance structure comprises two acting bodies: the Governing Board and a General Assembly of Members. REEEP's Meeting of Members, held at least once every two years and to which all 359 Member organisations are invited, functions as the General Assembly of the Renewable Energy and Energy Efficiency Partnership. The REEEP Statutes and Strategy are subject to ultimate approval by this Assembly.

GOVERNING BOARD

REEEP's Governing Board holds office for a period of four years, and is responsible for the conduct of business in accordance with the REEEP Statutes. The Governing Board develops and oversees key strategic direction, targets, time frames and priorities for REEEP's activities; prepares financial rules and accounting systems; and guides the operations of the International Secretariat.

Please see page 9 for a full list of Governing Board members.

ADVISORY BOARD

The REEEP Advisory Board comprises eminent experts and thinkers in clean energy and related fields, who provide the organisation with high-level expertise and strategic guidance. Members are invited by the Director General and approved by the Governing Board.

Please see page 9 for a full list of Advisory Board members.

REEEP MEMBERS

REEEP is a global public-private partnership, and counts as its official members 359 governments, international and multilateral organisations, non-governmental institutions, foundations and private sector actors.

The full list of REEEP Members can be found at **www.reeep.org/members**

- Governments: 46
- Government Ministries and agencies: 12
- Local governments: 11
- Multilateral agencies: 8
- Education facilities: 8
- NGOs: 116
- Businesses: 153
- Individuals: 5

ACRONYMS AND ABBREVIATIONS

API – Application programming interface

BGFZ – Beyond the Grid Fund for Zambia

CCCCC – Caribbean Community Climate Change Centre

CDKN – Climate and Development Knowledge Network

CERF – Clean Energy Revolving Fund

CITES – Convention on International Trade in Endangered Species of Wild Flora and Fauna

COP – Conference of Parties

EDISON – Energy Data and Intelligence System for Off-Grid Networks

ESP – Energy service provider

ESS – Energy service subscription

EUR – Euro

GDP – Gross Domestic Product

GHG – Greenhouse gas

GIZ – Deutsche Gesellschaft für Internationale Zusammenarbeit GmbH

IDS – Institute for Development Studies

IRENA – International Renewable Energy Agency

MEAs – Multilateral Environmental Agreements

MEL – Monitoring, Evaluation and Learning

MP – Member of Parliament

OFID – OPEC Fund for International Development

NCPC – National Cleaner Production Center

NMB – NMB Bank Limited

NREL – National Renewable Energy Laboratory

PFAN – Private Financing Advisory Network

PV - Photovoltaics

QuIO – Quasi-international organisation

Ramsar – Ramsar Convention on Wetlands

REEEP – Renewable Energy and Energy Efficiency Partnership

SANEDI – South African National Energy Development Institute

SCP – Sustainable Consumption and Production

SDGs – Sustainable Development Goals

SEI – Stockholm Environment Institute

Sida – Swedish International Development Cooperation Agency

SMEs – Small and medium-sized enterprises

SNV – SNV Netherlands Development Organisation

SPREP – Secretariat of the Pacific Regional Environment Prorgamme

UNDP – United Nations Development Programme

UNEP – United Nations Environment Programme

UNFCCC – United Nations Framework Convention on Climate Change

UNIDO – United Nations Industrial Development Organization

UNOPS – United Nations Office for Project Services

USAID – United States Agency for International Development

USD – U.S. Dollar

Wh – Watt-hour

REFERENCES

— Council on Energy, Environment and Water (2015). Access to Clean Cooking Energy and Electricity: Survey of States

— South African Cities Network (2014). Modelling Energy Efficiency Potential in Municipal Operations in the Nine Member Cities of the SACN

— Statistics South Africa - Municipal Profiles. www.statssa.gov.za

— Swai, ES and Schoonman, L. (2011). Microbial quality and associated health risks of raw milk marketed in the Tanga region of Tanzania. Asian Pacific Journal of Tropical Biomedicine.

— REEEP (2017) Scale and Sustainability - Toward a Public-Private Paradigm in Powering India

— World Bank (2015). Beyond Connections: Energy Access Redefined

— World Bank Open Data - Access to Electricity. Data.worldbank.org

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