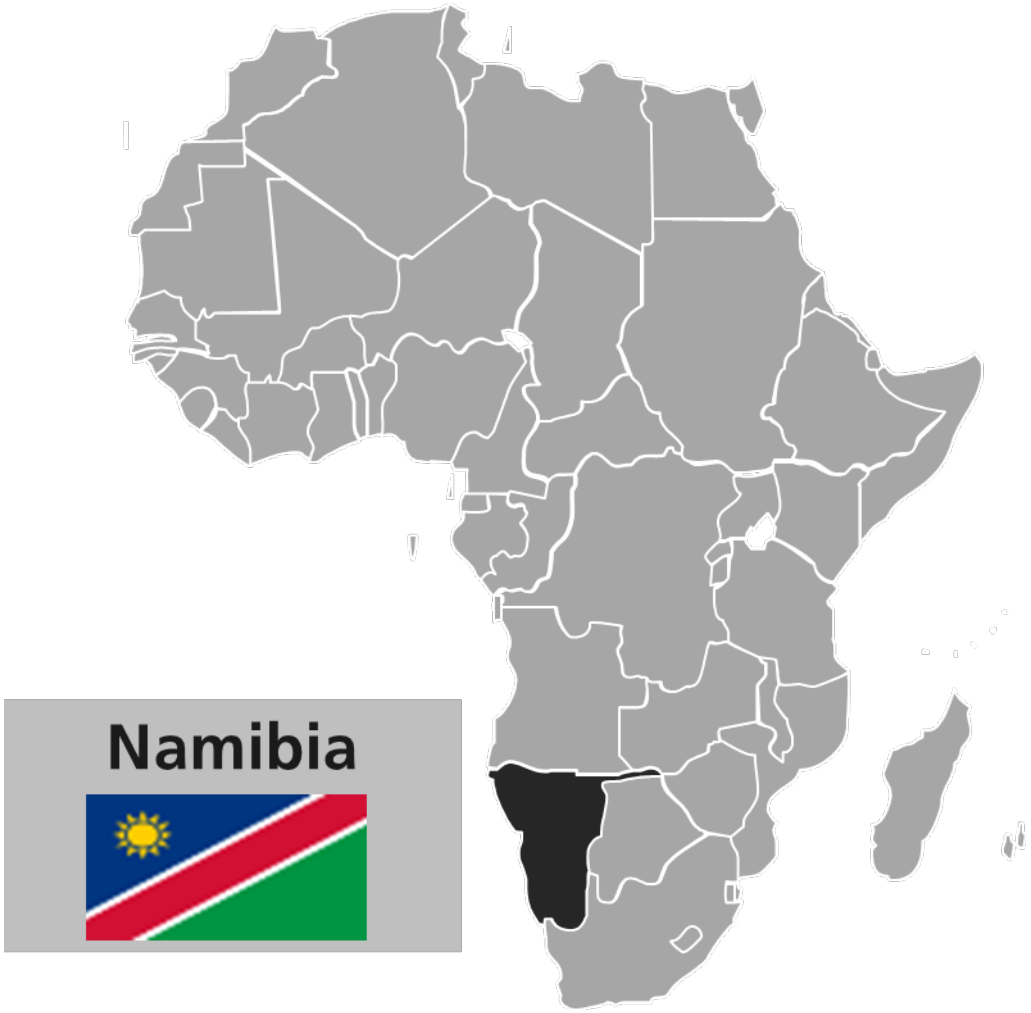
GET FiT Market Assessment
Project Concept Note



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Multiconsult

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This document has been produced for the exclusive use of the initiators of the GET FiT market assessment. It shall be read in conjunction with the other deliverables under this assignment, in particular the regional market studies and the explanatory note to the Project Concept Notes.

This PCN does not aim to provide a balanced and holistic view on a potential GET FiT intervention. Particularly, it does not elaborate on required commitments from the host government. Ideas presented in the PCN have been developed based on interviews conducted during the market assessment missions. Follow-up in the context of the PCN preparation has been limited. Therefore, the proposed elements of the GET FiT toolbox as well as the overall design of the intervention has neither been discussed nor approved by the host government.

Acronyms

CAPEX	Capital Expenditure
CDM	Clean Development Mechanism
CSP	Concentrated Solar Power
DECC	Department of Energy & Climate Change
DFID	Department for International Development
E&S	Environmental & Social
ECB	Electricity Control Board
FX	Foreign Exchange
GCF	Green Climate Fund
GDP	Gross Domestic Product
GET FiT	Global Energy Transfer Feed-in Tariffs
GIZ	Gesellschaft für Internationale Zusammenarbeit
GRN	Government of Namibia
HDI	Human Development Index
IPP	Independent Power Producer
KfW	Kreditanstalt für Wiederaufbau
LCOE	Levelized Cost of Electricity
MW	Megawatt
NAD	Namibian Dollar
N-BiG	Namibia Biomass Industry Group
NEI	Namibia Energy Institute
O&M	Operation & Maintenance
PCN	Project Concept Note
PPA	Power Purchase Agreement
PV	Photovoltaics
R&D	Research and Development
RED	Regional Electricity Distribution Company
SADC	Southern African Development Community
TA	Technical Assistance
TOR	Terms of Reference
UK	United Kingdom
UNFCCC	United Nations Framework Convention on Climate Change
USD	US Dollar
USDc	US Dollar Cents
USDM	Million US Dollar
ZAR	South African Rand

1. Key Messages

The proposed GET FiT programme for Namibia, as described in this Project Concept Note (PCN), rests on two pillars that are intended to bring about quick wins in the solar PV sector, while creating momentum to address the more complex challenges in the country's bush-to-electricity sector:

- ***A bush-to-electricity intervention that necessitates longer-term support in order to facilitate private sector investments across the sector's fledgling value chain, which represents a higher risk for the GET FiT sponsors.***
- ***A low-risk, short-term intervention to support and potentially accelerate existing solar PV initiatives including the REFiT process to build a positive track record of the regulatory process. Trust in the regulatory framework is essential to initiate private sector activity in the more complex biomass sector.***
- ***Taking into account the potential and pipeline of small/medium size projects in other RE technologies, we believe that the focus on the two technologies described above is efficient.***

The proposed support activities differ between the solar PV and bush-to-electricity projects. While solar PV projects require minor incentives to see an enhanced private sector activity, bush-to-electricity initiatives require longer-term support to realise the multiple long-term socio-economic benefits arising from across the sector's value chain:

- ***The bush-to-electricity sector is still in its infant stage. The financial viability gap is highest across all technologies, but these need to be seen against the background of multiple environmental and social co-benefits that such projects are expected to bring about. These are currently not properly reflected in the general biomass FiT. Current cost estimates and burden sharing assumptions are highly indicative, but provide some first guidance.***
- ***To kick-start the bush-to energy sector, significant investments will be needed to strengthen and increase existing harvesting capacity, and establish electricity generation assets. A credible sector strategy and the private sector's trust in the willingness of the government, the regulators as well as NamPower to constructively work with the private sector will be key to successfully unlock the sector's potentials.***

In addition to strengthening trust in the regulatory system in the private sector, the solar PV component could be structured to demonstrate the commitment of donors to enter into a reliable partnership with NAM public sector stakeholders:

- ***A GET FiT solar PV intervention is envisaged to contribute to the creation of a credible track record and lay the foundation for further investments in Namibia's RE sector, including in the more complex bush-to-electricity sector.***
- ***The level of support as well as instruments used heavily depend on the progress in ongoing processes. Therefore, the PV component needs to be structured after in-depth consultations with MME, NamPower and ECB based on their communicated needs as add-on to the ongoing processes.***
- ***The solar PV component is to demonstrate the commitment of donors to enter into partnership with Namibian public sector stakeholders, and entails a small top-up to reduce the negative implications of the recent depreciation of the NAD for IPPs (and indirectly NamPower).***

The proposed GET FiT toolbox includes instruments that address both incremental cost requirements as well as a variety of unmanageable risks facing future IPPs in Namibia:

- ***Details of viable bush-to-electricity business models still need to be developed, and are best elaborated in a consultative process involving NamPower, interested IPPs and biomass harvesters. The absence of tested models implies that the overall risk profile of future IPPs is***

not yet clear and that viability gap assumptions are subject to further analysis during the feasibility study phase.

- *To increase appetite at the end of the private sector, transaction risk and the chicken and egg problem in the sector with regard to harvesting capacity on the one hand and demand for harvested bush on the other hand must be addressed, i.e. a clear, credible and transparent strategy for the sector needs to be developed and communicated.*
- *Incremental cost support and/or concessional loans to IPPs (and potentially the harvesting companies) are considered insufficient. Support in developing appropriate structures to mitigate the biomass fuel supply risk for the IPP will be essential to enhance the bankability of bush-to-electricity projects.*
- *Off-taker risk guarantees for PPAs with NamPower are considered non-essential. For PPAs with REDs, such instruments are expected to remain useful.*
- *FX risk continues to be of significant relevance and is to be comprehensively addressed in REFiTs and tender procedures used in Namibia's electricity sector.*

A GET FiT in Namibia could be structured as a combination of development and climate support activities:

- *Bush encroachment is limited to Namibia's north-central regions, which have often not benefitted from economic development. A bush-to-electricity intervention would likely create considerable employment opportunities and contribute to the country's overall economic development.*
- *A bush-to-electricity intervention is expected to unlock various project co-benefits, including the increased availability of groundwater, improved agricultural productivity, and enhanced tourism in addition to providing much-needed base load power. According to giz, above described co-benefits of a (theoretically possible) complete de-bushing would yield annual benefits of around USDm 150.*
- *GET FiT could reduce GHG emissions by reducing the use of NamPower's coal-fired Van Eck and HFO power stations, and reduce electricity imports which are mainly from fossil-fuelled power plants in the region.*
- *Namibia's INDC proposes to increase the share of RE in the country's electricity mix from 33% in the business-as-usual scenario to 70% in 2030. 90% of Namibia's INDC is conditional, and GET FiT could contribute to the realisation of the conditional emission reduction targets creating an innovative climate cooperation in the post-Paris era.*
- *The Environmental Investment Fund has been accredited by the Green Climate Fund as National Implementing Entity. This implies that Namibia could apply for additional financing at the outset of the proposed GET FiT intervention or once the donor contributions are phased out by using the direct access option of the GCF. This would be a strong signal of national ownership and increasing sustainability.*
- *Building on GIZs and KfWs work in the area of bush encroachment provides a positive signal of coherence and continuity in donor cooperation with Namibia.*

2. Background and Approach

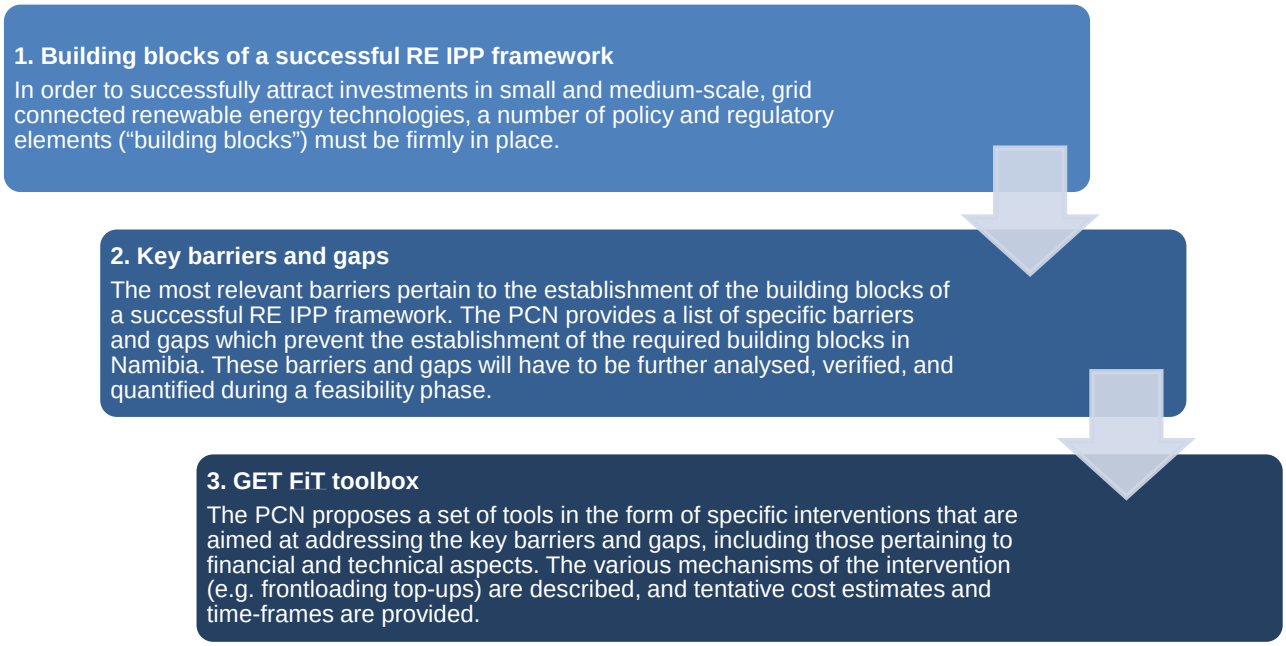
Developed in 2010, the GET FiT concept was designed to address climate change by improving the enabling environment for private investors to support renewable energy projects in emerging and developing countries. The GET FiT concept is meant to, in cooperation with the host country, identify and target the set of critical policy, institutional and financial gaps preventing the timely implementation of privately-promoted small and medium-scale renewables. Through transformative and sustainable sector-wide interventions, an enabling environment for private sector developers and investors would be established. Further, these interventions should be structured so as to ensure that the host government is able to take over full responsibility to maintain the momentum and enabling environment initiated by the intervention.

Subsequent to the successful implementation of the GET FiT pilot programme in Uganda, KfW/BMZ, UK DECC, and UK DFID are considering an expansion of the programme to other markets across Sub-Saharan Africa. An in-depth feasibility study is currently taking place in Zambia, and between July and November 2015, the authors of this report undertook assessments of ten markets across three regions on the continent with a view toward deciding if, when, and where a "third phase" of GET FiT programmes might take place. In November, representatives from KfW/BMZ, UK DECC, and UK DFID reviewed the findings and recommendations of the GET FiT Market Assessment Regional Study for Southern Africa, and requested the consultants to develop more detailed concepts for four of the ten markets, which showed greater promise for an expansion of GET FiT, among which Namibia was selected for further consideration.

This Project Concept Note (PCN) builds on the Regional Study for Southern Africa, and provides a more detailed conceptual outline for how a GET FiT programme could be structured in Namibia, including key procedural and implementation considerations, as well as highlights the prospective impacts using a range of Key Performance Indicators.

In arriving at the proposed toolbox elements described below (Figure 1), the following methodology is applied, in which the central building blocks for a successful renewable energy IPP framework are taken as a starting point, after which the key barriers and gaps are highlighted, and specific measures are proposed to address those which can be addressed by GET FiT:

Figure 1: Methodology



More specifically, this PCN aims to provide:

- A justification for proposing GET FiT in Namibia;
- A description of the indicative key elements of a "toolbox" for a GET FiT programme and its governance structure including a balanced risk assessment;

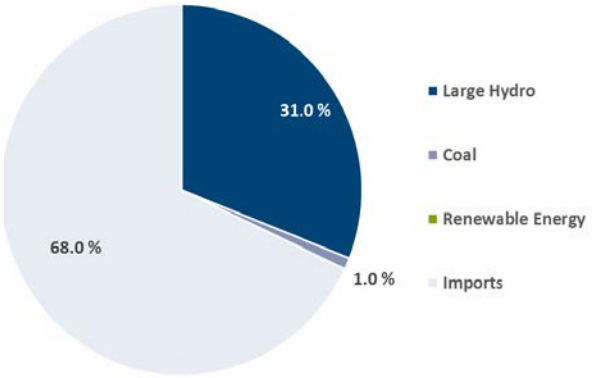
- Indicative estimates of targets, benefits, costs, and timeline; and,
- The basis for deciding whether or not to undertake an in-depth feasibility study, and if so, to offer insights for its design, including proposed issues to be investigated in greater detail.

This PCN also recognizes that donors and other public supporters of GET FiT have certain targets and requirements in the programmes that they support, and as such highlights how the programme in Namibia builds on existing interventions, can demonstrate results within a reasonable time-frame, requires a realistic public sector contribution that leverages private sector investment, and provides opportunities for scaling-up and learning curve effects.

3. Namibia Sector Context

Country Snap-shot	
Population:	2.4M (2014)
GDP/capita:	$5,719 (2014)
5-yr growth rate:	4.5%
HDI rank:	127(2014)
Ease of doing business:	88
Electricity access rate:	32-34% (2014)
Installed capacity:	492 MW
Generation:	NamPower, IPPs
Transmission:	NamPower
Distribution:	REDs, local authorities and NamPower
IPPs:	<1% of market
REFiT in place:	No
Ave. residential tariff:	N$ 2.00 /kWh (USDc 0.15/kWh - 2015)
Sources: Energypedia, NamPower annual report World Bank Databank, ECB, USAID Power Africa and Climatescope 2014	

Sources of Electrical Energy



Source: ECB, 2014

Namibia's economy has grown at an average annual rate of 4.5% in the last five years, which is expected to increase to an average of 4.8% in 2015-19 based on growth in the mining and construction sectors, and an upturn in the manufacturing sector. The country, which has a business sector with close ties to South Africa, is considered one of the most business-friendly jurisdictions in Sub-Saharan Africa.

Namibia's national agenda, Vision 2030, spells out ambitious development goals, including the transformation into an industrialized country. Energy security and energy access are increasingly being recognized as key national challenges and are main priorities of the government. Currently only about 32% of the population has access to electricity, and in rural areas this share is even lower with only 17% having access to electricity. Furthermore, the vulnerability resulting from the high dependence on imported electricity has been strongly felt in the last decade, after South Africa cancelled regular export of base-load electricity on account of its own power shortages. As import is not seen as a sustainable nor desirable long-term solution, Namibia urgently needs to increase its own generating capacity. With wind resources concentrated in coastal areas, and most planned solar PV stations in the centre and south of the country, bush-to-electricity projects could be solution for the country's northern parts.

Namibia's eco-system is fragile and heavily impacted by climate change. This is evident by the loss of productive land and biodiversity due to the "invader bush," as well as volatility in rainfall and resulting variability of output. The protection of the environment is not only a concern, but a constitutional issue in

Namibia. Although awareness around economic losses due to invader tree is high in all relevant institutions, so far progress in rolling out a de-bushing programme has been limited. This is in part due to challenges related to the recognition of value and the general valuation of associated co-benefits.

At present, maximum demand is around 600MW, but this has increased by approximately 4% annually in the last five years, almost in parallel to GDP, and is expected to continue to grow organically at an annual rate of 4% per annum. The opening of a new uranium mine will likely add 60MW of demand in the short term with additional 60MW over the next two years. Further, of total supply, more than 60% was covered by import from the Southern African region, while domestic generation capacity is dominated by the Ruacana hydropower plant, which is currently rated at 332MW, with a likely expansion to 347MW by 2018. To provide a sense of the scale, in the FY 2013/2014 Ruacana produced 99% of the domestically generated electricity.

Over the past several years, NamPower has rehabilitated the 120MW Van Eck coal-fired plant, which had been uneconomical due to escalating fuel, O&M, and replacement capex costs. While the plant allows for operations with locally manufactured 'green coal' (derived through a torrefaction process of harvested invader bush, which is then pelletised and distributed into the furnace along with coal), it is understood that NamPower prefers to support a decentralised biomass approach rather than focusing on Van Eck.

4. Rationale for a GET FiT programme in Namibia

Namibia faces serious electricity supply constraints, which are accentuated by the termination of import contracts. Two large gas-to-power projects, which could have closed the expected supply gap, have been in the pipeline for a long time, but are delayed as a result of legal and regulatory issues. Although the coal-fired Van Eck power plant, which has been unavailable for several years, will be back on grid early this year, albeit with a reduced capacity, average generation costs remain too high to be used a base load plant. Namibia also struggles with the length of its transmission grid and the significant distances between load centres and generation assets and the resulting technical losses.

In light of the above challenges, renewable energy generation becomes increasingly attractive in Namibia. The key advantages of adding RE generation capacity include the speed at which generation units can be added to the system, their modularity and the resulting option to add capacity close to load centres, and the diverse range of potential funding opportunities that can be tapped into. In addition, and of particular relevance for projects aiming to use the country's abundant invader bush resources lie in the significant social and environmental co-benefits that would be created through such undertakings. While being economically viable, it is noted however that such undertakings are complex, especially in regard to the establishment of the necessary supply chain, land rights, and the inherent transaction risk for both, the private and the public sector.

Namibia's interim REFiT program aims to deliver at least 70 MW of additional RE capacity, almost all from solar PV. Including a 30 MW solar PV tender by the Namibian Ministry of Mines and Energy (MME), the country's short-term additional RE capacity is expected to add a capacity of some 100MW.

Since the presentation of the Regional Study for Southern Africa, several important developments have affected the initial assessment. First, the 30MW solar PV tender was cancelled in the court of law, due to irregularities during the tender process, and secondly, the exchange rate of the Namibian Dollar versus the US Dollar has significantly deteriorated and has thereby placed the financial viability of local currency denominated REFiTs at risk[1]. In light of these developments, the effectiveness of the country's regulatory framework is in question. As a result, it is expected that it will take more time to realise RE projects than has been initially anticipated. This also implies that the concern that the stability of the Namibian grid could possibly be at risk because of the large number of potential solar PV projects has therefore diminished.

[1] The cancellation of the 3x10MW solar tender might have been favourable for Alten, the company to which the tender was awarded, since their bid price might have not been financially sustainable after the NAD devaluation.

Initially it seemed unnecessary to offer support to GRN in the context of solar PV projects. However, with the recent developments, a burden sharing with NamPower now is considered to be an appropriate intervention that would potentially help to accelerate the ongoing processes and to strengthen trust in RE regulation in the country. Both could be part of a Namibian GET FiT programme. In this context it is noted that Namibia has a relatively well developed regulatory framework, as well as a positive investment climate. However, as already mentioned, progress with the regulatory framework has recently lost some traction, and it is unclear how and to what extent the interim REFiT will incentivise the establishment of additional RE generation capacity in the country. **Any GET FiT support, in particular for PV, should be structured as an add-on to ongoing processes after further consultations with MOE, NamPower and ECB based on their communicated needs and taking into account their timelines and strategies for the next steps with regard to the implementation of the Interim REFIT and the 30MW solar tender.**

Presently it remains unclear whether additional PV projects could be realised without burdening consumers. Therefore, and in view of the recent depreciation of the NAD, it now seems important to provide finance to support the incremental cost of PV in order to unlock its future growth and lay the foundation for the development of other RE technologies, such as biomass. For example, financial support at levels reflecting the abatement of emissions from the coal-fired Van Eck power station could be of interest. In addition, technical support to revise the REFiT program once the interim process has been completed could be offered, for example entailing the analysis of the economic value of solar PV plants of a capacity of less than 5MW, how scale effects could best be realised, and the advantages/disadvantages of having FiTs rather than using a competitive tendering approach. Such efforts could contribute to a more optimal contribution of solar PV to the country's future energy mix, and in this way bring about important learning curve effects.

GET FiT donors and the secretariat as well as the design and implementation team could act as creative and unbiased sparring partners for the stakeholders with support instruments that could also unlock additional activities in other technologies. **In particular, and in view of the potentials offered by using invader bush, despite the multiple challenges, there are considerable social and environmental co-benefits** that could be unlocked, while demonstrating consistency of international cooperation and continued support of the existing GIZ de-bushing programme in Namibia. Supporting biomass power stations has the additional advantage in that the capacity factor of generation based on biomass-powered generation plant would add to Namibia's base load capacity, and contribute to grid stability. Also, as bush-to-electricity plants will predominantly be located in rural areas, such support would contribute to the economic upliftment and development of areas that do not routinely benefit from development funding.

Climate and development cooperation

A Namibian GET FiT programme would entail a **combination of climate and development cooperation.** It would aim at reducing the use of the fossil-fuelled power stations such as Van Eck, Anixas and Paratus through the increased use of renewables, while strengthening the security of supply and supporting rural electrification by adding generation assets in more remote areas. In this way, a GET FiT program is a unique opportunity that combines climate cooperation in form of an intervention to realise the country's ambitious INDC, while further strengthening existing development cooperation activities.

Namibia's INDC was submitted to the United Nations Framework Convention on Climate Change (UNFCCC) in September 2015; the NDC is not confirmed and therefore we assess GET FiT against the currently available INDC. In its submission, Namibia states an aim to reduce its GHG emissions by 89% relative to the business-as-usual scenario by 2030, most of which is from agriculture, forestry and other land use-related activities which accounts for 81.7% of the mitigation potential. The energy sector plays a minor role only with 5.7% and mitigation potential resulting from three pillars: renewable energy, energy efficiency and (mass) transport. The targeted mitigation contribution of RE comes in at 3.3% of the total reduction target and is driven by an increase of the RE share in the generation mix from 33% to 70% (in 2030). 90% of Namibia's INDC is conditional upon funding support. The overall financing gap is stated to be USD 33 billion. For the energy sector, the INDC states a need for both technical assistance as well as financial support for the country to implement its commitments, specifically citing REFiTs and PPAs as areas that would benefit from further review and support.

Namibia's National Integrated Resource Plan (NIRP) is expected to be finalised in March 2016, and forecasts a peak demand of some 1,100 MW in 2030. Assuming that future imports are to be considerably below current levels (68% of all electricity requirements were imported in 2014), the business-as-usual RE share in the total generation mix can be more or less achieved with the existing Ruacana power plant. In the business-as-usual scenario, any growth in installed capacity would come from non-RE sources – in the

current plans primarily gas. The INDC targets an increase of RE to 70% (approx. 700MW), i.e. an addition to the currently installed RE capacity of approx. 400 MW. This target appears aggressive but not completely unrealistic taking into account the country's plans of significant investments in CSP. Small to medium scale RE under GET FiT could support 90 MW by 2020, and thus contribute to the country's ambitions in the run up to the reference year 2030.

As stated above, 90% of the INDC is conditional, with a total reported funding requirement of USD 33 billion. While the INDC does not provide details of how the funding requirement was determined, it is assumed that a proportional funding need over all sectors and actions would result in a requirement of approx. USD 1.2 billion to increase the share of RE. This would equal approx. USDm 3/MW. Against this background, **the proposed GET FiT intervention could provide some meaningful support for the realisation of Namibia's INDC/NDC ambitions**.

Short mid/term potential for GET FiT

Overall, a GET FiT intervention may be able to support an **additional 90MW of small and medium RE capacity that could be unlocked over the next 2 to 5 years**. There are two different pillars on which the proposed programme rests: **solar PV and bush-to-electricity projects**.

While both solar PV and bush-to-electricity technologies offer a considerably higher potential than the envisaged 90MW capacity in the mid-term, the GET FiT target is considered **appropriate to ensure that a viable track record is created without distorting the market or introducing dependencies.**

In this context it is anticipated that the market entry and establishment of solar PV will not require long-term support once a number of successful projects have been realised. In addition, as PV prices are expected to decline even further, the long-term support is not considered necessary in the medium- to long-term. As a result, the GET FiT PV intervention would be limited to a maximum of two years only.

In regard to bush-to-electricity, and given the necessity to develop the fuel supply chain as well as the electricity generation component for this technology to be considered viable in the future, it is estimated that a support programme of 3 to 5 years is necessary before 50MW capacity becomes available. For this intervention, GET FiT aims to support the preparation of the market, i.e. unlock the sector rather than establish a significant project pipeline beyond the first 50MW capacity.

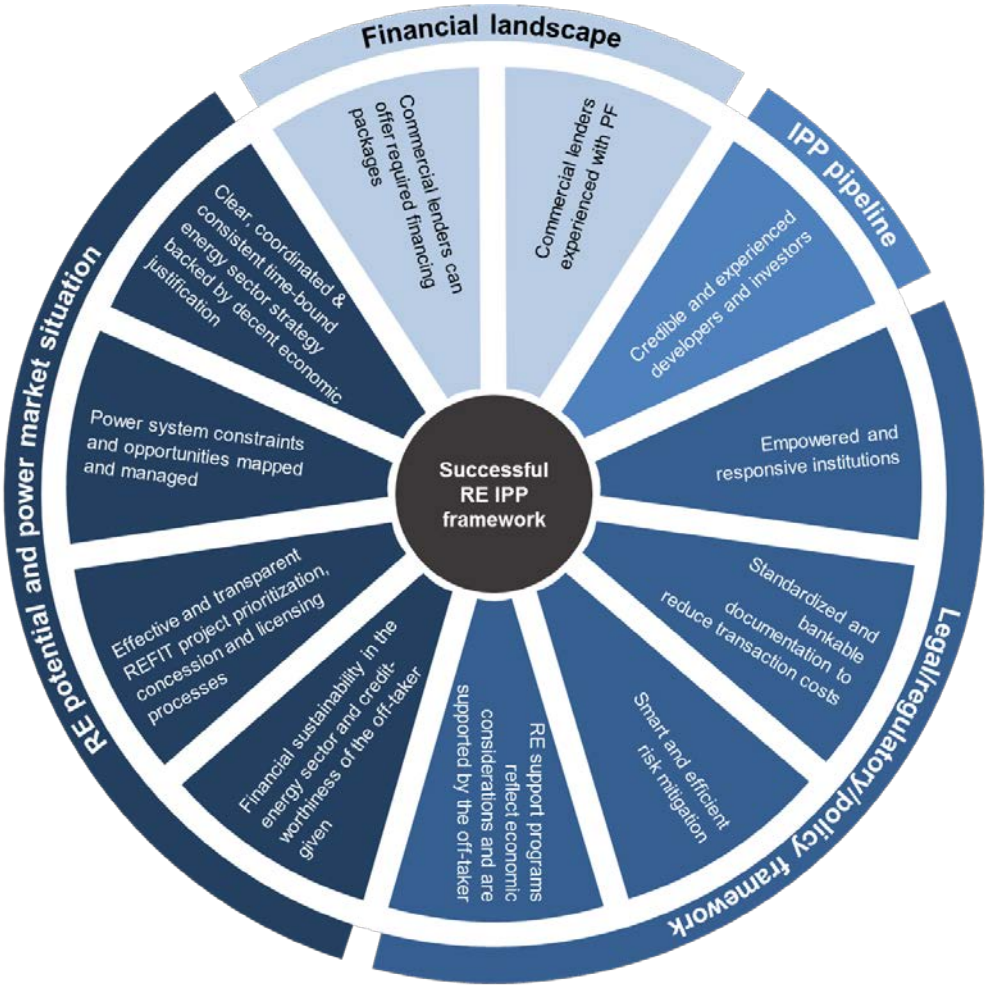
Namibia's direct access accreditation with the GCF could ensure support of bush-to-electricity projects once the foundation for such projects is in place. It is expected that strong learning curve and scale effects will significantly reduce the incremental costs once the initial 50MW capacity is operational.

5. Building blocks for a successful RE IPP framework: existing elements and key gaps

Introduction

There is no single item or factor that is sufficient to create a successful renewable energy IPP framework. Rather, there are a variety of factors, which when all present (at least to some degree), create an enabling environment for private actors in the power market. In the interest of simplicity, these factors have been consolidated into 11 "building blocks," which can be grouped into the four due diligence areas set out in the TOR for this assignment, and which formed the basis of the Regional Report. The figure below summarises the four areas of due diligence and the related building blocks for a successful RE IPP framework.

Figure 2: Building Blocks of a successful RE IPP framework



A comprehensive analysis of the power market status, barriers and opportunities for Namibia is presented in the Regional Market Study which has been used as input into the PCN. The table and sections below provide a summary of the current status of the respective building blocks in Namibia, and draws on the Regional Market Study as well as on information that has been gathered in the interim. The table presents the key barriers and gaps to establishing the building blocks, and identifies the type of support that would be required to overcome these.

It is noted that the proposed GET FiT intervention in Namibia targets two very different technologies which have significantly different maturity characteristics. At present, the regulatory framework for solar PV is considered to be relatively well-established, and had the currency not depreciated so substantially over the recent months, the tenders would almost certainly have resulted in additional installed capacity. However, as a result of the cancellation of the main solar tender, credibility issues have surfaced and may continue to plague the sector. In this regard, bush-to-electricity projects are completely different, in that only a few initial steps have been taken to introduce the entry of this technology into the country.

Table 1: Due diligence areas, building blocks, barriers and toolbox implications

Due diligence area	Building Block	Specific barriers and opportunities	Toolbox implications
RE potential and power market situation	Clear, coordinated & consistent time-bound energy sector strategy backed by decent economic justification	▪ Different actors in the sector are strongly aligned with regards to the sector vision ▪ NamPower and the GRN appear to have constructive and non-bureaucratic dialogue ▪ Planned power projects have repeatedly been delayed and expansion targets missed ▪ The energy sector strategy is applying a holistic approach including load management and energy efficiency initiatives ▪ The alignment between the energy and climate policy and cooperation between the responsible ministries need to be further discussed	▪ Coordination and political will are good departure points for a GET FiT intervention ▪ Support from the MME and buy-in from NamPower are important driving forces
	Power system constraints and opportunities mapped and managed	▪ No grid integration plan available, with a concern that a PV limit could be reached soon ▪ Feasibility studies for CSP plants are ongoing	▪ Support grid integration study, if necessary, and discuss “preferred zone” definitions and/or pricing differentiation in the context of a review of the REFiTs
	Effective and transparent REFIT project prioritization, concession and licensing processes	▪ Award of solar tender cancelled ▪ Specific regulations for bush-to-electricity projects are unavailable; this technology would likely require a separate tariff to reflect high harvesting costs and E&S co-benefits	▪ With involvement of GET FiT the creation of a positive track record of Namibian RE regulation could be accelerated. For solar it is not necessarily about a top-up but the donor involvement which reduces transaction risk for IPPs
	Financial sustainability in the energy sector and creditworthiness of the off-taker given	▪ Tariffs have been revised upwards and are deemed cost-reflective ▪ NamPower’s credit rating is good, while creditworthiness concerns might exist for transactions where REDs are involved	▪ Off-taker risk mitigation instruments for NamPower most likely not needed ▪ Role of REDs as off-taker to be discussed and necessity of risk mitigation instruments in such transactions to be assessed
Legal/regulatory/ policy framework	RE support programs reflect economic considerations and are supported by the off-taker	▪ REFiTs are currently capped at 5MW which limits economies of scale benefits ▪ No specific invader bush REFIT ▪ Public sector sees REFiTs generally as high but has signalled readiness to support RE projects even with PPAs prices above average generation costs	▪ GET FiT could support the transition toward a more transparent tender system, which would reduce the necessity for incremental cost financing ▪ Specific bush-to-electricity REFiT to align economic and financial viability and to define transparent E&S criteria for this technology
	Smart and efficient risk mitigation	▪ NamPower’s credit rating is rated Investment Grade by Fitch ▪ Subsidies are allocated over a multi-year period and are communicated transparently ▪ With the LRMC levy, NamPower may build a buffer to be used in case of price shocks provided this is approved by the regulator ▪ Short as well as long-term FX risk is a major concern: Short term FX risk in aprticular for developers and investors in the context of bidding processes. Long-term FX risk primarily at the end of NamPower and/or REDs	▪ Technical assistance to address short-term FX risk in revision of tender documents ▪ Consider targeted off-taker risk mitigation instruments for REDs ▪ Develop smart transaction structures and, if necessary, risk mitigation scheme to mitigate fuel supply risk for bush-to-electricity projects
	Standardized and bankable documentation to reduce transaction costs	▪ Standardized PPAs and Transmission Connection Agreements are available for REFiT ▪ Potential deal breakers in the PPA relate to deemed energy and connection risk and costs ▪ Currently no GRN guarantees available	▪ Limited dedicated support to achieve bankable documents ▪ Support by legal advisors as needed
	Empowered and responsive institutions	▪ Institutions are competent and empowered within their mandates ▪ ECB is a competent regulator ▪ NamPower is considered a professional organisation ▪ NEI and the Environmental Investment Fund are new actors without track record and with limited in-house capacities	▪ GET FiT could cooperate with EIF to strengthen its role and capacities. The fund could be important for follow up financing by the Green Climate Fund
IPP pipeline	Credible and experienced developers and investors	▪ Both local and international developers are active in the country ▪ Developers have the skills to successfully realise projects ▪ Only three medium-scale RE projects have been realised so far, with the pipeline largely focusing on solar ▪ Biomass harvesting companies have recently joined forces in form of a biomass industry group that is developing approaches for making available biomass for power generation projects	▪ Support should be structured to promote technology diversification ▪ Technical assistance and close dialogue with N-BiG and NamPower necessary to identify the most appropriate transaction structure as private sector role needs to be discussed ▪ TA to project developers is probably not necessary for PV
Financial landscape (investment climate)	Commercial lenders experienced with PF	▪ Experienced bankers with required structuring expertise ▪ Banks are knowledgeable about the energy sector and interested in financing S/M RE projects	▪ Local commercial banks can provide senior debt. Appetite to be tested for bush-to-electricity projects, a more detailed discussion with banks is necessary once the transaction structure has been defined ▪ Involvement of commercial lenders in technical assistance for bush-to-electricity business model development to maximise sustainability
	Commercial lenders can offer required financing packages	▪ Project finance loans with up to 10-year tenors available ▪ The 5 MW cap for REFiT projects might limit the availability of project finance (small ticket size)	▪ No full replacement of top-up with concessional loans, which should rather be targeted to allow commercial banks to participate in financing

Invader bush as a source of biomass fuel in Namibia

Overview

Bush encroachment represents an important environmental challenge in Namibia. Its negative impacts include reduced groundwater recharges, biodiversity loss and adverse impacts on livestock production and tourism. Overall, economic losses are estimated at around USDM 150 per year. Using invader bushes as biomass source for power production could help alleviate some of these problems. According to GIZ, fuel supply from invader bush could be sufficient to run a total of up to 170MW of biomass power projects.

The development of the sector has for a long time been challenged by a chicken-and-egg problem: on the one hand, limited harvesting capacity exists, and does not allow for quick ramp up of electricity generation capacity as the fuel supply risk is a deal breaker. On the other hand, an increase of the harvesting capacity is not financially viable as long off-take is not secured. In addition, the various social and environmental co-benefits of bush-to-electricity generation are accepted but are not taken into account by the different institutions involved, e.g. the energy sector primarily benchmarking total generation costs against avoided costs while ignoring externalities.

Current status of the industry

Currently there are 3-4 players cooperating with giz under their ongoing program that are actively harvesting woody biomass from invader bushes with an estimated harvesting capacity of around 30,000 tonnes per year. A cement factory is using woody biomass from invader bushes as a coal substitute. More harvesting firms are active in the charcoal industry and we are confident that they would become interested in serving a bush-to-electricity sector if clear signals regarding this opportunity are given.

According to industry sources, the harvesting capacity could be scaled-up almost immediately to serve a 5MW power plant, using current equipment and machinery. NamPower is currently in discussions with market players, and has indicated that focusing on supplying Van Eck with biomass is not a priority, but rather that they will adopt a smaller-scale, decentralised approach.

To support the case, GIZ is undertaking an assessment of the economic viability of de-bushing activities. Harvesting companies have gone through a learning phase and are now in a position to supply biomass at a price of NAD 800-1,000 per tonne.

There is no pipeline of advanced bush-to-electricity generation projects, but it is considered likely that developers and investors will consider the technology once a clear signal has been sent by the Namibian public sector stakeholders.

Industry outlook

Biomass harvesting companies have recently joined forces. In 2015, eight companies set up the Namibia Biomass Industry Group (N-BiG). N-Big is currently operationalized, and is negotiating with NamPower. However, the status of these negotiations is somehow unclear as we understand that NamPower has decided to focus on decentralized electricity generation options.

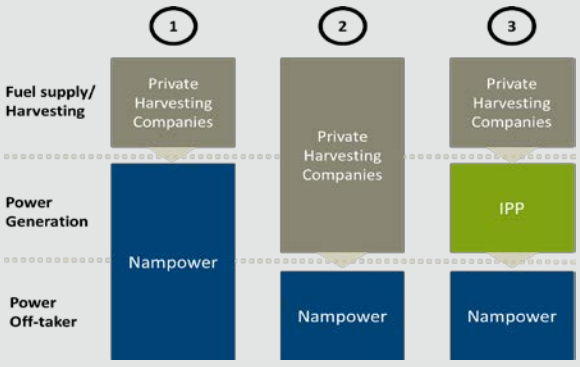
Despite ongoing negotiations, the final structure of the industry is not yet clear. Three potential scenarios could unfold:

Scenario 1 – NamPower. This is the structure which is currently under discussion between N-BiG and NamPower. Under this scenario, biomass companies enter into a fuel supply agreement with NamPower, either individually or through N-BiG.

Scenario 2 – Power Generation. Members of N-BiG have also mentioned that they might be interested in expending their activities into power generation and become IPPs. While such a structure would mitigate fuel supply concerns of the power generator, equity requirements at N-BiG level are significant and might prove to be a barrier.

Scenario 3 – IPP. Similar to Scenario 1, harvesting companies would not be involved in power generation. The difference lies in the nature of the fuel off-taker, which would be an IPP and therefore, fuel supply risk mitigation instruments would be critical. Depending on the balance sheet of the harvesting company external support may be required (a similar structure in use in the Kenyan geothermal sector is described on p.19).

Different industry structures for bush-to-electricity power generation



In scenarios 1 and 3, the chosen harvesting activities will have a heavy impact on the fuel supply risk. In this regard, the involvement of N-BiG as counterpart and bundling and risk diversification entity is expected to positively impact on investor appetite in the electricity generation sector.

Rationale for GET FiT intervention and potential support structures

By supporting the Namibian stakeholders in developing a sector strategy and providing a top-up to the initial 50MW of bush-to-electricity projects, GET FiT could provide a strong and credible signal that would help to overcome the barriers that the industry is currently facing. GET FiT support would trigger investments in the harvesting value chain and unlock learning effects and economies of scale, thereby lowering the subsidy requirements to make future projects not only economically but also financially

viable. In addition to investments at IPP level, significant investment in harvesting capacities are essential.

An efficient support scheme to close the viability gap needs to take into account the specifics of the sector and therefore cannot be a copy-and-paste from the incremental cost financing mechanism as chosen in Uganda (see section 6.2).

Case study: Baringo Power Plant

An example of how invader bush can be used to produce power is the Baringo power plant in Western Kenya. Developed by Cummins Cogeneration, a joint venture between Gentec Energy and Cummins Power Generation, it uses Mesquite wood, a species that has invaded agricultural land, watercourses, and roadsides to produce power.

The 2.4MW plant, which will eventually be expanded to around 9MW, was financed by Equity Bank and the project sponsor Cummins. Power is sold to Kenya Power under a 20-year Power Purchasing Agreement, with the standard REFiT for biomass of USDc 10/kWh and escalation applicable to 15% of the tariff. The project has also benefitted from several support programs. It received USDM 1 from the Africa Enterprise Challenge Fund (AECF) and another USDM 0.5 grant from OPIC under the U.S.-Africa Clean Energy Financing Facility (ACEF). To ensure fuel supply, Cummins entered into an agreement with contractors which in turn hire their own employees to collect the Mesquite wood. Currently, around 2,000 harvesters are employed with annual earnings of around KES 80,000 per year and harvester. The harvesting capacity is calculated such that the company can build up fuel reserves to cover several months of fuel supply. Contractors that enter into fuel supply agreement have to demonstrate that they possess the rights to harvest the biomass on the land.

Overall, the project can provide interesting lessons learnt for a potential bush-to-electricity component in Namibia. However, it should be kept in mind that there are important differences in terms of the biomass specie used as fuel and the required harvesting process.

- The USDc 10/kWh come in significantly below the estimated LCOE for Namibian bush-to-energy plants. However, including the grants from AECF and ACEF, the equivalent revenue per kWh increases by 2-2.5 USDc. The resulting LCOE of about USDc 12-12.5/kWh appears a more reasonable benchmark.
- The grants have been exclusively used to buy down investment costs at the end of the IPP. This, however, is driven by the fact that investment cost at harvesting level appears extremely low in Kenya with nearly no machinery being involved. Due to the more complex harvesting process in Namibia, such a focussed support might not be efficient under a GET FiT.
- Commercial lenders have been involved in the transaction and have showed appetite for the technology. In the context of the GET FiT Namibia feasibility study their risk profile should be analysed in more details and discussed with Namibian lenders to identify prerequisites for a private sector involvement.
- In Kenya, a lighthouse project approach was chosen to open the sector and donors have opted to support the realisation of the project by providing incremental cost financing in addition to the general biomass FiT. For Namibia we recommend a sector wide approach, a closer cooperation with the Namibian government and a stronger burden sharing between donors and the utility/government from the beginning on. This recommendation is based on the findings that the technology itself is already tested and that there is a stronger awareness among public sector stakeholders about the need of addressing the invader bush challenge. These prerequisites need to be tested again during the feasibility study phase.

6. The GET FiT Toolbox

6.1. What does GET FiT want to achieve?

In this section the barriers and gaps in the building blocks identified above are addressed, along with a more detailed analysis of exactly how a toolbox could be structured to create a solid framework for renewable energy IPPs in Namibia. Broadly speaking, the proposed interventions can be grouped into risk allocation/mitigation, incremental cost support (i.e. financial/FiT support), and technical assistance.

As highlighted above, there are a few overriding considerations that should be included in the implementation plan regardless of the final tools and activities selected. The first is that the starting point for Namibia, an upper middle income country, is quite different than for most countries in the region, and as such the GET FiT storyline is not solely a development effort but rather a combination of development as well as climate cooperation.

With these factors in mind, the following key steps inform the toolbox design and ultimately the implementation:

- **Strengthen trust in RE regulation:** The trust in RE framework and processes has suffered after the cancellation of the 3x10MW solar PV tender. With a concurrent slow-down of the REFIT process, one important aspect of a potential GET FiT programme in Namibia is to accelerate the creation of a positive track record in Namibian RE regulation.

- **Mitigate risks: Risk mitigation is an essential first step, but it needs to be realised that the Namibian risks are substantially different from those faced in many other countries in the region.** Across the continent, off-taker risk remains a significant barrier to renewable energy IPPs reaching financial close, and as such a very common request from the private sector is for some for guarantee because the off-taker/utility is deemed not to be creditworthy. In Namibia, off-taker risk in transactions with NamPower seems to be well managed. Residual risk could be addressed by minor structural changes to the REFiT, as is addressed below. If PPAs with regional distribution companies should become more important, the picture might look different. A significant risk in the Namibian context is the FX risk, as the Namibian Dollar (NAD) is pegged to the South African Rand (ZAR), which has considerably depreciated against the USD since November 2015, which in turn calls into question the viability of the interim REFiTs.

- **Provide incremental cost support for solar PV in line with abatement costs:** Overall, Namibia has excellent solar resource, and while costs have come down, there is a possibility that the unit cost from solar PV may be seen to be high, especially in light of recent currency movements. As such, there is a potential opportunity for GET FiT to share the burden of additional solar PV with the public sector, by bridging the incremental cost gap arising as a result of the NAD depreciation. A potential GET FiT solar component could also focus on PPAs with REDs only, thereby contributing to the further development of the sector. Overall, the financial support for solar PV should be seen as an investment in the general investment climate that is needed to incentivise private participation in Namibia's RE sector as a whole.

- **Support the energetic use of biomass from Namibia's invader bush resource which offers significant development opportunities:** The proposed GET FiT programme builds upon KfW's pre-feasibility study on biomass and GIZ's de-bushing program, where significant opportunities for deploying biomass as a fuel source for the electricity sector as well as capitalizing on the environmental and social co-benefits that arise from the productive use of this resource have been demonstrated. While bush-to-electricity technology has a high initial incremental costs it also triggers significant co-benefits which are not properly reflected in the current treatment of bush-to-electricity projects under the REFIT. Taking those into account initial GIZ studies on economic viability show very appealing results. Establishing a bush-to-electricity industry necessitates the creation of entirely new value chains, which is expected to be complex and time-consuming. TA will be needed to develop a sector strategy.

- **Provide limited institutional TA:** While being an important component, it is expected to be less important to the success of the envisaged GET FiT Programme than the elements identified above. Namibia has well-established institutions, but some areas remain that would benefit from a modest, targeted TA program, requiring a limited budget only. Here, the cooperation with donors could help to add credibility. There may also be an opportunity to work with the Environmental Investment Fund to access funds directly from the Green Climate Fund, to which the former was accredited as an implementing entity in July 2015.

Elements of the GET FiT toolbox

The components of a GET FiT programme should be carefully tailored to address the specific barriers preventing the realization of a successful RE IPP program and fill in the gaps described above.

Table 2 below outlines the major elements of a GET FiT programme for Namibia, which aims to address the barriers currently facing the electricity sector. Risk mitigation measures are narrowly focused, with the FiT support suggested to bridge the viability gap for solar PV. Indeed, the implicit aim and assumption is that a successful GET FiT programme will strengthen the credibility of the country's RE IPP framework, reduce the perceived risks, create precedence for successful RE integration, and thus bring the economic value of RE in

line with alternative system costs. As emphasised before, the TA elements will be very specific and of rather limited scope.

Table 2: GET FiT Toolbox

Risk allocation/mitigation	▪ Reduce transaction risks for investors by increasing trust of IPPs in RE regulation and regulatory processes ▪ Work with ECB/NamPower to potentially slightly restructure REFiT PPAs and processes to further mitigate risks ▪ Limit FX risk by developing hedges, local currency lending options and others ▪ Create risk mitigation instrument for biomass fuel supplies
Financial support/FiT tariff support	▪ Create a burden sharing instrument to address the depreciation of the NAD ▪ REFiTs are generally seen as financially viable; however with results from REFIT tender coming in below announced FiT level and taking into account the recent NAD depreciation, the financial viability of the projects might have suffered significantly ▪ Provide incremental cost support for bush-to-electricity projects taking into account the various co-benefits from such projects
Technical assistance	▪ Develop business models and a sector strategy for bush-to-electricity sector ▪ Support the biomass industry in developing the value chain elements ▪ Undertake a grid integration study solar PV plants ▪ Support the ECB in the review of the REFiT program

6.2. Risk allocation/mitigation

- ***Risk mitigation instruments would likely be unnecessary for solar PV projects***
- ***For bush-to-electricity projects, a supply guarantee is essential to make such projects bankable***
- ***FX risk is and remains a significant concern***

Private sector project developers and financiers are exposed to several risks during the different phases of a RE project. While they can absorb and manage some specific project risks, others cannot be reasonably managed, such as the political, regulatory and off-taker risks. In Namibia most of these risks are not deal breakers for developers. Indeed, Namibia has a healthy renewable IPP pipeline is developing, and the list of license holders also demonstrates the broad variety of capable developers being interested in the PV sector (though with little technology diversification). As will be discussed below, FX risk remains the major concern, and a place where the public sector can play a more pronounced role. The table below highlights risks faced by RE projects and which sector is best positioned to absorb/mitigate this risk.

Figure 3: Risk Slicing

Only some of the risks from group B present a significant barrier in Namibia. The table below describes the risks and how they could be mitigated.

Table 3: Key Barriers

Risk	Status Quo	Mitigation Option
Political Risk	Namibia is a stable democracy and political instability in the short and medium is considered unlikely.	No risk mitigation is deemed necessary.
Off-taker Risk	NamPower is considered a creditworthy institution and is rated investment grade. In case REDs act as off-takers, some additional assurances may be needed.	Adjustments of contractual agreements and if needed, Partial Risk Guarantee as offered by World Bank or MIGA (or Regional Liquidity Support Facility)
Regulatory Risk	An independent regulatory body is in place. Irregularities in the recent solar tender shed a bad light on regulatory process and the predictability of the GRN.	GET FiT involvement and strict project management
Grid unavailability risk	Many well-resourced sites are far away from the existing grid.	Only sites close to the grid to be eligible for support.
FX Risk	The NAD has strongly depreciated recently, along with the ZAR that it is pegged to.	Involvement of local financial sector and FX hedging instruments.
Tax Risk	Namibia recently amended its income tax and VAT. Taxes are considered relatively high.	The current PPA is not very clear regarding tax risks. Adjustment of PPA provisions for tax treatment could mitigate tax risk.
Fuel Supply Risk	The structure of the bush-to-electricity fuel supply chain is as yet unclear.	Explore different models: risk reduced if harvesting companies invest in generation, but makes project finance very difficult for generation asset only.

No/limited barrier, Medium barrier, Significant barrier

Mitigating off-taker risk: NamPower enjoys a solid reputation and benefits from strong credit ratings. Although off-taker risk mitigation might become an issue, this could be likely addressed by way of minor structural changes. The need for external guarantees/insurance support seems to be limited for NamPower. It could be considered in case GRN requests support for transactions with REDs as off-taker.

Mitigating FX risk: There are both short-term and long-term FX risks in Namibia. In the short term, when the PPA is signed and financing is arranged, the FX risk can be managed. Should an FX shock occur in future, a structural adjustment needs to be implemented (e.g. developers could state which share of the bid price would have to be FX adjusted for the new rate at the date of the PPA signing/financial close). GET FiT could facilitate such a discussion with NamPower. For long-term FX risk, the standard suite of instruments and/or mechanisms (e.g. indexation) could be utilized.

Mitigating the fuel supply risks: To successfully enable project finance for bush-to-electricity projects, the fuel supply risk will have to be mitigated. Such risk mitigation would likely include indemnification of the power generator in case of non-delivery of fuel. It is estimated that such a structure would have to cover at least 3-6 months of fuel supply. To advance geothermal projects in Kenya, AfDB has issued a PRG that covers six months of steam supply. If GDC, the state-owned company that delivers steam to IPPs, fails to deliver, the IPPs benefitting from such guarantee will receive payments from AfDB to compensate for losses related to non-production of electricity. However, in the case of Namibia, designing such a structure would likely be more challenging than in Kenya since fuel would be supplied by one/several private entity(ies) and not the Government.

The cost of a fuel supply guarantee covering 6 months of fuel supply for a 10MW plant would be approx. USD 60,000 per year. In case the guarantee would compensate for foregone revenues and not fuel costs (e.g. if there is no alternative to purchase fuel at the same price), the cost of the guarantee would roughly

double. Therefore, a preliminary exposure estimate is USD 60,000 to 120,000 per year for a 10MW plant, and therefore USDM 0.3 to 0.6 per year for the envisaged 50MW portfolio.

Absorbing only risks that the public sector can manage (more efficiently) is a core pillar of the GET FiT concept. An intervention as described above would be in conflict with the original GET FiT concept but potentially necessary to resolve the situation. The scheme would have to be designed carefully with a particular focus on alignment of interests, ensuring that suppliers have sufficient skin in the game. In any case, structural adjustment like the involvement of N-BiG as bundling and supply diversification entity are likely to be better than guarantees.

Risks not addressed by the GET FiT toolbox: Grid integration remains a risk for solar PV and needs to be assesses for the bush-to-electricity component. On account of the geospatial characteristics of Namibia, the grid is spread out over a large area. As such, grid integration can be a risk for the expansion of solar PV, and while GET FiT is not positioned to address this risk, it cannot be ignored in the longer term, while it is not considered to be significant in the next few years during which GET FiT may be operational. Following the recent developments, we do not believe that that the initially expected 100MW from the 30MW solar tender plus REFIT will come on grid in the next 12 months.

6.3. Incremental cost support

- ***A small solar PV top-up is proposed as incentive to GRN and Nampower to enter into a cooperation with the GET FiT sponsors and/or to facilitate PPAs with REDs, especially in view of the recent depreciation of the NAD***
- ***Assumptions on the viability gap of future bush-to-electricity projects are less robust and need to be further developed during the feasibility study. With no specific REFIT for this technology being in place at this point in time, we believe that a fair burden sharing with NamPower involves a technology specific FiT above current (low) biomass FiT levels***

The case for tariff support

A key aim of GET FiT is to accelerate the creation of an enabling environment by providing transitional support which reduces risks, improves investment attractiveness, lifts institutional capacity, and fosters development in which a RE IPP track-record can be built. To this end, incremental cost financing is considered to be an effective tool to unlock the potential of the bush-to-electricity business and promote the fair pricing of externalities and the wider socio-economic co-benefits.

Expected incremental cost support levels

Further, the results-based nature of the support ensures that a true partnership is developed whereby funding is only released if the partners in the programme are successful in unlocking private investment and commissioning projects. Thus, in rolling out GET FiT, it is anticipated that either top-ups or buy-downs will be required during the transitional phase (duration of the GET FiT programme). For the solar component, these could take the form of support of PPAs with REDs as well as with NamPower.

As a result of Namibia's excellent solar resource, the LCOE for solar PV projects is relatively low. Tariffs offered in the most recent solar tender have been of the order of USDc 8/kWh and below. However, with a strong depreciation of the NAD bids are expected to be no longer financial viable.

Smaller PV projects are expected to be slightly more expensive than their multi MW counterparts and it has to be monitored whether REFiT bid level changes and how the REFiT process develops. This will heavily impact the economic viability of a REFiT for <5MW solar. As described above we believe that it is crucial to ensure a solid track record for one technology before investors are asked to allocate funds to the more risky biomass value chain. Therefore, a top-up of USDc 1/kWh is proposed, which may also be appropriate as a buy down for future PPAs with REDs. Such a burden sharing arrangement may also provide an additional incentive for NamPower to support the further deployment of solar PV. While such a solar GET FiT component would have to be implemented rapidly, a fast track programme could also assist in re-energising the Namibian REFiT program and strengthen the program's credibility within the RE project developer community.

LCOE estimates for bush-to-electricity projects are less robust than their solar PV counterparts, given the absence of a track record in this sector. Based on capex and opex assumptions provided by industry experts, the LCOE is estimated to be of the order of USDc 15/kWh. In the medium term, learning effects and economies of scale are expected to reduce the LCOE and we expect that assumptions provided by N-BiG also to include some buffers for the initial operations. Initially, interest rates for commercial debt are assumed to be relatively high and debt ratios to come in low, also as a result of the unproven track record of contemporary bush-to-electricity business models. As the sector matures, financing costs for such projects may decrease, and positively affect future LCOEs.

Currently, there is no specific FiT in place for bush-to-energy projects and the biomass FiT would apply. For the calculation of the gap it is assumed that the REFiT for bush-to-energy projects is increased from the current USDc 8/kWh (NAD 1.3/kWh) to USDc 11/kWh. Such an increase can be justified on the grounds that bush-to-electricity projects contribute to base load capacity, and their positive contributions to externalities. Here it is assumed positive externalities would be taken into account by NamPower, and are potentially backed by the GRN. The willingness of ECB and NamPower to increase/accept such a burden sharing has not been tested and must be elaborated with the host government.

Figure 4: Bridging the viability gap with top-up for solar PV projects (USDc/kWh)

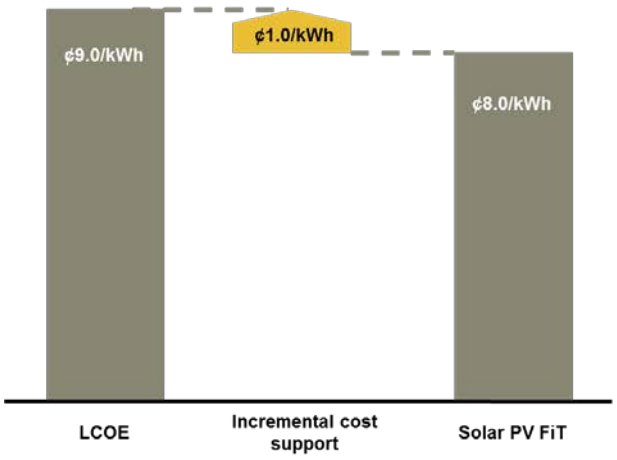
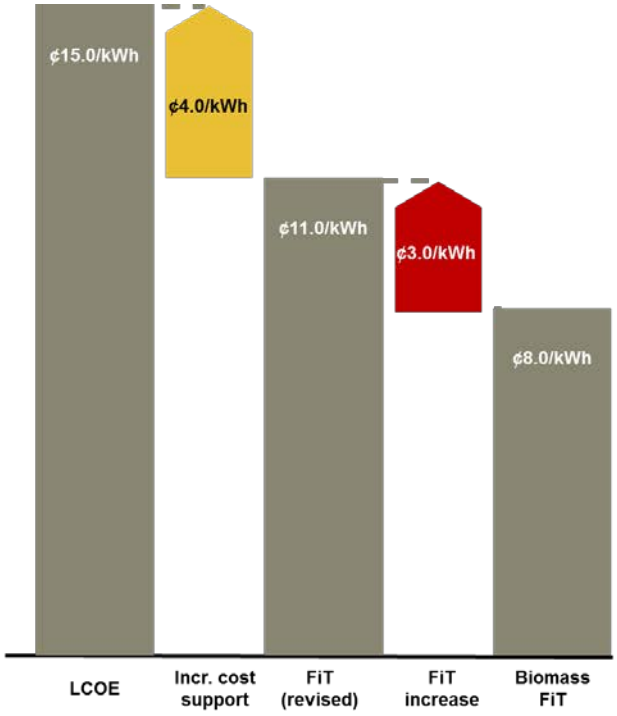


Figure 5: Bridging the viability gap with top-up for bush-to-electricity projects (USDc/kWh)



Support structures for bush-to-electricity projects

As stated above, an efficient support scheme to close the viability gap needs to take into account the following specifics of the sector and therefore cannot be a copy-and-paste from the incremental cost financing mechanism chosen in Uganda. We would like to highlight three major aspects:

- *Different investors/entities in harvesting and electricity generation might require dedicated financial support:* Given the limited financial strength of most of the existing harvesting companies, it is expected that future IPPs will be different from fuel supply companies (c.f. scenario 3 as discussed before). This implies that different investors deploy capital at the different levels of the value chain. While only providing a high FiT as sole financial support instrument, and trusting that IPPs will ensure that appropriate prices are paid to fuel supply firms, the economic efficiency of such an approach should be compared to a two-fold support structures that directly targets both IPP and supply entities. Against the background of higher creditworthiness of NamPower and/or GET FiT donors compared to the IPP, this might result in lower

private sector financing costs at the level of the harvesting company and consequently lower overall LCOEs.

- *High operating costs of both harvesting and electricity generation operations, and lower capital intensity limit the potential of front loaded top-up support:* Compared to conventional hydro or solar PV projects, the capital intensity of bush-to-electricity projects is lower. At the level of the IPP, fuel costs contribute some 50% of the LCOE. For harvesting companies, we understand that average equipment lifetime does not exceed five years. The shorter lifetime results in higher replacement capex, while shorter individual payback periods reduce financing costs. Any frontloading of financial support needs to be carefully assessed in order to ensure appropriate remaining incentives for the investors (at both levels, harvesting and electricity generation) over the 20 years PPA lifetime. Based on current assumptions it therefore appears inappropriate to suggest a frontloading structure as was the case for GET FiT in Uganda. We are, however, confident that a mix of an increased 20 years base FiT, concessional financing targeting both harvesting companies and IPPs and moderate financial top-ups can be determined which closes the financial viability gap in an efficient and sustainable way.
- *High exposure to inflation risk needs to be addressed in incremental cost support*: Harvesting companies face a significant exposure to inflation risk driven by high operating costs. Inflation will be a key driver for the ex-post LCOE of supported projects and therefore the actual viability gap. Any incremental cost support needs to be structured in a way that it addressed this risk and reduces uncertainty for the IPP investor in order to minimize their return expectations and consequently overall financing costs.
- *Strong learning curve effects in harvesting are realistic and support schemes need to be structured in a way to avoid over-subsidisation:* According to N-BiG representatives, the average lifetime of harvesting equipment seldom exceeds five years. This implies that learning curve effects in harvesting are likely to be realised in short cycles and are expected to bring down fuel costs for IPPs. This in turn has favourable repercussions for the LCOE, not only in follow-up projects, but even within a single 20-years PPA. Attracting investments to the sector will require transparency and revenue visibility and we do not expect investors to be willing to bed on decreasing fuel costs. On the other hand, a GET FiT intervention needs to be structured to avoid the over-subsidisation of IPPs. As a result, it is proposed that the financial support through the GET FiT programme is to be structured in a way that motivates IPPs and harvesters to realise scale effects, while at the same time allowing for reduced support in case of a decreasing viability gap. An appropriate sharing mechanism for learning curve benefits should therefore be a pillar of the future financial support structure.

The above aspects will need to be carefully analysed during the feasibility study phase. Also, underlying cost assumptions need to be challenged. The concrete support level and structure will strongly impact overall funding needs. The funding requirements presented below are based on the assumption of a frontloading structure, as was used in the GET FiT Uganda programme, so as to ensure comparability across the different countries. However, it is emphasised that such frontloading does not appear to be a realistic option for application in Namibia.

Funding requirements

The table aside provides an overview on the funding required to close a 1 USDc gap for a 40 MW solar PV pipeline and a sensitivity analysis for the gap for 50MW of biomass capacity.

As stated above it is highly unlikely that the frontloading structure used in GET FiT Uganda will be appropriate to support bush-to-electricity based IPPs. The required financial support to close the viability gap will most likely involve a mixture of direct financial grants and concessional financing targeting both harvesting companies and IPPs. As this support structure still needs to be developed, a first indicative budget is provided which is based on the Uganda payment structure. Given the high uncertainty with regard to actual LCOEs for bush-to-electricity projects as well as our feeling that assumptions made available by N-BiG provide some buffers, a sensitivity analysis over a 2-4 USDc/kWh top-

Table 4: Incremental cost support scenarios for solar PV and bush-to-electricity projects

Incremental cost support, in USDc/kWh	40 MW Solar PV, in USDM
1.0	8.6

Incremental cost support, in USDc/kWh	50 MW bush-to-electricity, in USDM
2.0	70.2
3.0	104.9
4.0	140.4

up range is undertaken.

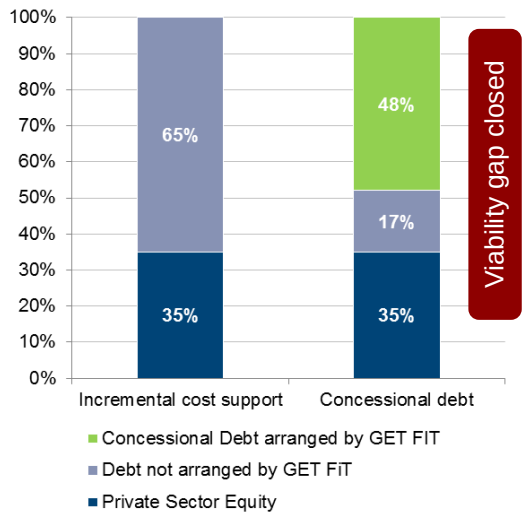
Comparing the funding needs for the solar PV versus the bush-to-electricity portfolios, capacity addition and yield need to be taken into account. As such, financing a 50MW bush-to-electricity portfolio costs up to 15 times more than the solar PV component, it will add approx. 350 GWh per year, compared to some 80 GWh per year from solar PV, without taking the additional co-benefits from bush-to-electricity projects into account.

Replacing incremental grant support with concessional financing

We understand that the UK is interested in considering concessional financing to support GET FiT rather than direct financial support. While the budgetary implications are explored aside, here the implementation considerations are outlined. Many Namibian commercial banks have expressed an interest to provide funding for small and medium-scale renewable energy projects, in particular solar PV. As such, the feasibility study should explore whether it would be possible for Namibian banks to take on a senior debt tranche of approximately 30-40% of the total investment, leaving another similar size tranche for concessional debt based on the assumption of a 65/35 debt/equity split.

For the envisaged solar PV component, a replacement of a USDc 1/kWh buy-down/top-up would require concessional loans covering approx.. 50% of the financing structure, with 17% left for senior debt from commercial lenders, and 35% for equity (Figure 6). For the 40MW solar PV portfolio, direct support of 8.6 USDM could be replaced by 20USDM concessional financing (linearly repaid over the 15 years).

Figure 6: Financial structure for solar PV



For bush-to-electricity projects, concessional financing would have to target both harvesters and IPPs and would not only address high financing costs but potentially also access to debt financing itself. At the level of harvesters, financing costs are expected to come in at approx. 10% of total costs (i.e. required price per ton harvested invader bush which is needed to make the business model of the harvester financially viable), well below the level of the IPP. This is driven by the shorter lifetime of equipment and payback period of investments in equipment. Consequently, the provision of concessional loans and the resulting reduction in debt financing costs would only have a minor impact on the overall costs for the harvester (and the fuel cost for the IPP). For the IPP, financing costs represent up to 20% of the LCOE with the impact of concessional financing being stronger. Overall, we do not expect that the gap of 4 USDc/kWh could be covered by concessional financing only but the provision of concessional debt could clearly help to improve access to financing itself.

Implied carbon price of the buy-down

GET FiT is an especially important tool for facilitating investments in renewable energy in part because there is not at present a well-functioning carbon market. However, it is nonetheless valuable to indicate the implied carbon price of the proposed buy-down. This section presents an estimate cost of the implied abatement costs of a USDc 1/kWh top-up payment.

In the case of Namibia, estimates for current emission factors range from 0.10 to 0.96 tonnes of carbon dioxide per MWh, depending on whether only the generation mix in Namibia or in the SAPP region is considered[2]. As there are several natural gas power projects planned in Namibia, the GET FiT abatement costs are calculated based on the domestic emission factors of newly added capacity, which is estimated at

[2] The 0.1 tCO2/MWh the authors estimate based on the current generation mix ignoring imports. The 0.96tCO2/MWh is the value mentioned in the UNFCCC approved standardized baseline for the Southern African Power Pool. The only two registered CDM projects used an emission factor of 0.91tCO2/MWh.

0.5 tCO2 per MWh, and the regional emission factor of 0.96 tCO2 per MWh. Based on these assumptions, the implied carbon price for the USDc 1/kWh buy-down for solar PV electricity amounts to USD 20.0/tCO2, and USD 10.4/tCO2 respectively.

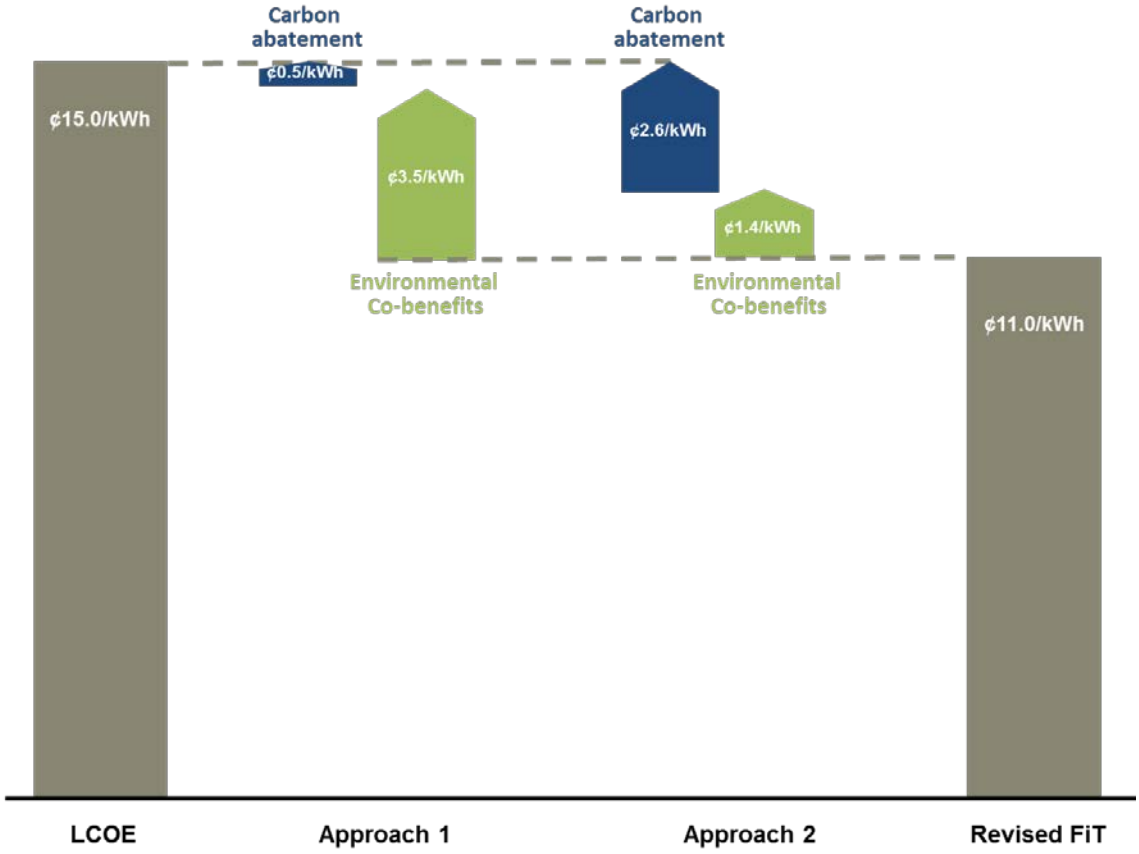
For the USDc 4/kWh buy-down for bush-to-electricity, abatement costs would be significantly higher. However, since significant additional environmental and economic benefits are expected to be created by such projects, these co -benefits have been taken into account for the calculation of carbon abatement costs. Based on different studies, indicative estimates for the value of co-benefits range between USDc 1.4 and USDc 3.5 per kWh (see Figure 7). Carbon prices based on the carbon abatement portion (i.e. the incremental cost support minus the value of co-benefits) therefore range between USD 5/tCO2 to USD 52/ tCO2. Based on this method, the carbon price for bush-to-electricity projects amounts to an average USD 23.6 per tonne CO2, as illustrated in Table 5.

Table 5: Abatement cost scenarios

	t CO2/MWh	Implied carbon price		
		1 USDc/kWh incremental cost support	4 USDc/kWh incremental cost support	
			Scenario 1	Scenario 2
Future estimated emission factor of domestic generation	0.50	20	52	10
Estimated emission factor of SAPP generation	0.96	10	27	5
Average		**23.6**		

Note: In Scenario 1 the co-benefits are estimated at USDc 1.4/kWh with a resulting carbon component of USDc 2.6/kWh. In Scenario 2 co-benefits are estimated at USDc 3.5/kWh with a resulting carbon component equal to USDc 0.5/kWh. Please see Annex I for detailed calculations.

Figure 7: Preliminary estimate of the value of co-benefits



6.4. Technical assistance

Based on the status quo on the ongoing activities of other development partners, key activities that would be complementary are listed in the table below along with an indicative pricing. This list will develop and evolve during the feasibility phase, as the concrete needs for support will become clearer in the coming months, especially with regard to the bush-to-electricty component. In addition, coordination of TA activities relating to the bush-to-electricity component will require strong coordination with GIZ since the institution has been very actively supporting the development of a business to use invader bush as energy source.

Table 6: TA components and indicative pricing (USDM)

Component	Indicative pricing In USDM
TA Support to develop risk mitigation mechanism for invader bush	0.5
(Ongoing) TA for invader bush value chain development	1.5
TA for ECB as potential host institution (incl. for example REFiT review or grid integration study)	0.6
M&E consultant[3]	1.0
Implementation consultant	4.0
Project Management	2.0
Total	**9.6**

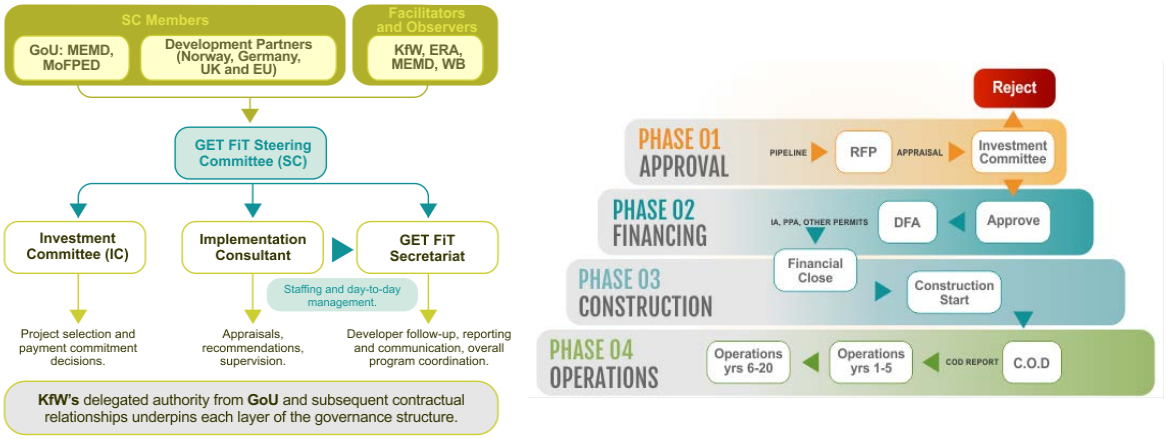
In particular position 1 and parts of position 2 could be part of the feasibility study phase as the results will heavily impact the actual implementation structure of a GET FiT Namibia. For the implementation consultancy we have applied cost levels from GET FiT Uganda. We are, however, confident that a reduction of the budget might be feasible taking into account the existing set-up in the Namibian energy sector.

6.5. Implementation and governance structure

Introduction of the GET FiT concept in new countries will require adaptation to the specific country and power sector contexts, and will not be a blue-print of the pilot GET FiT Uganda programme. Important inspiration for the governance structure and project cycle can nevertheless be found in the experience in Uganda. Final programme design will be based on detailed studies and extensive dialogue with the key stakeholders.

[3] The monitoring could in theory also be conducted by the implementation consultant. The evaluation however should be conducted by an independent unbiased party. Irrespective of the split of tasks between several consultants, a budget would be required for monitoring and evaluation.

Figure 8 GET FiT Uganda Programme Governance structure and Project Cycle



There is no single advocate for RE IPPs in Namibia. However, key institutions in the sector seem to be in agreement in their support towards RE and IPPs. Despite this, little tangible progress has been made in establishing IPPs to date. The MME, as the custodian of the energy sector, in close collaboration with the ECB, has embarked on refining policies and develop targets for small- and medium-scale RE applications as part of the country's overall energy mix. In addition, the ECB has initiated and managed the REFiT process. Therefore, these institutions will also be the primary contact to GET FiT. With recent challenges around the solar PV tender and delayed REFiT implementation, any GET FiT set-up would need a strong advocate at the end of the Government of Namibia. The Ministry of Mines and Energy would have to provide clear guidance. Furthermore, NamPower buy-in will be essential and as such it would have to signal strong support for GET FiT.

EIF is already involved in RE/EE lending support and is an accredited implementing entity of the Green Climate Fund. The latter can be crucial to ensure a sustainable phase out of donor support or a decent co-financing from the beginning on, which is not unlikely given that the GCF is very interested in GET FiT and would be very likely to approve a direct access GET FiT request from Namibia. While the EIF does not appear strong enough to champion a GET FiT approach with convening power as well as implementation firepower being limited at this point in time, it could be an important implementing partner for ECB and MME partner, in particular in a scenario involving concessional financing.

Indicative approach to project selection

The approach to assessing eligibility and selecting projects for support will vary significantly for the two components. For PV it should be aligned with the outcome of the second attempt at a solar tender and/or the REFiT process.

For the invader bush component, the economic and financial criteria will heavily depend on the outcome of the feasibility study. Clearly, a strong focus would need to be put on the compliance with IFC performance standards.

The following describes the process followed in Uganda which also could provide references and guidance.

The Uganda GET FiT Investment Committee made the final decisions concerning the successful projects, but were informed by Appraisal Reports assembled by the Implementation Consultant (for the RfPs) and a separate consultant for the solar tender. Both the RfPs and solar tender in Uganda applied similar appraisal and evaluation criteria (numbers indicate weights applied to the third and final RfP);

- Financial and economic performance (30)
- Environmental and social performance (IFC Performance Standards) (20)
- Technical performance (30)
- Viability of Project Implementation Schedule (20)

Projects were ranked according to total score and had to achieve a minimum score of 70 in aggregate and 50% for each individual criteria. A notable adjustment for the solar tender was the inclusion of scoring according to geographic priorities – projects in priority areas received higher scores. A key driving element of the scoring and ranking, as well as the primary economic motivation of the programme, in Uganda has been the urgency of introducing new capacity so as to avoid the start-up of thermal power once again. Each project was required to have a Feasibility License, a (draft) Feasibility Study, ESIA and (draft) RAP, in order to be eligible. Each applicant was screened for completeness, followed by a detailed appraisal, including site visit.

The importance of the IFC Performance Standards in terms of environment and social criteria must be emphasized. Systematic application and follow-up of IFC Performance Standards for all relevant RE projects is challenging for developers, consultants and authorities, whom might be in need of some form of support or assistance to address the requirements appropriately. The requirements must be communicated clearly and consistently, including the challenges they pose in terms of quality of development efforts and reporting. For invader bush projects in particular, clear eligibility criteria need to reflect compliance with IFC performance standards to develop the sector from the very beginning in a highly sustainable way.

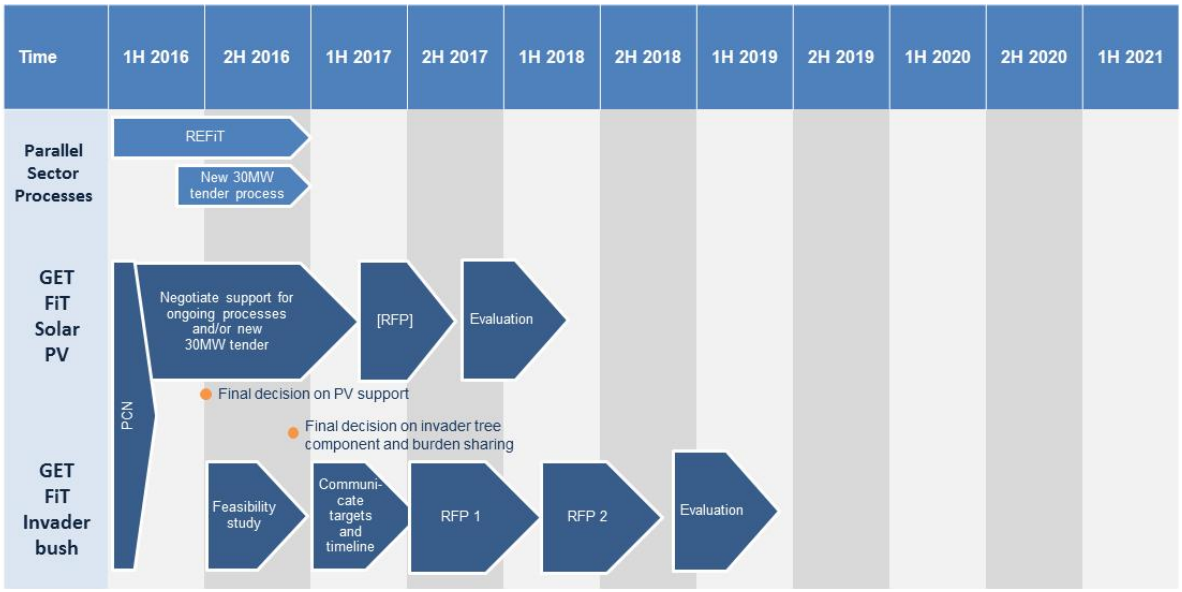
Additionally a minimum commercial debt tranche (e.g. 20-30%) could be introduced. The inclusion of commercial debt was considered as one of many factors when scoring the financial performance in Uganda, but no specific requirements were defined.

6.6. *Indicative implementation timeline*

As stated above we believe that GET FiT donors should be open to support Namibia in the ongoing PV processes if requested. Whether cooperation would be needed also for the next round of tenders will depend on the agreed burden sharing but also the FX development and the resulting relative attractiveness of PV compared to other technologies. In any case, the focus and the timeline for the support will depend on the needs communicated by the Namibian stakeholders. We do not believe that a detailed feasibility study for such a fast-track option would be necessary.

For the invader bush component, 3-5 years until first projects coming on grid is a more likely timeline given the substantial sector support required to establish an effective business model and supply chain. We suggest that a general agreement on cooperation on invader bush and an appropriate burden sharing should become the prerequisite for PV support and consequently link the two work streams.

As discussed in the context of the Baringo case study, the assumption that a sector wide approach is appropriate and superior over a project specific intervention would need to be reassessed in the feasibility study. This as well as the required agreement with MME/ECB on an appropriate burden sharing should become basis for Go/No-Go decisions during/after the feasibility study.



7. Required budget and potential results of a GET FiT Programme

Based on the proposed toolbox activities highlighted in the previous sections, this section provides an indicative budget for a GET FiT programme in Namibia. As before, the figures provided are indicative only and should be understood as being preliminary in nature.

7.1. *Indicative budget*

Table 7 summarises the indicative budget requirements for the proposed GET FiT programme for Namibia. It is emphasised that budgetary provisions would have to be further refined during the feasibility study phase. It is of particular importance to note that the funding requirements for the incremental cost support should be analysed in greater detail once the targeted business model for bush-to-electricity is defined. Table 7 is based on indicative country-specific estimates of potential investment costs and capacity factors, and does as yet not include any grid strengthening or expansion investments as may be required.

The cost for the bush-to-electricity project top-up represents the main part of the budget. This has to be seen in light of the much higher capacity factor and base load contributions from bush-to-electricity projects when compared to those from solar PV projects.

Table 7: Indicative budget for the proposed GET FiT programme for Namibia

Category	Use of funds	Amount (in USDM)
Risk allocation/mitigation	▪ For off-taker risk mitigation, funds would only be required for technical assistance support to facilitate the provision of the risk mitigation instruments. The cost of the instruments itself would likely be covered by developers. ▪ Due to the uncertainty with regard to the need and structure of a fuel supply, we do not budget (revolving) capital needs at this point in time.	▪ See TA ▪ (Exposure for a 6m fuel supply guarantee would come in between USDM 0.3 and 0.6)
Incremental cost support	▪ Provision of a USDc1/kWh top-up to developers to cover the gap between the LCOE and the current REFiT for solar projects for a 40 MW solar PV pipeline. ▪ Provision of a USDc2-4/kWh top-up to developers to cover the gap between the LCOE and the current REFiT for solar projects for a 50 MW biomass pipeline.	▪ 9 ▪ 70-140
Technical assistance	▪ TA support to develop risk mitigation mechanism for invader bush ▪ TA for invader bush value chain development ▪ TA for ECB as host institution ▪ M&E consultant ▪ Implementation consultant ▪ Project Management	▪ 0.5 ▪ 1.5 ▪ 0.6 ▪ 1.0 ▪ 4.0 ▪ 2.0
Total		**89 - 159**

7.2. Projected KPIs of a successful GET FiT implementation

This section puts forward some key performance indicators for the proposed GET FiT programme in Namibia. These include the proposed generation capacity additions, energy contributions, emission reductions, incremental cost, leverage and burden sharing ratios.

- **Installed generation capacity:** GET FiT is to support a capacity addition of up to **90MW**, of which **40MW** is from solar PV, and **50MW** of bush-to-electricity projects.
- **Energy contribution:** the proposed solar PV projects will add an expected 80 GWh per year, while the bush-to-electricity projects are expected to add up to 350 GWh per year, i.e. a total electrical energy contribution of approx. **430 GWh per annum**.
- **Emissions reductions:** an additional capacity of 90MW would reduce Namibia's GHG emissions by **4.3 MtCO2** / **8.3 MtCO2** assuming emissions factors of 0.5tCO2/MWh / 0.96tCO2/MWh over a period of 20 years.
- **Leverage ratios and burden sharing.** With the incremental costs as indicated above, and assuming capital expenditures of approximately USDm 1.1/MW for solar PV, the leverage ratios and burden sharing proportions are exhibited in Table 8 below.

Table 8: PV Leverage ratios and burden sharing (%)[4]

		Frontloaded grant support
Leverage ratios	With technical assistance	0.83
	Without technical assistance	0.89
Burden sharing	With technical assistance	16.2%
	Without technical assistance	15.2%

7.3. Potential development benefits

Despite a focus on climate benefits, the proposed GET FiT programme would also result in significant development co-benefits. These are in form of an increase in the security of electricity supply, which is important as Namibia currently imports almost 70% of its electricity needs from neighbouring countries. Furthermore, the bush-to-electricity intervention would help to address the invader bush problem that the country is facing. By using biomass from such invader bush, biodiversity can be increased, the recharge of groundwater resources is promoted.

And, importantly, local employment opportunities are created throughout the value chain, including in areas that are characterised by below-average economic development. While job creation for PV is rather limited after construction phase, we see a more significant potential in full supply chain of the bush-to-electricity projects. Overall, we expect job opportunities of the order of 600 FTE positions to be created during the construction phase, while an estimated 500 FTE positions will be created during operations.

8. Assessment of key risks to successful implementation

The potential implementation of a GET FiT program in Namibia is challenged by various risks for KfW/BMZ, UK DECC and UK DFID as outlined in the table below.

Table 9: Risks and mitigants

#	Risk	Probability	Consequence	Mitigation
1	**No willingness of GRN to cooperate on PV and continued difficulty with solar tender**	Medium	▪ Lower number of projects supported ▪ Potentially, no track record for bush-to-electricity	▪ Go/no-Go decision for feasibility study on bush-to-electricity component
2	**Grid connection for solar PV not given**	Low	▪ Lower number of projects supported	▪ Define eligible sites for support
3	**Further depreciation of NAD vs. USD**	Medium	▪ FiT levels might be too low and financial viability gap increasing	▪ None

[4] This table provides figures for both leverage ratios and burden sharing under different scenarios, including with and without technical assistance included. The leverage ratio is calculated by dividing the total investment size of the proposed portfolio, and dividing it by the present value of the donor funding requirements (i.e. incremental cost support and in some cases technical assistance). A higher leverage ratio indicates fewer donor resources required per USD of total investment. Burden sharing is calculated by dividing the present value of the incremental cost support (and in some cases technical assistance) by the present value of the total revenues received by the IPP. A higher burden sharing figure indicates that the donors are covering a relatively higher proportion of the revenues/incremental costs relative to the offtaker/host government. For bush-to-electricity projects, this calculation is more complex and will need to take into account investments made at different levels of the value chain. It should be analysed once the structure of the incremental cost support has been defined.

			▪ Higher need for incremental cost financing	
4	**No agreement with GRN on burden sharing for bush-to-energy component**	Medium	▪ Implementation of second pillar not possible	▪ Clear communication and agreement on targeted burden sharing as prerequisite for cooperation
5	**Feasibility study reveals missing readiness for sector-wide intervention**	Medium	▪ Implementation of second pillar not possible ▪ Potentially project-specific intervention	▪ None; unbiased analysis will be key
6	**Limited developer activity in bush-to-energy value chain**	Medium	▪ Lower number of projects supported	▪ Detailed technical analysis and due diligence

9. Next steps

9.1. Considerations for a feasibility phase

The two parts of the suggested GET FiT intervention require different levels of preparation. As indicated above we recommend GET FiT sponsors offering GRN a very flexible and short-term support based on a relatively short and compact cooperation preparation. Prerequisites for such a cooperation on PV should be the willingness of the GRN to support the feasibility study for the bush-to-electricity component and to enter into negotiations about an appropriate burden sharing once the feasibility study has provided a validation of the viability gap assumptions. Also, the willingness of GRN to request direct access funding from the GCF for the realisation of the bush-to-electricity component could be added as prerequisite.

Before the main part of the GET FiT programme – the bush-to-electricity component – can be started, a number of elements need further research, validation, and discussion. In line with the indicated Implementation Timeline, these activities should be partially concluded through a Feasibility Phase for the this component, the duration of which likely should be allowed at least 6 months. It is expected that the Feasibility Phase will consist of two primary work-streams:

- **Needs assessment and detailed design of GET FiT intervention**: The bush-to-electricity sector is still in its infant stage. In a first step, efficient transaction structures need to be developed to allow for a robust gap assessment. Thereafter, appropriate support structures need to be designed. This would be in the form of one or more consultancy assignments, involving financial, technical and legal expertise. Based on ongoing assignments/procurements, the cost of this support is likely in the range of EUR 300.000-600.000.
- **Dialogue and coordination.** Spearheaded by the KFW, this activity necessitates detailed discussions with GRN counterparts and development partners. Experience from similar projects, amongst them the GET FiT programmes in Uganda and Zambia indicate that in-depth discussions are required, and necessitate resources from KFW as well as potential programme partners. It is noted that substantial additional efforts may be required to identify local implementation processes taking into account the existing capabilities and roles of the Namibian institutions.

In case Namibia is progressed to feasibility phase, we recommend including the following areas for further due diligence:

- Assessment of readiness of the bush-to-electricity sector for a sector wide intervention rather than project specific support
- Broader economic justification including jobs creation, environmental co-benefits and average generation costs with and without GET FiT (to be developed with Government)

- Design of appropriate support structures taking into account the sector specific aspects raised above
- Design of a cost-effective, transparent and sustainable local implementation model and identification of the local support needs to implement the GET FiT programme
- Dialogue and line-up of potential donors and programme contributors

9.2. Key developments to follow

A number of developments may have an impact on the development of a GET FiT programme in Namibia. It is therefore recommended that such developments are followed, both in the run-up and during the proposed feasibility phase of the programme, including the following:

- The development of Namibia's RE Policy and thereview and update of the IPP framework for Namibia, as is currently undertaken by the ECB
- The impact and implications of the updated National Integrated Resource Plan as is finalised in March 2016
- The review of the White Paper on Energy Policy, as is undertaken under the auspices of the MME
- Development of new/additional solar PV tenders in Namibia and progress of projects under the REFiT program
- Namibia's NDC submission

Annex I: Incremental Cost Financing Terminology for GET FiT

The GET FiT toolbox includes different kinds of support to small and medium-scale renewable energy projects. After the application of risk mitigation instruments, the remaining viability gap between the REFiT offered and the revenues required for IPPs to achieve a reasonable rate of return could be closed by incremental cost support.

Incremental costs: here incremental costs refer to the per-unit costs (in this case per kWh of electricity generated) incurred by a project above a given baseline (either the REFiT or avoided cost), and can be contrasted with financing costs. For the purposes of GET FiT, we look at the levelised cost of electricity (LCOE) of the IPP to determine incremental costs. There are two primary scenarios under which GET FiT could support a project's incremental costs:

- **Top-up:** in some cases, REFiTs are not high enough for a project to achieve a sufficient return, and investors will not pursue it. GET FiT can provide a top-up, or an additional tariff support beyond the REFiT per kWh of electricity produced. This was the scenario under which the incremental cost support took place in Uganda.
- **Buy-down:** in other cases, REFiTs may be sufficiently high (indeed many are prepared by consultants using a cost-plus methodology), but the public sector is either unable or unwilling to agree to long-term contracts for electricity that seems relatively expensive. In this case, GET FiT could share the burden of paying a relatively high tariff to IPPs by paying a portion of the REFiT. One approach (though not the only approach) would be for GET FiT to pay everything between the avoided cost/long-run marginal cost and the REFiT. Note that the level of support can be equivalent with the top-up, but only the benchmark for comparison has changed.

Frontloading: Uganda was also innovative for its modality of paying the top-up, i.e. through frontloading. This concept refers to the donor partners providing the present value of the agreed 20-year top-up during the first few years of operations. In Uganda, this took the form of a grant of 50% of the value paid on the commercial operations date, and 10% paid per year over the subsequent five years based on actual production. This allows the IPP to enjoy higher cash flows in the early years while they are servicing their debt, and it allows donors to disburse funds in a more timely fashion consistent with their project support cycles. It has the further benefit that funds are often more valuable for IPPs in the early years, as their cost of capital is higher. Hence there is also an added value based on the differential between the donors' and IPPs' discount rates.

Concessional financing equivalents: Because some donors prefer to offer concessional debt rather than grants, the incremental cost support grant (i.e. top-up or buy-down) can be converted into concessional loans. In this case, simulations are run to arrive at the IPP's LCOE for a given required equity return with the grant support. Then the grant support is removed from the project's revenues, and the financing costs are adjusted to include a highly concessional debt tranche. The size of that tranche is adjusted until the IPP's equity return returns to the same benchmark level achieved with the grant support under the original simulation.

Financial flows for incremental cost support: the specifics in terms of fund disbursement depend heavily on the chosen structure of the GET FiT programme in each country. Whether these funds are paid directly to IPPs or are rather channelled through the host government, will be an item for discussion as implementation arrangements are made. Likewise, the schedule for payment will depend on whether frontloading is selected as an option, and over what time period (while Uganda opted for the 50/10 split between COD grant and annual subsidy, other countries may opt for different arrangements). Likewise, if concessional debt is chosen to replace grant financing, then the loan schedule will have to be negotiated as well. These elements should be fleshed out during feasibility.

Annex II: Methodology for and Calculation of Abatement Costs

To capture the full value of bush-to-electricity projects, the *per kWh* value of co-benefits has been estimated. This allows for a separation of the broader environmental benefits and the pure mitigation impact.

To do this, two estimates are used to quantify the value of de-bushing. This value was then divided by the biomass stock in the country which yields a weight-specific value of the co-benefits. Finally, the weight specific value was adjusted to finally arrive at a per kWh estimate.

In a second step, environmental co-benefits were deducted from the total incremental cost support in order to calculate abatement costs net of co benefits. This yielded a carbon abatement component of USDc 3.4/kWh and USDc 1.4/kWh for the two approaches. Combined with the two relevant grid emission factors for Namibia, the resulting abatement costs range between USD 5 and USD 52/tCO2e, with an average of USD 23.6/tCO2e.

Approach 1: Based on De-bushing assumptions	Value	Source
NPV Livestock related benefits - base case (over 25yrs; NADm)	6371.7	GIZ study - p.73
NPV Groundwater related benefits - base case (over 25yrs; NADm)	51609.5	GIZ study - p.73
NPV co-benefits - base case (over 25yrs; NADm)	57981.2	Calculated
Biomass harvest (over 25 years; Mtonnes)	54.0	GIZ study - p.67
NPV co-benefits (NAD per t)	1073.7	Calculated
Energy yield (MWh/t biomass)	1.0	N-Big
NPV of co-benefits (NAD/MWh)	1073.7	Calculated
FX rate (NAD/USD)	15.4	Calculated
NPV of co-benefits (USD/MWh)	69.6	Calculated
NPV of co-benefits (USDc/kWh)	**7.0**	Calculated
25% of co-benefits (USDc/kWh)	**1.7**	
50% of co-benefits (USDc/kWh)	**3.5**	

Approach 2: Based on estimated annual losses	Value	Source
Economic losses (USDM per year)	150	Presentation
Standing biomass (Mt)	134.9	GIZ study p. 66
Avoided losses (USD/t/year)	1.1	Calculated
Average lifetime of avoided losses	12.5	Linear effects over 25yrs
Avoided losses during project lifetime (USD/t/year)	13.9	
Energy yield (MWh/t biomass)	1	N-BiG
NPV of co-benefits (USD/MWh)	**13.90**	
NPV of co-benefits (USDc/kWh)	**1.4**	

Grid Emission Factors	*Co-benefit value*	
	*1.4 USDc/kWh**	*3.5 USDc/kWh***
Abatement costs with Grid EF 0.5t/MWh (USD/tCO2e)	52	10
Abatement costs with Grid EF 0.96t/MWh (USD/tCO2e)	27	5
Average of scenarios (USD/tCO2e)	**23.6**	
* Corresponds to Approach 2		
** Corresponds to Approach 1 with 50% weighting		

Annex III: List of interviews conducted

Organisation	Name	Position	Email
CENORED	Mburumba Appollus	CEO	MAppolus@cenored.com.na
Chief Officer: Power System Development	Margaret Mutschler	Executive Committee Member	Margaret.Mutschler@nampower.com.na
Electricity Control Board	Foibe Namene	CEO	fnamene@ecb.org.na
German Embassy	Christian Grün		wz-1@wind.auswaertiges-amt.de
GIZ	Frank Gschwender	Project Director de-bushing	Frank.gschwender@giz.de
Hangala Group	Dr. Leake S. Hangala	Executive Chairman	leake@hangala.com
KfW	Dr. Uwe Stoll	Senior Project Manager	Uwe.Stoll@kfw.de
Konrad Adenauer Stiftung	Dr. Bernd Althusmann	Resident Representative	bernd.althusmann@kas.de
MME	Simeon Negumbo	Permanent Secretary	ps@mme.gov.na
MME	John Titus	Director of Energy	jtitus@mme.gov.na
MME	Nico Snyders	Project Officer	nsnyders@mme.gov.na
Namibia Energy Institute	Dr. Zivayi Chiguvare	Director	zchiguvare@polytechnic.edu.na
NedBank	Ingo Schneider		ingosc@nedbank.com.na
RMB	Steve Galloway	Director	Steve.Galloway@rmb.com.na
Scatec Solar	Ipinge Agapitus	Project Manager	Ipinge.Agapitus@scatecsolar.com
Electricity Control Board	Francois Robinson		frobinson@ecb.org.na