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- ▶ **Assessment of the enabling environment for the uptake of renewable energy in Botswana to mitigate the effects of climate change**

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First published 2023



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Assessment of the enabling environment for the uptake of renewable energy in Botswana to mitigate the effects of climate change

ISBN: 9789220400791 (web PDF)

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► Table of Contents

List of Tables and Figures.....	2
Acronyms	3
Executive Summary.....	5
1 Introduction	8
1.1 Purpose of the Report.....	9
1.2 Terms of Reference.....	9
2 Research Methodology.....	10
2.1 Data Collection	11
2.2 Population and Sampling.....	11
3 Country Context and Climate Change	13
3.1 The Energy Mix in Botswana	14
3.2 Overview of RE in Botswana	15
3.3 A Historical Snapshot of Experiences with RE in Botswana	15
4 International Context and Best Cases of RE and Just Transition	17
4.1 International Literature Review.....	18
5 Findings of the Assessment – Botswana Energy Sources, Use, and Financing Options	24
6 Challenges in the Uptake of RE	29
6.1 Policy, Legal and Regulatory Framework	30
6.2 Social, Employment, Gender-Equality and Environmental Opportunities and Challenges	33
7 Improving RE uptake in Botswana	37
7.1 Review of Policy, Regulatory Framework and Related Instruments.....	39
7.2 Financing RE Uptake in Botswana	40
7.3 Information, Education and Human Resources	43
7.4 Stakeholder Participation.....	43
7.5 Gender and Inclusive Measures.....	43
8 Conclusions and Recommendations	44
8.1 Conclusions.....	45
8.2 Recommendations	46
9 Draft Implementation Plan	48
10 References and Footnotes	51
References.....	52
Footnotes.....	53
Policies and Documents Reviewed	53
Appendices.....	54
Key Informant Interviews and Focus Group Discussions	55
Consultative Workshop on the Assessment of the Enabling Environment for the Uptake of Renewable Energy in Botswana to Mitigate the Effects of Climate Change	56
Annexures: Attendance Lists and Concept Notes	59

► List of Tables and Figures

Tables

Table 1: Sample distribution by enumeration area	12
Table 2: Types of energy use in Botswana	25
Table 3: Regional distribution of RE facilities	27
Table 4 : Regulatory instruments governing the energy sector	31
Table 5: Policy statements from Botswana's National Energy Policy	31
Table 6: Opportunities for RE in Botswana	38
Table 7: Policy, institutional, regulatory and financial review and reforms required.....	39
Table 8: Draft implementation plan	49

Figures

Figure 1: Share of energy by type for Botswana for 2000 to 2020.....	14
Figure 2a: Instruments for increasing RE uptake – Policy Strategy	20
Figure 2b: Instruments for increasing RE uptake – Financial Incentives.....	21
Figure 2c: Instruments for increasing RE uptake – Information.....	21
Figure 2d: Instruments for increasing RE uptake – Human Resource Development	22
Figure 3: RE currently being used	26
Figure 4: Usage of solar power according to the e-survey respondents	27
Figure 5: Participants' rating of RE uptake	28
Figure 6: Environmental opportunities from RE usage	34
Figure 7: Policy review, challenges and bottlenecks framework	40
Figure 8: Factors that improve accessibility to RE schemes	41
Figure 9: Sources of RE funding	42

► Acronyms

AU	African Union
BB	Business Botswana
BEMP	Botswana Energy Master Plan
BFTU	Botswana Federation of Trade Unions
BOBS	Botswana Bureau of Standards
BOFEPUSU	Botswana Federation of Public, Private and Parastatal Sector Unions
BPC	Botswana Power Corporation
BERA	Botswana Energy Regulatory Authority
BITRI	Botswana Institute for Technology, Research and Innovation
BOTEC	Botswana Technology Centre
BQA	Botswana Qualifications Authority
CSO	Civil Society Organization
DOE	Department of Energy
EFT	Energy Feed-In Tariffs
ERB	Engineering Registration Board
EU	European Union
FGD	Focus Group Discussions
FIT	Feed-In Tariff
GDP	Gross Domestic Product
GHG	Greenhouse Gas
GoB	Government of Botswana
ILO	International Labour Organization
IRENA	International Renewable Energy Agency
IRP	Integrated Resource Plan
KII	Key Informant Interview
NDC	Nationally Determined Contribution
MMGE	Ministry of Mineral Resources Green Technology and Energy Security
MoESD	Ministry of Education and Skills Development
MW	Megawatt
NEP	National Energy Policy
NGO	Non-Governmental Organization
OECD	Organization of Economic Cooperation and Development

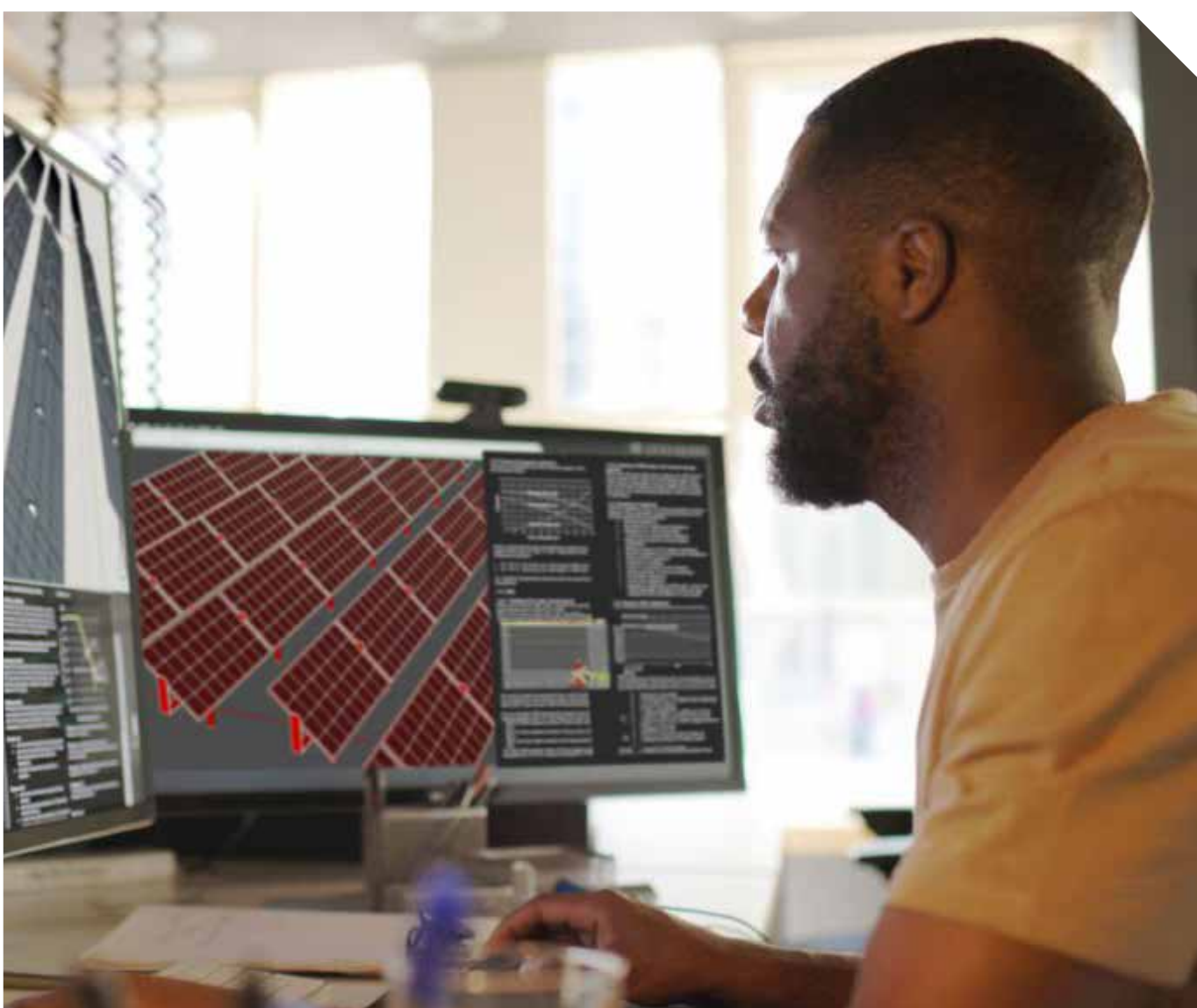
PV	Photovoltaic
RE	Renewable Energy
SADC	Southern African Development Community
SDG	Sustainable Development Goals
TOR	Terms of Reference
UN	United Nations
UNDP	United Nations Development Programme
UNFCCC	United Nations Framework Convention on Climate Change
VAT	Value-Added Tax
WBG	World Bank Group

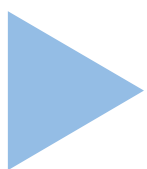
► Executive Summary

1. This report on the assessment of the environment for renewable energy (RE) uptake in Botswana to mitigate the effects of climate change was commissioned by Business Botswana (BB) with the support of the Botswana Government and the International Labour Organization (ILO) in November 2022.
2. The findings concentrate on the energy mix in Botswana and assess the social, employment, gender equality, and environmental opportunities and challenges for increased investment in RE. The report also reviews current policy, legal and regulatory frameworks as well as investor appetite for solar and wind energy plants. The report highlights regional and international benchmarking and best practices for RE infrastructure and financing options from which Botswana can draw lessons.
3. A mix of methodologies comprising an e-survey, key informant interviews (KIIs), focus group discussions (FGDs), panel discussions, and consultative and validation workshops were deployed to elicit required data from government officials, employers and business member organizations, labour unions, civil society organizations (CSOs), enterprises and households across different parts of the country. Regional and international literature reviews related to climate change, policy and regulatory measures for climate change adaptation and mitigation, and RE were undertaken to add depth and complement the findings of this assessment.
4. Botswana has in place an array of global warming and climate change mitigation and adaptation policies and regulatory frameworks guided by the country's key policy documents. These include the National Development Plans and National Vision 2036 which are aligned to the United Nations' (UN) Sustainable Development Goals (SDGs) framework, the Southern African Development Community (SADC) and the African Union (AU) Climate Change and Resilient Development Strategy and Action Plan (2022–2032). However, this assessment shows that the country needs to do more to address RE uptake through conducive policy, regulatory and investment promotion tools critical for a just transition. Successful cases of just transitions from different countries show what needs to be done to achieve this goal.
5. Botswana has high potential for RE production and usage at industry, public utilities, small and medium enterprises and household levels. However, despite several years of trial through initiatives to promote RE uptake, Botswana still has a low RE uptake.
6. There are glaring challenges at business, labour and community levels in awareness as well as knowledge and skills about RE. Even more critical are deficiencies on infrastructural and technological levels, inadequate and unclear RE financing options coupled with low prioritization of RE in national programming. These constitute some of the key barriers to investment in RE and its increased uptake by different energy users in Botswana's economy.
7. Although households, women and youth would benefit greatly from expanded access to RE technologies that would power their small and medium enterprises and create opportunities for new businesses and jobs, the absence of deliberate supportive policies aimed at these groups, a lack of RE knowledge and skills and low public education on RE and climate change in general, are key constraints to the entrenchment of green economy activities to support the most disadvantaged groups in society.
8. Imported RE technology, e.g. solar photovoltaic (PV) equipment, among others, remains expensive and financially inaccessible to the majority of Botswana's citizens and businesses with no clear and sustainable financing schemes and incentives for RE producers.
9. A combination of strategies need to be developed and implemented to induce the appetite for investment in RE. Such strategies should (i) increase citizens' confidence and consumption of RE, and (ii) encourage BB members and other investors to invest in RE and drive the economy towards a sustainable green economy path.

10. The labour unions and NGOs who potentially provide a huge market for RE products are not sufficiently and actively engaged in efforts towards a just transition to RE, either by BB or by government programmes.
11. The government, the private sector and multilateral partners such as the ILO should engage and collaborate in developing a combination of incentives such as tax reductions, trade-offs, trade-in tariffs and value-added tax (VAT) reductions that have worked successfully in other countries known for their smooth and just transitioning to greener economies.
12. The assessment has made a number of recommendations to address policy and regulatory reforms, financing options and incentives for the business community, labour unions and civil society to promote independent producers of RE in Botswana. Public education on RE as well as research, knowledge and systematic skills development initiatives are urgently required to ensure enhanced RE uptake and support for a just transition away from carbon-based energy production in the country. In summary these are:
 - 12.1 The Government of Botswana (GoB), through the Ministry of Energy and Green Economy, should develop a specific RE policy, regulatory frameworks and standards that are accompanied by a costed implementation strategy and plan with clear time frames.
 - 12.2 A special institutional vehicle made up of representatives of government, private sector and civil society / trade unions should be established by the Ministry of Mineral Resources Green Technology and Energy Security (MMGE).
 - 12.3 The GoB through the MMGE should restructure the Botswana Power Corporation (BPC) to allow for independent generation, transmission and distribution and set up an independent power producers' (IPP) office to oversee tendering, adjudication and awarding of RE contracts.
 - 12.4 The GoB should introduce investment incentives aimed at attracting investment in RE. The investments should also be protected by legislation just like Congress in the United States or European Union (EU) enacts legislation to protect investments in RE.
 - 12.5 To promote broad-based participation in the RE economy and increase uptake at household level, the GoB working with commercial banks should establish government-guaranteed RE loans and incentive schemes for citizen-owned small businesses, women and youth projects that should be supported by trade unions and NGOs.
 - 12.6 The MMGE should develop implementation guidelines for the Integrated Resource Plan (IRP) for Botswana to reach its ambitious goals of 15 and 30 per cent RE in its energy mix by 2030 and 2036, respectively.
 - 12.7 Deliberate all-inclusive human resource development RE programmes should be planned, developed and prioritized under (i) the Department of Tertiary Student Financing (to support male and female tertiary students specializing in RE fields of study), (ii) the TVET sector to target vocational skills development in colleges and brigades for male and female youth, women and disadvantaged communities, and (iii) all programmes should be accredited by the Botswana Qualifications Authority (BQA) for certificates and above, and the Human Resource Development Council (HRDC) for short courses.
 - 12.8 To promote advanced research and innovation in RE, the Ministry of Education and Skills Development (MoESD) through the Department of Science and Technology Research and the Botswana Institute for Technology, Research and Innovation (BITRI), should establish a fund for collaborative research in RE technologies for which independent researchers and universities can apply competitively.

- 12.9 BB should mobilise capital in international markets and local markets to invest in (i) RE infrastructure and (ii) battery storage systems to mitigate low-capacity demand for solar energy.
- 12.10 To promote awareness and sustained education on RE in Botswana, BB and BFTU/BOFEPUSU should develop an education and training campaign on RE funded by government and development partners. The campaign should target their general membership and the general public.
- 12.11 To increase citizens' knowledge about the transition to the green economy and to help them identify opportunities for investment as well as to create a pool of knowledge and skills specific to the green economy, BB and trade unions working with multi-laterals/development partners such as the ILO, should initiate a three-year longitudinal study on Botswana's green economy.
- 12.12 The Botswana Energy Regulatory Authority (BERA), working closely with BB, should implement the energy feed-in tariffs (EFT) as per the guidelines of the MMGE (2020).
- 12.13 To ensure quality in RE products, technologies, market and service provision, the Engineering Registration Board (ERB) and Botswana Bureau of Standards (BOBS) should approve all RE products before being allowed on the market.





1

Introduction

This final report discusses the assessment of the environment for the uptake of RE in Botswana to mitigate the effects of climate change. It discusses the country's background in terms of policies and regulatory frameworks to climate change, adaptation and mitigation measures in line with international best practice in just transition from carbon-based energy production systems to RE. The report then presents key results from the data collected using qualitative and quantitative research methodologies. The evidence, together with information from a desktop research and benchmarking exercise, provide analytical answers to the key Terms of Reference (TORs) of this work. Conclusions and recommendations on how best Botswana can move forward on the path to an inclusive just transition to RE wrap up the report.

► 1.1 Purpose of the Report

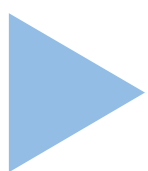
The purpose of this report is to provide findings of the study on the assessment of RE uptake in Botswana. It is the last of the three main deliverables of this project, namely the Inception Report already presented and the Interim Report which was discussed and validated through workshops and panel discussions in mid-February 2023. The findings, conclusions and recommendations of the report are drawn based on a thorough understanding of the policy and regulatory environment of the country and will serve as the main basis for discussions by key stakeholders, i.e. the GoB, BB, trade unions and CSOs, and development partners, going forward to support a just transition through higher uptake of RE. The findings of this report require that an action plan be formulated and implemented by a joint task team of stakeholders coordinated by the Department of Energy (DOE) and BB as the two key drivers in RE uptake in Botswana.

► 1.2 Terms of Reference

The TORs of the Consultancy were to assess the enabling environment for the uptake of RE in Botswana to mitigate the effects of climate change¹. The specific terms of reference were to:

- 1.2.1 Provide an analytical background on energy sources and their use in Botswana. The analysis looks into the energy mix and who has access to what type of energy by location.
- 1.2.2 Assess the social, employment, gender equality, and environmental opportunities and challenges for increased investment in and use of RE in the country.
- 1.2.3 Carry out interviews with relevant stakeholders (including private sector players) to investigate the causes of low uptake of RE.
- 1.2.4 Review the current policy, legal and regulatory framework and use the outcomes of interviews with private sector players to assess the investment appetite for new solar and wind energy plants.
- 1.2.5 Benchmark national efforts against international best practice, assess and recommend infrastructure financing options including incentives.
- 1.2.6 Review the current policy environment and existing legislation (i.e. land allocation and licensing procedures) to determine if they are conducive to private sector investment and recommend reforms, and what the bottlenecks and challenges are.
- 1.2.7 Present preliminary findings and a final report of findings and recommendations on measures to promote the uptake of RE by both investors and households.

¹ TORs as provided by ILO in the Request for Proposal 2022.



2

Research Methodology

The Consultant adopted a participatory approach for the data collection methods that were deployed to study the low uptake of RE in Botswana. These included an opinion survey of key stakeholders using a rapid assessment methods e-survey. This approach is a constructive framework that promotes candid sharing of views and understanding among stakeholders. It does not diminish the authority of any party or restrict the ability or the obligation of the Consultant to make decisions and take required actions. The FGDs and KIIs were used as additional tools to facilitate the open and free exchange of views. Additional data were collected through the literature review and document analysis. National validation workshops and panel discussions with carefully selected stakeholders were held as additional methods to elaborate and/or correct some of the perceptions from the e-survey and other sources of the collected data. These mixed approaches and methods enabled the Consultant to triangulate the data and to determine the extent to which findings from these different sources corroborated and/or differed. Potential weaknesses in the data are compensated for by the strengths of other datasets. This, therefore, increased the validity and reliability of the results.

► 2.1 Data Collection

2.1.1 Data Collection Tools

Self-administered questionnaires were developed for the survey while for the KIIs, an interview guide was developed to steer the interviewers. Finally, for the FGD, a set of questions were developed to ensure that researchers maintained the core message of the assignment. Questions were shaped by information gleaned from the literature review, document analysis, and feedback from the Reference Committee. The data collection tools are presented in **Appendix 1**.

2.1.2 Questionnaire Items

A 27-item e-survey questionnaire was constructed. The questionnaire was divided into two segments. The first segment captured demographic variables of the respondents including gender, age, marital status, educational attainment level, and the role of the respondent in the community in the context of the subject of this assessment. The second segment of the e-survey captured participants' perceptions, perspectives and experiences in relation to RE uptake in the country.

Areas covered included vending, advocacy, policy implementation, RE financing, incentives, and the role of development partners and involvement of different stakeholders in promotion of RE uptake in Botswana.

The questionnaire can be viewed here: <https://forms.office.com/r/48ww97i4Mr>.

► 2.2 Population and Sampling

Decisions on the selected population were informed by considerations for RE as a driver of employment in the ten districts of Botswana and 27 enumeration areas as designed by Statistics Botswana. However, given the expansive nature of the country and cost considerations regarding the national spread for coverage, the Consultant purposely selected six regions: Chobe, North West, Central, Kgalagadi, South East and North East.

The Consultant adopted enterprises as the unit of analysis. Out of the 27 enumeration areas established by Statistics Botswana for survey enumerations, 12 areas were selected for this assessment. The enumeration areas were as follows:

- ▶ Urban – Gaborone, Francistown and Jwaneng.
- ▶ Urban villages – Serowe/Palapye, Maun, Chobe, Tlokweng/Ramotswa and Kweneng East.
- ▶ Rural villages/towns – Ghanzi, North East, Ngwaketse South and Kgalagadi South.

From these 12 enumeration areas, the total enterprises from Statistics Botswana's enterprise register were about 20,000. From this list, 300 enterprises were selected randomly for interviews. There was, however, a deliberate bias towards enterprises dealing with RE issues as venders or users/consumers. The number of enterprises was chosen in proportion to the total number of enterprises and also deliberately included small, medium and large enterprises. The sample included enterprises in all sectors, especially the productive and service sectors given their strategic importance to RE issues and usage.

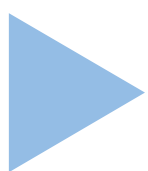
The sample of approximately 1.5 per cent of the total population may not be strictly representative of the whole population, but it still provided valuable information indicative of the sentiment of the broader population. Qualitative approaches using the KIIs and FGDs described earlier enhanced the reliability of this information.

Table 1 shows the number of enterprises selected from each enumeration area. Where businesses are small, such as in Kgalagadi, the study chose to add more enterprises, increasing the sample to 303 instead of 280.

Table 1: Sample distribution by enumeration area

Enumeration Area	Number of Enterprises	Numbers in the Sample	%
Gaborone	9,485	132	47.2
Francistown	2,494	35	12.4
Jwaneng	311	4	1.5
Ngwaketse South	752	10	3.7
Tlokweng Ramotswa	891	12	4.4
Kweneng East	2,047	29	10.2
Serowe/Palapye	1,475	21	7.3
North East	253	4	1.3
Maun	1,561	22	7.8
Chobe	451	6	2.2
Ghanzi	266	4	1.3
Kgalagadi South	98	1	0.5
Total	20,084	280	100.0

Source: Calculated from Statistics Botswana's enterprise register data base.



3

Country Context and Climate Change

Botswana is an arid to semi-arid country of 582,000 square kilometers located in Southern Africa. It is a landlocked and upper-middle-income country with a population of 2.3 million inhabitants, of which 30 per cent live in rural areas. Botswana has acceded to the United Nations Framework Convention on Climate Change (UNFCCC) (DMS, 2019). The UNFCCC Paris Agreement binds nations that are party to the agreement to strive towards reduction of greenhouse gas (GHG) emissions into the atmosphere, which are major sources of global warming.

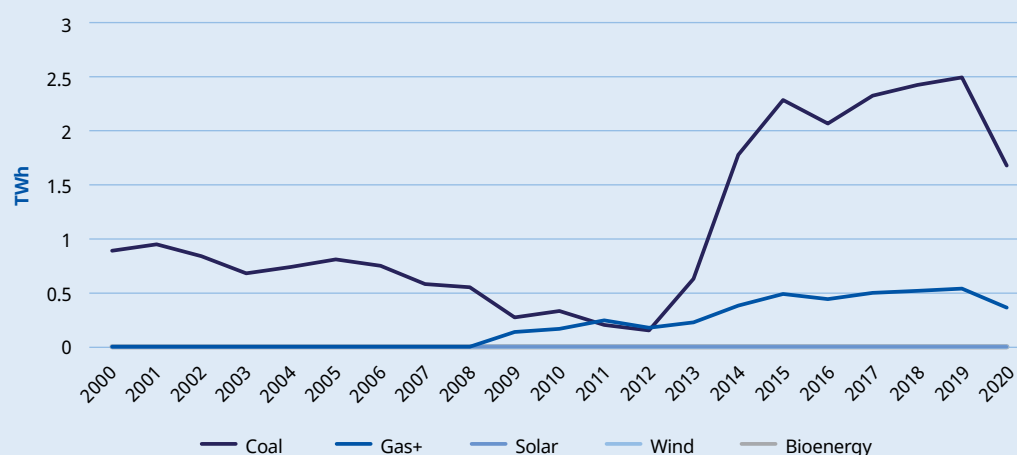
The Paris Agreement was a historical milestone where nations committed themselves to limiting global warming to between 1.5 and 2 degrees Celsius above pre-industrial levels by 2100. This ambitious agreement assumes a human face by the recognition stated in the preamble that reductions would happen, "Taking into account the imperatives of a just transition of the workforce and the creation of decent work and quality jobs in accordance with nationally defined development priorities" (UNFCCC Preamble, 2022).

The Nationally Determined Contribution² or NDC made by Botswana as a signatory of the Paris Agreement has set strategic objectives at country level. To this end, the government has submitted a voluntary commitment through the NDCs to reduce its total GHG emissions by 15 per cent by the year 2030, with reference to 2010 emissions. Botswana is working towards providing affordable and clean energy in line with SDG 7.

► 3.1 The Energy Mix in Botswana

Botswana's energy mix consists of fossil fuels that contribute over 99 per cent of the total energy requirements in the country, leaving only about one per cent that is from clean energy sources. For a long time, Botswana imported most of its electricity from neighbouring countries, mainly from South Africa. This has decreased drastically. However, coal remains the main source of electricity generation in the country, followed by gas (petrol, diesel and other). Figure 1 shows the trend in terms of energy type between 2000 and 2020.

Figure 1: Share of energy by type for Botswana for 2000 to 2020



Source: Global Electricity Review 2022 | Ember (ember-climate.org)

² Available at: <https://unfccc.int/sites/default/files/NDC/2022-06/BOTSWANA.pdf>

Botswana's current total electricity demands stands at about 4,505 GWh³.

This demand comes from all economic sectors including mining, industry, the services sector and households. The demand is expected to grow up to 8,637 GWh by the year 2040, a growth that is proportional to the growth of the economy (average GDP growth of 3.6 per cent). Currently, the country's installed generation capacity stands at 732MW (600MW from Morupule B and 132MW from Morupule A) against a peak demand of 600MW. An additional capacity of 160MW also exists from two diesel-generated peaking plants. Orapa has an installed capacity of 90MW and Matshelagabedi 70MW. All of these generation plants are operated by the BPC which is a state-owned enterprise.

Despite this dependency on fossil fuels, Botswana has ample RE potential to gradually replace generation from coal and diesel. For example, solar energy, which currently contributes insignificantly to electricity generation despite the abundance of the resource, could in future contribute to well over 80 per cent of the country's energy demand. There is also wind and coal bed methane potential which have not been fully explored.

► 3.2 Overview of RE in Botswana

Botswana has abundant RE resources, primarily in the form of solar energy. The country receives over 3,200 hours of sunshine a year and has very few days with complete cloud cover. The average daily radiation on a horizontal surface is 21 J/m². This rate is among the highest in the world⁴, and it makes Botswana especially suitable for solar energy applications⁵.

Solar energy is well distributed throughout the country, and this is especially advantageous in rural areas where conventional energy sources are not readily available. As the results of this assessment show, where it is in use, solar energy is used for water heating (mainly in urban areas), and electricity production to power telecommunication equipment, home lighting, schools, and clinics (rural areas). Despite the abundance of solar energy, its contribution to the national energy balance remains insignificant.

► 3.3 A Historical Snapshot of Experiences with RE in Botswana

In 2008, BPC Lesedi (Pty) Ltd was formed for the purpose of rolling out the RE-based Rural Electrification Solar Project, named *RE Botswana*. The project was a collaborative effort between the GoB, the United Nations Development Programme (UNDP) and the Global Environment Facility. BPC Lesedi was established as a joint venture between the BPC and *Electricite de France*, with a mandate to undertake rural electrification in Botswana using a franchise model. The company targeted to connect RE to 25 per cent of villages that are not on the grid, 49 per cent of unconnected households in grid-electrified villages and all of the country's 99 settlements which were not electrified at the time. The project, which was not for profit, was to be funded through equity and loans.

³ Access to electricity stands at 65 per cent (81 per cent in urban areas and 28 per cent in rural areas).

⁴ Integrated Resource Plan – Government of Botswana.

⁵ Terence Dambe. Africa Energy Futures: Botswana.

By 2011, the main achievements of the BPC Lesedi Project were documented as follows:

- ▶ 200 solar home systems sold.
- ▶ 330 efficient cooking stoves sold.
- ▶ 280 rechargeable lanterns supplied.
- ▶ Three recharging stations were built in the following villages: Kgope, Dikgatlong and Medie in the Kweneng district/region (Molenga, 2012).

The Botswana Technology Centre (BOTEC)⁶ had several other RE projects including:

- ▶ A 5.7 kW centralized solar PV power plant in a remote village of Motshegaletau (pilot project).
- ▶ Solar Chimney Project by BOTEC.
- ▶ Solar Water Heaters (SWH) Thermal Testing Facility.
- ▶ Solar (PV) Streetlights.
- ▶ MW Solar PV Power Station being built in Botswana, funded by the Japanese Government.
- ▶ A 200MW concentrated solar thermal power station bankable feasibility study funded by the World Bank and African Development Bank.

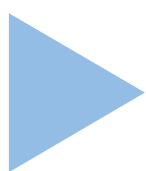
Wind energy: Reasonable wind speeds exist within the country with the highest wind resources potential located in the South-West and Eastern parts of the country, with averaging wind speeds above 7m/s, wind power density above 200W/m² and annual energy production above 4.5 GWh/year. The wind potential has not been fully explored and has primarily been used on windmills for water pumping by farmers (Ministry of Mineral Resources, 2021). However, experts say that the reason why windmill use has declined so much since independence, is that the water table has gone deeper, making the boreholes difficult to be run by wind power.

Current projects in RE include:

- ▶ A national feasibility study is underway for the implementation of waste-to-energy projects and to advise on an associated road map.
- ▶ Through its Biofuels Project, the DOE – with technical support from the University of Botswana and the Department of Agricultural Research under the Ministry of Agriculture and Food Security – is engaged in a research project that seeks to stimulate the development of the local biofuel industry.
- ▶ Hydro Energy: There are no known planned hydropower energy installations in the country⁷.
- ▶ Thermal Energy: As with hydro energy, there are no known planned thermal power energy installations in the country.
- ▶ At community level, a number of biogas energy projects have been carried out in the north and southern Kgalagadi and South East and southern regions of Botswana, working with groups of farmers – mainly women – to promote the use of this form of RE. According to UNDP reports, these initiatives have been quite successful. As a result, the government and UNDP have agreed to scale up these projects to the other parts of the country (reported by the UNDP at the Panel Discussion on 22/02/23 and Validation Workshop on 23/02/23).

⁶ BOTEC was a leading research and technology organisation established by the Botswana Government in 1979 under the Minister of Infrastructure, Science and Technology. BOTEC was established to support the national development goals by aligning research, science and technology products and services with the Vision 2016 ideals and the national development plans. As the result of dissolution of BOTEC and the Rural Industries Innovation Centre, BITRI inherited all the satellite campuses and all of the assets. BITRI is a parastatal under the Ministry of Infrastructure Science and Technology, established in 2012 through an Act of Parliament, to conduct needs-based research and development in focused areas in accordance with national priorities.

⁷ Based on 3rd January 2023 interview submission by Permanent Secretary, MMGE. Botswana.



4

International Context and Best Cases of RE and Just Transition

► 4.1 International Literature Review

In international contexts, national governments' desire to enhance energy self-sufficiency and industry demand for sustained power supply are pushing to boost RE production as an alternative to carbon-based energy production. The public demand for clean environments has been identified as key drivers to the development of RE and in particular solar energy in a number of countries around the world. Of the known RE, solar PV technology helps to mitigate climate change because it emits much less GHG than fossil fuels. It is also an energy source that is in abundance, especially in environmental areas that have massive landmass, such as Botswana, or ocean-level exposure to the sun due to limited or almost no cloud cover for most parts of the year.

4.1.1 Development of Solar PV Energy

According to international energy data⁸, the 2020 top ten PV nations with installed capacity is led by China (253 GW capacity), the EU (151 GW) is in second position with the United States coming third. However, the list is dominated by Western Europe, the United States, Australia, India, Japan and South Korea. Honduras has the highest generated electricity from solar PV while Vietnam has the highest number of installations with 90 W per capita per annum.

Countries where significant progress in the development of solar PV has been visible also provide evidence of deliberately targeted policies that characteristically promote maximum impact on the reduction of GHG, enhanced RE capacity addition and RE electricity generation. These policies also identify with cost-effectiveness in that limited resources are invested effectively.

a. Wind Energy

The United States Department of Energy is targeting 35 per cent of the nation's energy source to come from wind sources by the year 2050. Prior to 2022, Europe had witnessed growth in wind energy investments. This is because wind energy has emerged as a dominant source of clean and RE, especially in regions that experience significant wind speeds such as the United States, Canada, Japan, Europe and Australia. In 2020 alone, the United States received 24.6 billion dollars in investment funding in wind energy. Wind energy falls in two categories: utility-scale wind and distributed wind with the former being a target of investors because of the ecosystem that it supports. For example, windfarm operators, utility companies, green bonds, manufacture of turbines, towers, electronic controls and other integrated parts etc. Wind farms are built both on land and offshore. The cables on the seabed carry electricity to feed the main grid onshore where the target market is readily available. To promote investment in wind energy, the United States Congress passed extensions to the Production Tax Credit for wind. It further established a 30 per cent investment credit for offshore wind projects⁹.

b. Hydro Energy

Hydro energy or power is the oldest and largest source of clean RE. It is produced by harnessing naturally flowing water or water that has been tamed behind a wall to fall and cause turbines to turn and generate electricity. A large percentage of people get electricity through this source. For example, Zambia and Zimbabwe use the Kariba Dam to generate hydroelectricity for their respective national needs and export to the Southern African Power Pool when sufficient quantities are produced. In the United States, 31.5 per cent of the total RE comes from hydroelectricity. In Africa, several rivers are dammed to generate this form of green energy. However, climate change, with its ability to cause

⁸ International Energy Data <https://www.iea.org/energy-system/renewables/solar-pv>

⁹ Casey Murphy(2022) Investopedia. Wind Energy, How to Invest in Wind Energy.

adverse droughts, is impacting this RE source. Energy security is being threatened for countries that depend on this form of energy. Because of drought conditions, turbines are exposed and eventually lose their ability to turn and generate electric power. These conditions are threatening energy security for Zambia, Zimbabwe, and the Southern Africa Power Pool, which are complementing their national energy mixes with alternative sources of energy.

c. Thermal Energy

Geothermal can be accessed and used almost anywhere in the world. The RE resource can be derived from the following thermal energy sources: geothermal, biomass, ocean thermal, biogas, landfill gas, biofuels and solar thermal. Thermal energy is another important source of RE that countries such as the United States, Iceland, New Zealand, Philippines and Turkey, to name but a few, have developed and depend on for heating and electricity. China is the largest producer of thermal energy followed by the United States and India. In Africa, Rwanda, Ethiopia, Djibouti, Kenya and Tanzania are recording progress in harnessing the untapped resources of geothermal energy. Plants in Ethiopia and Kenya have attained geothermal power generation capacity of about 900MW electric (MWe¹⁰). This RE source can help countries to fulfil the 2030 Agenda for Sustainable Development and climate goals set out in the Paris Agreement.

4.1.2 Lessons from International Best Practice

The review of international literature on countries' responses to global warming shows that with the right RE policies, strategies, programmes and financial incentives, it is possible to make a significant and sustained transition from the GHG systems of energy production to RE sources. Although global warming and its resultant damage to the environment is still a clear threat to global efforts to attain the SDGs set for 2030, across the world several countries are making good progress towards smooth transition by generating energy and electricity from RE sources. Different reports from the Climate Council, regional economic development communities including the Organization of Economic Cooperation and Development (OECD), the EU, the UN and even others in the developing world like SADC, show encouraging, though slow and unequal, progress towards a just transition to RE uptake and increased mitigation through energy efficiency interventions.

Among successful countries that reduced GHG emissions through combinations of RE and fossil energy sources are Iceland, Germany, Uruguay, Sweden, Denmark, China, Morocco, New Zealand and Norway.

Botswana and many countries in the developing world, which are struggling to transit from GHG to RE energy sources, have a lot to learn from the countries listed here and those widely discussed in the energy transition literature and climate change studies. The global policy studies and reports on emission reduction show that RE just transition countries have individually used innovative combinations of policies, strategies, financial models as well as prioritization toward alternative energy production to get to where they are today.

Just to illustrate the point, Sweden, for instance, has set its NDC emissions at 100 per cent RE production or net-zero emissions by 2040. In 2012, Sweden had reached 50 per cent RE electricity production – eight years ahead of the target set by the country earlier (Climate Council, 2020).

Taking advantage of its natural resources, Sweden used a combination of hydropower and bioenergy to achieve its RE targets. Similarly, Costa Rica is reported to have produced 98 per cent of its electricity from RE sources over the past seven years. Like Sweden, Costa Rica is using a combination of hydro, thermal, wind, biomass, and solar power to achieve the country's transition from a GHG emissions system to RE new technology sources. Scotland is another example of a successful transition country. According to the Climate Council Report (2020), Scotland increased its RE electricity from 37 per cent in 2011 to 60 per cent in 2020 and targets net-zero emissions by 2045. In Iceland, reports show that nine out of ten homes use geothermal power for their energy needs. Iceland uses a combination of geothermal and hydropower to achieve 100 per cent of the country's electricity needs.

¹⁰ International Renewable Energy Agency (IRENA).

Other transition success stories include Germany with a target of 80 per cent RE in 2030 and 100 per cent in 2035. Uruguay generates 98 per cent of its electricity from combining hydropower, solar, wind and biofuels. Denmark too is a typical success story being the leading user of wind energy in the whole of the OECD. Success in energy transition to RE is not limited to Europe or developed world countries as demonstrated by countries such as China with 33 per cent RE production, and New Zealand at 84 per cent RE electricity. Morocco has one of the largest solar farms in Africa, measuring 3,500 football fields and producing a lot of solar energy to meet the country's energy needs. It even exports to Spain in the EU.

Closer to home in SADC, Mauritius, Namibia and Tanzania show that with the combination of the right policies, strategies, sound financial incentives, information dissemination and human resources development, a lot of ground can be covered to make progress in adaptation to and mitigation of climate change.

These three SADC countries have responded to the challenges of global warming much earlier than Botswana. All three countries developed their national policies and strategies on adaptation and mitigation of global warming between 2010 and 2012 while Botswana's critical policies and strategies on RE are post-2019. The latter helped each country to set RE priorities, define more clearly government's priority, commitment, defined institutional regulatory mechanisms and standards, investment in research and development in RE linked to universities and research institutes while concurrently carrying out public education awareness programmes.

SADC reports on industrialization and energy use show that RE transition progress is more advanced in Mauritius, Namibia and Tanzania than Botswana whose policies and strategies only took-off in the early 2020s. Figures 2a to 2d summarise the key policy, financial incentives, information and human resources strategies used by countries that increased uptake in RE. These provide useful lessons for Botswana.

Figures 2a to 2d: Strategies used to increase RE uptake

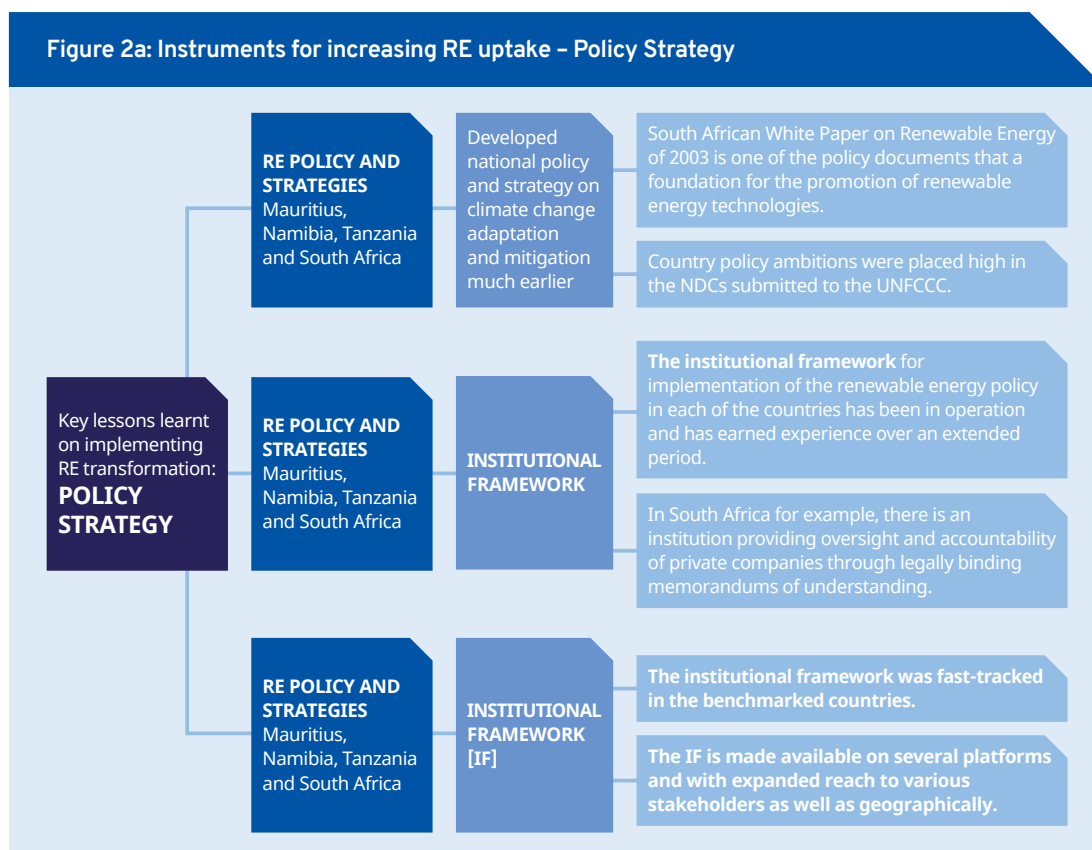


Figure 2b: Instruments for increasing RE uptake – Financial Incentives

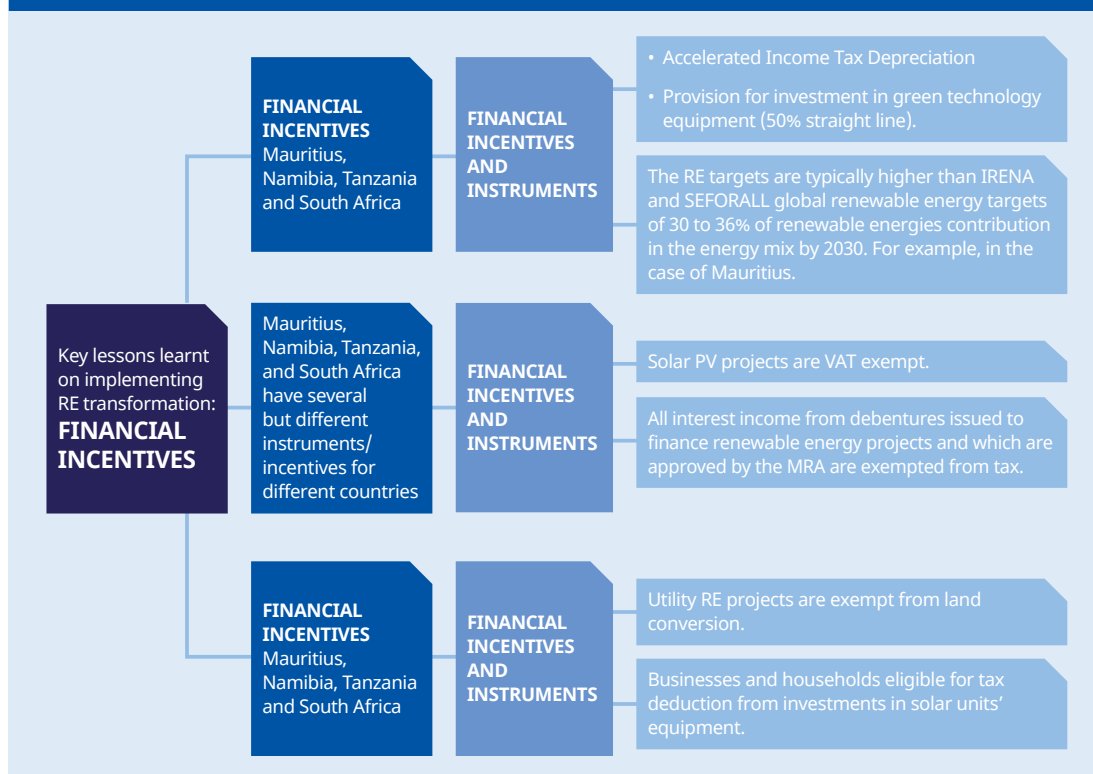


Figure 2c: Instruments for increasing RE uptake – Information

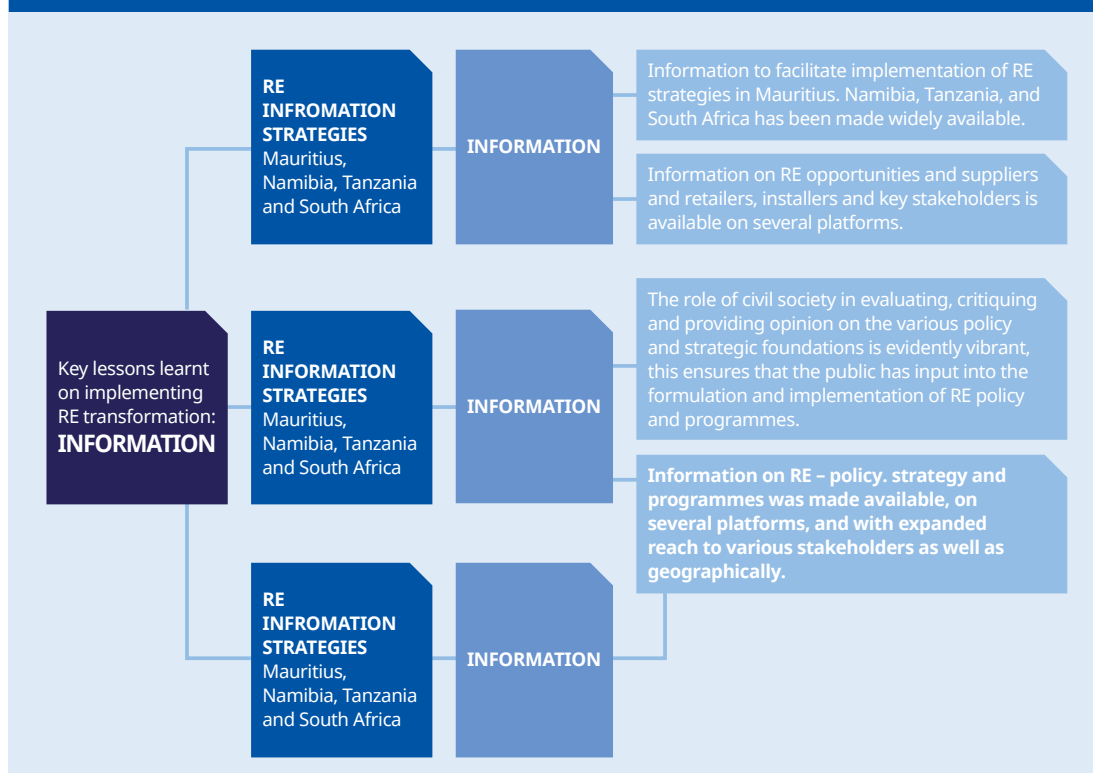
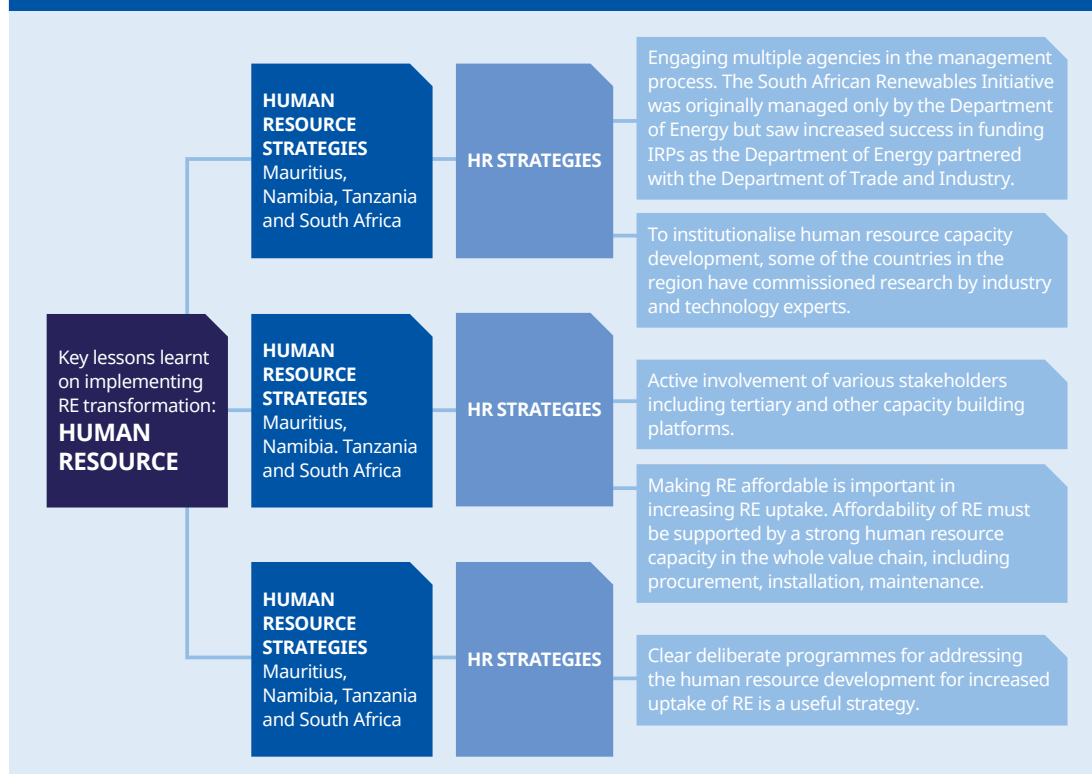


Figure 2d: Instruments for increasing RE uptake – Human Resource Development



In the African context, the Third Annual Global Electricity Review (EMBER, 2022), lists wind and solar as the fastest growing sources of electricity accounting for a record 10 per cent of global electricity in 2021. All clean power is now 38 per cent of supply. But demand growth for fossil fuels rebounded, leading to a record rise in coal power and emissions.

Solar generation rose 23 per cent in 2019, and wind by 14 per cent. Combined, this takes them to more than 10 per cent of global electricity generation. All clean electricity sources generated 38 per cent of the world's electricity in 2021, more than coal (36 per cent). Promoting a transition to low-carbon energy systems to mitigate climate change requires an optimization of RE planning.

African countries face the challenge of providing electricity for 596 million people who currently lack access – that is, 43 per cent of the African population (1.216 billion) (Census: 2021). Concurrently, for advancing climate change mitigation and achieving long-term objectives of the Paris Agreement, the electricity sector needs to be climate-neutral by mid-century (IPCC, 2014). While many developed countries are dealing with the environmental impacts caused by a long history of fossil fuel energy dependence, African countries could leapfrog the transition to renewable, low-carbon energy supply systems.

During recent years, solar and wind power have exhibited the highest growth rates among Africa's RE resources, yet they still contribute marginally to Africa's energy resource mix with solar at 1.2 per cent and wind at 1.5 per cent share of total electricity generation (SADC, 2016). Given the dependence of solar and wind power on meteorological variables, power generation from these RE resources is variable and intermittent, from short (sub-hourly) to long (seasonal and interannual) timescales. To address this challenge, increased research attention has been given to approaches that investigate integrated RE storage options and exploit the complementary energy source.

4.1.3 RE Incentives

The higher financial costs associated with the development and deployment of RE technology tend to hinder mass participation of the national population in the consumption and use of RE sources and in particular solar energy. However, RE policies tend to mitigate this barrier in most of the countries that have recorded an uptake of this RE source. There are three types of incentives in the RE sphere.

i. Feed-In Tariffs

The Feed-in Tariff (FIT) policy sets out a price per KWh that is guaranteed over a period of time during which producers can sell renewably generated electricity into the grid¹¹. In this sense, the FIT is an energy production system that provides stability in terms of planning for investment and cost recovery of that investment. Germany and Spain provide viable examples of FITs. These countries have offered a higher retail price for a KWh for FITs from solar than the electricity produced from fossil fuel. Individuals, small businesses and large corporate entities involved in the PV industry are incentivised by higher FITs. This has ensured economic viability and sustainability of the PV industry. Data¹² show that 50 countries that promoted higher FIT saw an improved local manufacturing of PV products and value addition in the PV production value chain.

ii. VAT and Other Taxes

Incentives to small businesses also tend to come in the form of tax credits, VAT, and a reduction in sales and energy, among others. In fact, South Africa introduced tax rebates to households for investing in RE in February 2023. Generally, this form of incentive applies to services (pre-investment projects as well as from sale of electricity and related ancillary income). Policymakers may also shield future RE technologies from taxes to motivate investors in RE. Generally, tax incentives have been reported to be effective when they are linked to electricity generation and not just to installation capacity.

However, tax exemptions in the solar sector have been reported to help double up or kick-start local manufacturing of PV modules/equipment which are produced on scale, triggering a reduction in solar product costs over the longer term and an uptake of the RE source. Incentives also provide opportunities for locally induced technical capacity training and development.

iii. Auctions and Tenders

Auctions and tenders as a policy incentive in RE cover incentivization in the form of capital subsidy, grants or rebates, net metering, investment, or production credits, tradable RE credits, energy production payment¹³, heat obligations and mandates. The government puts out a call for bids of the total cost investment of the RE projects and utilizes an open selection process for auctions and closed selection process for the bids.

However, price competition in auctions tends to muscle out small-scale business entities which may lack the financial resources to compete with the larger and established competitors.

In summary, international literature provides rich experiences and lessons from which countries like Botswana with abundant RE resources including solar, wind, biomass and possible geothermal energy potential, can draw. The literature further points to the critical role of good governance in RE transition. Inclusive involvement of all public and private stakeholders including the private sector – small and large businesses as well as civil society and local authorities and unions – is mandatory for a smooth transition from GHG emissions energy systems to new and just transition RE systems.

¹¹ Renzi, 2016

¹² Ibid

¹³ Renzi 2016



▶ 5 Findings of the Assessment – Botswana Energy Sources, Use, and Financing Options

As already indicated, Botswana possesses considerable RE potential, most notably solar, wind and bioenergy. However, these remain largely unexploited, despite the country's ambitious plans for integrating RE into its energy system. In the recent IRP 2020, it was announced that Botswana's RE should account for at least 15 per cent of the energy mix by 2030. The country's Vision 2036 sets the target even higher at 50 per cent of RE contribution to the energy mix by March 2036. In light of these targets and given where the energy mix stands in 2023, Botswana needs to have a clearer policy, a firm regulatory framework, investment package and a separate RE programme for concerted RE implementation to achieve the 15 per cent energy mix in seven years and an additional 35 per cent to make the 50 per cent mix in 13 years from now.

The World Bank Group (WBG) senior energy specialist, Joseph Kapika, has observed that "while Botswana is endowed with 66% of Africa's coal resources and has ambitious plans to exploit them for both domestic and export use, there are compelling reasons to be thinking strategically about bringing in renewables, both on-grid and as part of the country's off-grid programme," (WBG, August 11, 2014, WB Newsletter).

At a workshop to discuss RE in Botswana (WBG, 2014), it was further observed that solar and wind costs have dropped, and experience from South Africa shows that these can be cost competitive with thermal.

That notwithstanding, there are limitations to the role that renewables can play in Botswana or any country with baseload needs that cannot be fully met by renewables. Data from KIIs with Botswana's high-ranking Ministry of Energy officials and from the survey show that the path to incorporating RE into mainstream energy use can often be complex and requires overcoming market availability issues, various regulatory, policy, and/or financial obstacles, among other issues.

For example, Botswana has to deal with the low-capacity factor for solar energy. There are peak periods of 5 am to 10 am demanding 680MW. During the day, this demand drops drastically and then peaks again from 5 pm to 10 pm. This calls for advanced energy storage battery systems to ensure energy is harnessed and not wasted away. However, these are expensive and not an attractive option given the low-capacity factor. Furthermore, while the IRP provides a roadmap, it lacks implementation guidelines to assist various agencies tasked with implementation.

Results from the e-survey conducted for this study have confirmed the low uptake of RE in Botswana. From the 303 respondents as shown in Table 2, the commonly used sources of fuel are cooking gas (28.16 per cent), coal (26.53 per cent) and solar (24.37 per cent). In addition, 9.93 per cent of respondents reported using biomass (wood and grass), 5.42 per cent used hydroelectricity, 3.07 per cent used paraffin while 2.53 per cent used biofuel (ethanol, cow dung). RE use and in particular solar is much higher than the one per cent reported nationally because the sample was purposely and deliberately biased towards enterprises dealing with RE issues as venders or users/consumers.

Table 2: Types of energy use in Botswana

Type of Energy	% of People Using the Energy
Cooking gas	28.16
Coal	26.53
Solar	24.37
Biomass (wood, grass)	9.93
Hydro electricity	5.42
Paraffin	3.07
Biofuel (ethanol, cow dung)	2.53
Grand Total	100.00

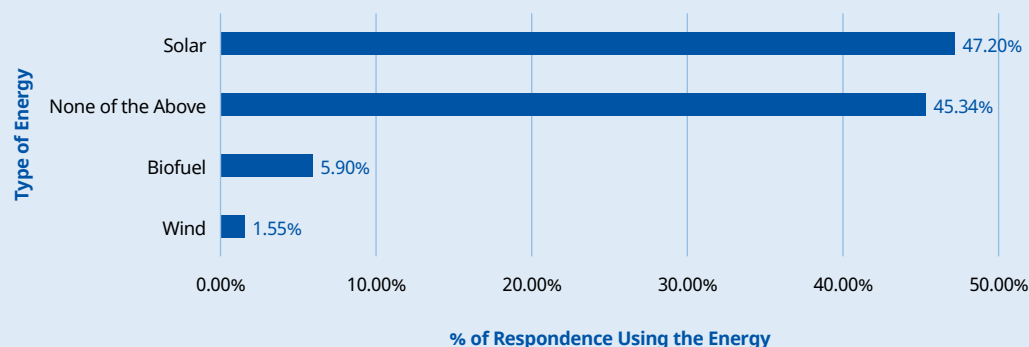
Source: Data from the e-Survey for Assessment of Renewable Energy Uptake, 2022.

Despite the abundance of solar energy potential in Botswana, solar contributes insignificantly to the energy mix. It is mainly used for lighting, water heating and water pumping. The learnings from past experiences show that there are a number of barriers to RE and specifically solar energy¹⁴ development. These barriers cut across policy, institutional and regulatory frameworks, technology, market and capacity.

When survey respondents were asked to indicate the type of RE they were currently using, 47.20 per cent said they were using solar energy, 5.90 per cent said they were using biofuel and 1.5 per cent reported using wind energy. Clearly, RE in Botswana is currently dominated by solar. The results are summarised in Figure 3. Wind energy use is very low and as a result, this report has not covered it as extensively as solar.

Lately, the increase in concerted global research and technological developments has highlighted the potential of wind power generation and the need for further exploration. To this end, efforts to allocate resources to ensure development of wind energy projects aligned with the national RE strategy are being pursued. What the data have also revealed is the potential for RE use in Botswana – a significant population in the sample indicated that they did not use any of the RE choices that were presented in the survey. As Figure 3 shows, 45.34 per cent do not use solar, biofuel nor wind. This is still a high percentage despite the biased sample towards those in renewables.

Figure 3: RE currently being used



Source: Data from the e-Survey for Assessment of Renewable Energy Uptake, 2022.

The initial capital cost for implementation of solar energy technologies is high in Botswana, despite the global trend of reducing costs. This comes from the fact that Botswana imports the technology in its entirety as there are no local manufacturers in this field.

The current subsidy on conventional fuels deems solar energy less competitive, resulting in an environment less conducive to attracting either local or foreign investment into solar development. The absence of an appropriate legal and regulatory framework also poses a challenge to investors as this brings little confidence in the system.

When asked to indicate the region where the RE facility was installed, respondents answered as shown in Table 3. Most are in Gaborone, but as a percentage of enterprises surveyed, it can be concluded that most RE use is in urban and peri-urban areas.

¹⁴ This is because of the abundance of this RE resource which by far dominates any other RE in Botswana's energy mix.

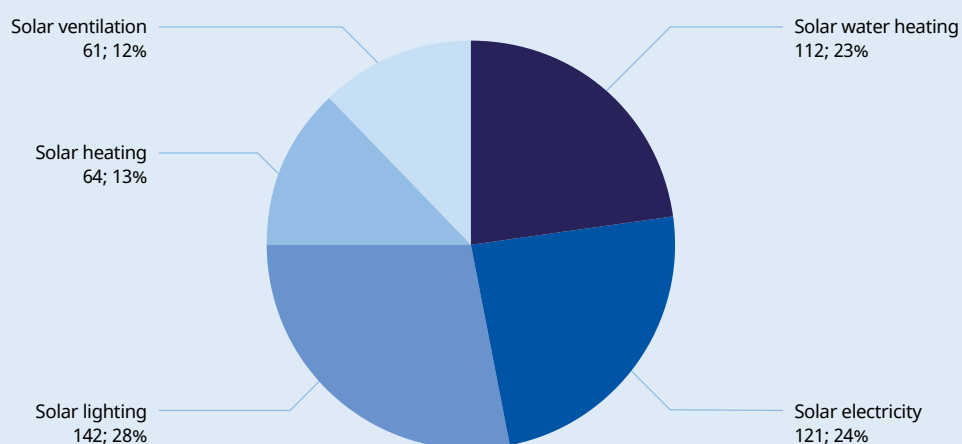
Table 3: Regional distribution of RE facilities

Region/Area	No. of Solar Installations
Gaborone	96
Central	35
Southern	32
Francistown	25
North East	23
South East	23
Kweneng	20
North West	15
Ghanzi	6
Kgalagadi	5
Kgatleng	4

Source: Data from the e-Survey for Assessment of Renewable Energy Uptake, 2022.

While most RE facilities are in Gaborone, they are fairly distributed in other regions as well. However, Ghanzi, Kgalagadi and Kgatleng have significantly less RE facilities. Most usage of solar power is for lighting, water heating and solar electricity. This is summarised in Figure 4.

Figure 4: Usage of solar power according to the e-survey respondents

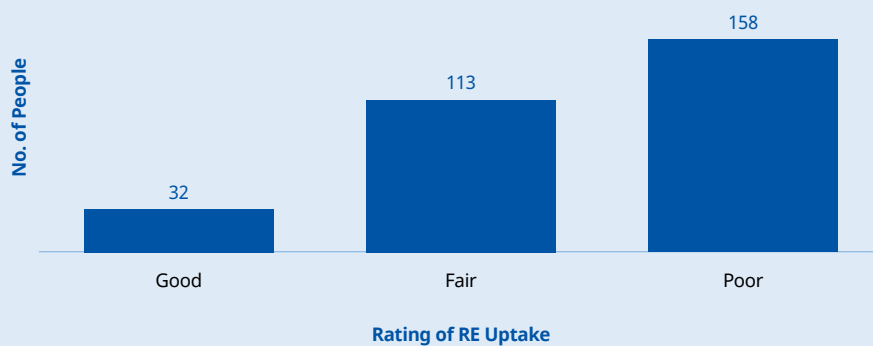


Source: Data from the e-Survey for Assessment of Renewable Energy Uptake, 2022.

All sources of data for the assessment judged the uptake of RE in Botswana as relatively low. As shown in Figure 5 of the survey results, 158 (52 per cent) of the respondents rated the RE uptake rate as poor while 113 (37 per cent) rated it as fair and only 32 (11 per cent) rated it as good.

- ▶ The respondents from the KII, FGD and validation workshops corroborated the findings from the e-survey. According to these sources, solar thermal is also low because of a lack of access to financing.
- ▶ Given negative experiences following the application of solar thermal in the 1980s in Botswana, there is now a rejection of RE in general.
- ▶ Solar thermal could be used for heat production but will have to be produced at a large scale and will need an innovative financial mechanism.

Figure 5: Participants' rating of RE uptake

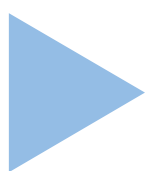


Source: Data from the e-Survey for Assessment of Renewable Energy uptake, 2022.

Data from the e-survey, KIIs and FGD show that the main reasons for the low uptake of RE are low tariffs, lack of maintenance parts, finance, labour issues, perceptions of value, and storage. These are summarised in order of importance in the following box:

Reasons for low uptake of RE

- ▶ Low tariffs as a result of subsidized coal, therefore PV pricing is not comparable.
- ▶ Maintenance parts and supply chains are also a problem as are the lack of local financing mechanisms.
- ▶ Finance – cost of solar energy units and other related parts, for example, is prohibitive.
- ▶ Labour issues related to mining and coal – issues relating to the environment and all these relating to labour.
- ▶ Perception that good electricity comes from the grid.
- ▶ Storage is available, but very expensive – the tariff would escalate to 20 cents (US\$) per KWh as compared with 1BWP per KWh, however, Botswana consider this tariff expensive.



6

Challenges in the Uptake of RE

► 6.1 Policy, Legal and Regulatory Framework

Botswana's energy sector developments have, since 1985, been guided by the Botswana Energy Master Plan (BEMP). The BEMP was subsequently reviewed in 1996 and 2002, and in its latest review, the National Energy Policy (NEP) was formulated in 2021. The MMGE, through the DOE, as the government organ responsible for directing and coordinating overall developments in the energy sector, is the custodian of the NEP. The DOE is the lead policymaking authority of government on all energy supply and demand matters.

The department is responsible for:

- i. Development of policies, strategies and plans that ensure national energy security.
- ii. Rural electrification planning, funding and implementation.
- iii. Defining procurement and off-take of responsibilities for new generation.
- iv. Setup and administration of various energy funds.
- v. Import control of petroleum products.

The DOE is reinforced by state-owned entities in implementing its mandate, mainly through government-supported projects and programmes. These are:

- i. The BPC¹⁵ which is the country's state-owned power utility and mandated to generate, transmit and distribute electric power. Currently, the BPC owns and operates the country's major power stations, Morupule A and B coal-fired plants, as well as the transmission grid.
- ii. The Electricity Supply Act was amended in 2016 to allow for IPPs' participation in the generation of power. Currently, the BPC continues to enjoy the monopoly for transmission and distribution of electric power.
- iii. The national oil company, Botswana Oil Limited, ensures security of supply of petroleum products, operation and management of the government's strategic petroleum reserves and is also mandated to promote citizen participation in the petroleum fuels value chain.
- iv. ¹⁶BERA handles regulatory issues of the entire energy sector. BERA currently regulates the technical and economic aspects of the electricity sector, administers licences for sector activities and makes recommendations to the Minister of MMGE regarding issuance of licences. With regards to petroleum fuels, BERA regulates pump prices, issuing of licences and granting of permits for construction of new facilities and ensures that service standards are met.

In the absence of an Energy Act, the Botswana energy sector is currently governed by a number of statutory instruments, some not specific to energy. Table 4 shows some of these instruments which guide activities in the sector.

¹⁵ Botswana Power Corporation was established in 1970 and is currently the only electricity supplier in the country. The BPC represents Botswana in the Southern African Power Pool.

¹⁶ Botswana Energy Regulatory Authority is the energy regulator and a government parastatal of the Botswana Government. The parastatal was founded after the Botswana Energy Regulatory Act was put in place in 2016 and started its operations on the 1st of September 2017.

Table 4 : Regulatory instruments governing the energy sector

Electricity	► Electricity Supply Amendment Act, BERA Act and BPC Act
Oil and Gas	► Oil and Gas Bill, Safety Guidelines, and BERA Act
Biomass and biofuels	► Forest Act (Chapter 38:03), BOBS standards, Biofuels Guidelines
Solar	► BOBS Standards, Rooftop Guidelines
Coal	► BERA Act, The Coal Roadmap

Source: National Energy Policy, April 2021, p4.

There are several policy statements from the NEP that stimulate future actions on RE in Botswana. These are summarised in Table 5.

Table 5: Policy statements from Botswana's National Energy Policy

Sector	Policy Statement #	Narrative
Solar and Wind Energy	P10	The government will support and facilitate the development of on-grid and off-grid solar to increase the contribution of solar energy to the energy supply mix.
	P11	The government will explore the potential for wind as an energy source and facilitate wind power development.
Biomass and Biofuels	P12	The government will ensure sustainable and efficient use of wood fuel to reduce resource and to protect the environment.
	P13	Initiatives related to production and use of energy derived from biodegradable materials to offset the country's carbon footprint.

Source: NEP.

Results from stakeholders indicate that the country was comparatively late in coming up with RE policy and regulation. Currently, Botswana faces challenges associated with the implementation of development projects and the energy sector is not an exception. Some of these implementation failures in the energy sector result from weak project management skills, poor quality of equipment, substandard workmanship, and a lack of maintenance of the installed systems.

One of the main challenges at policy and regulatory level identified by key informants and FGDs is that having coal in abundance in Botswana results in most planning being directed to coal. Generally, the preference is biased towards the BPC as a state-owned enterprise.

Other issues raised are as follows:

- There had been a lack of direction and no master plan for the previous 10 years.
- The market was skewed towards the BPC Lesedi – aimed at the small individual units.
- In the 1980s there was roll out of solar thermal energy projects. However, there was no regulatory framework and institutions were weak. Furthermore, the projects were of a small scale.
- Low tariffs because of subsidized coal; therefore, PV pricing is not comparable.
- High prices to the end user; therefore, company vendors buy at user price.

- ▶ Maintenance parts and supply chains are also a problem, coupled with the lack of local financing mechanisms.
- ▶ Government needs a clear strategy, enabling environment, subsidies, and must work with the private sector to self-regulate the uptake.

A shift in the uptake of RE requires several fundamental actions at policy and regulatory levels for BB to invest significantly in the sector. This is because project take-off and success in the energy sector largely depend on three factors, namely technology availability; access to finance; and well-established, supportive and consistent regulations. These were echoed by the respondents to the survey as well as informants from BERA. Given Botswana's aspirations towards clean energy¹⁷, it should facilitate financial resources to the sector to enable capital availability for businesses to participate in the RE sector.

Discussions with the BPC and BERA indicated that both are willing to work closely and facilitate increased private sector participation in RE development in the country. However, both BERA and BPC need to move quickly to turn their wishes into actions. For example, informants from BERA acknowledged the country's challenges regarding a lack of locally grown RE technology. In addition, a failure to innovate technology exposed the country to exorbitant prices on imported technology. The technology with related hardware was largely unregulated.

Informants in FGDs and KIIs acknowledged that technical skills are also generally lacking in the country. These sources further highlighted the absence of a governing body to regulate the technical personnel in the sector, although the ideal would be to have such bodies in place.

BERA is the GoB's response to BB to regulate the energy sector. This has induced a measure of confidence in the business community. However, BERA has not been bold enough to regularise the RE sector to enable BB's effective participation in the sector. Some key informants hold the view that BERA in its current form does not need reform and can function as constituted.

However, there was a general recognition among informants that BERA is relatively new and it lacks human resource and financial capacity to formulate and enforce regulations. For example, although BPC's functions of generating, transmission and distribution have been regulated, it is still largely a dominant player in the energy sector, crowding out private sector players. In this regard, the view among informants is that the BPC needs to be restructured to allow for IPPs to participate fairly and competitively. The BPC in its current state is conflicted and is acting as judge and jury in receiving and adjudicating RE projects in which it has interests. Informants are thus calling for the creation of an IPP office and another in charge of a green economy which would be linked to the MMGE.

To date, no significant RE projects, particularly solar projects, that have potential to induce BB's participation as a private sector have been concluded and operationalised. Clarity is needed in the regulations for BB to participate fully. IPP agreements need to encourage private sector participation. Key informants from BB told this study that BB desires to see BERA act with clarity of purpose like their counterparts in the region. For example, the South African Renewable Energy Independent Power Production Programme established supportive and consistent regulations, and the South African business sector has responded by commissioning over ten billion dollars' worth of RE investments into the RE sector.

However, it is within BERA's mandate to expand BB's participation in the RE sector. This is being signalled by BERA's proactive stance to develop more pro-business regulations on how BB, for example, would participate in the Rooftop Solar project, generating for the grid and starting solar energy projects for export. BERA is also developing advisory capacities to inform the Minister of Energy on potential incentives that would boost and expand participation in the sector by BB.

¹⁷ See Vision 2036 and International Agreements on Climate Change.

► 6.2 Social, Employment, Gender-Equality and Environmental Opportunities and Challenges

RE has potentially many opportunities but also challenges that affect the environmental, economic, social and gender systems of any society. Even though there are some respondents who wondered what the link between gender and RE usage was, it is clear from different sources of our data that the opening of the economy through the window of RE offers a great opportunity for gender and citizen empowerment, in general. In FGDs and validation workshops, several points were raised concerning how the empowerment space provided by RE could be used. They noted, among others, that:

- i. The energy sector is traditionally male-dominated, and it is gender-insensitive. This currently unequal sector is likely to be reproduced unless drastic policy decisions and targeted empowerment actions are taken to ensure women, youth and marginalised groups effectively participate in RE decision-making and programmes.
- ii. The costs of RE technology and equipment are too high to be affordable to economically disadvantaged groups. Hence, these groups are likely to continue to be excluded under RE initiatives. In this context, if not treated radically differently from the country's current economic system, the transition to RE will not be **just** according to the respondents.
- iii. Participants also expressed concerns that the present RE policies, programming and implementation processes are already defective in that they are not sufficiently inclusive of different key stakeholders such as labour, civil society and gender groups.
- iv. The participants/respondents in this assessment wanted to see systematic and specific skills training and human resource development for women and youth in the RE sector so that they can participate as business persons and as employees.
- v. Respondents in KII and FGDs cited several gender equality opportunities to be derived from RE usage. According to them, RE usage will open opportunities for women to study science-related programmes such as engineering. This industry requires installers, maintenance technicians or even manufacturers of required components.
- vi. Increased uptake of RE implies that job opportunities will increase and both men and women will be employed. Women will also have an opportunity to open their own businesses in the RE field, giving them an opportunity to meaningfully contribute to the economic development of Botswana. This, in turn, results in increased income which promotes the quality of life for women and children. Usage of solar energy will definitely reduce women's dependence on men as solar energy is user-friendly unlike diesel generators which would require more physical strength to start or operate. As a result, women can easily run their farming ventures on their own.
- vii. Deliberate decisions need to be made to include women in the RE executive boards. This will give them the platform to promote women participation in RE and increased finance options. For example, while the initial installation for generation of solar energy is expensive, in the long run, women will save money to afford this technology and ensure access to uninterrupted power. This reduces the burden on women either to gather firewood or do extra work to earn money to buy electricity or gas.
- viii. To sum it all, one respondent asserted that RE uptake provides immeasurable opportunities to break the glass ceiling that has been set for women and gender systems. Given the need for a new sector to transform Botswana's growth from domination by diamond mining, RE, if supported well, will become the new diamond for Botswana. Respondents in the KIIs emphasised that the change to RE can free women from, for example, the heavy time investment in fuel energy sources such as firewood and paraffin, especially for cooking and lighting. The freed time will allow women to do

other productive activities in RE jobs and businesses. FGDs and KII informants agreed that if the transition to RE is properly planned, especially with human resources training, including adults and youth of both genders and other marginalised communities to prepare them for new technologies, there is less likelihood of job losses and, therefore, less exposure to poverty. This will ensure a just transition to the new green economy.

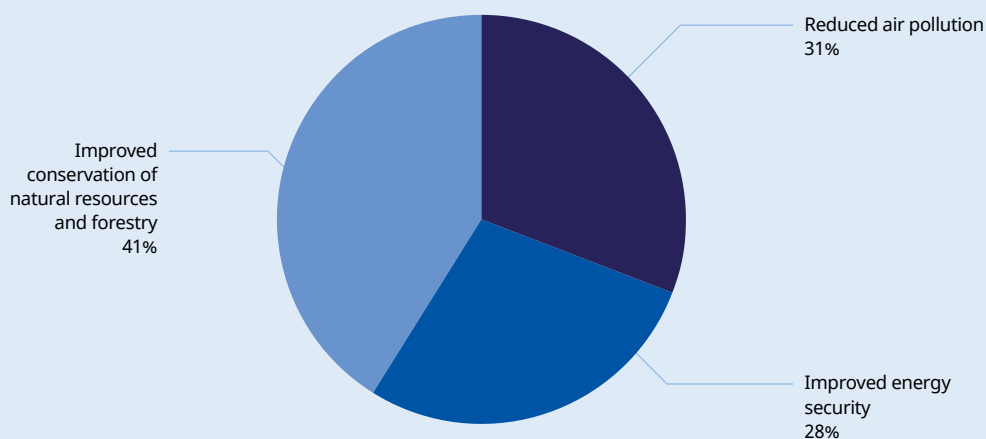
- ix. In conclusion, the message coming through the gender lens of the assessment is that the RE discourse must address gender and marginalised groups at macro (policy), meso (institutional) and micro (household/business) levels to ensure that this, indeed, “constitutes a just transition”.

The survey asked respondents to rank social opportunities derived from the use of RE. The social opportunities in descending order were:

- i. Inexhaustible energy and less global warming.
- ii. Improved public health.
- iii. Improved income.

When asked to identify the most important environmental opportunity derived from the use of RE, 168 (41 per cent) of respondents selected, “Improved conservation of natural resources” followed by, “Reduced air pollution” which was selected by 126 (31 per cent) of the respondents. The least environmental opportunity was, “Improved energy security” which was selected by 115 (28 per cent). These responses are summarised in Figure 6.

Figure 6: Environmental opportunities from RE usage



Source: Data from the e-Survey for Assessment of Renewable Energy Uptake, 2022.

Types of Users of RE by Level

For RE uptake to increase and a just transition to be realized, all producers and consumers of energy must endorse and use this type of energy extensively. At the moment, this is not the case in Botswana. Looking at the findings from the different data sources used in the assessment, the following results are profound and evident of what the current constraints are:

i. Households/Community Energy Users

When scrutinized further, the statistics on energy use show that households are generally not into RE. They predominately use wood, paraffin and methane cooking gas, and conventional electricity (where available) for lighting and refrigeration. Some relatively wealthy households also use generators/diesel energy to run television and handle other household energy equipment such as washing machines and welding. This is particularly true in peri-urban and rural areas where conventional electricity is not available or has limited accessibility.

On the positive side, however, several households of middle income and retirees were found to be using their own resources to finance RE mainly in the form of solar rooftop panels and solar heaters. While many households and communities are not fully inducted into the value of RE and its reliability, middle-class households in different towns and villages show potential for increased RE uptake, provided that education and financial incentive schemes were designed for this segment of the population.

ii. Business Energy Use

Many small and medium-size businesses in cities, towns and villages are not into RE usage. Many demonstrated ignorance and scepticism of its reliability and affordability while some have tried different types without much success. They have therefore resorted to conventional electricity and/or generator/diesel energy as their main supply of energy. Only a small number of businesses use solar and wind energy in combination with conventional electricity.

Among the business community, however, there is a small but growing community of suppliers and distributors of RE technologies. These are importers and suppliers who also install solar equipment of different types and quality for household energy needs, borehole pumping, solar heating and related uses. In the context of this assessment, this group of small investors in RE has formed the Renewable Energy Association of BB. Although not all such RE suppliers are members of BB, going forward, this group represents a viable entry point for RE promotion and it needs to be assisted to develop capacity and full appreciation of the policy and regulatory environment on RE in the country. They also need clearer financial incentives including commercial bank loans to finance RE projects.

iii. Public Institutions' Energy Use

For a long time, public institutions including schools, health facilities and water supply activities of local and central government in rural villages and smaller settlements were using diesel engines to generate electricity for their needs. However, since the late 1980s, a shift to rooftop solar energy was introduced to replace conventional/diesel energy.

Although this transition has not been very successful due to poor maintenance of solar panels, among others, the solar energy in public institutions, especially staff housing, has made a difference. It needs to be upgraded and maintained to sustain consumers' confidence in RE.

iv. Labour Unions and Civil Society Organisations' Energy Use

Like women respondents and disadvantaged groups, the trade unions/labour representatives in this study share a positive view and hope that transition to RE will be just by being inclusive and beneficial to the working people of this country and particularly the unemployed who are mainly youth. The labour movement is therefore very open and keen to participate in a just transition to RE. The leadership of unions were, however, mindful of possible disruption likely to be caused by the transition to RE which might include loss of existing jobs, lack of skills required by new jobs and possibly a high cost of energy resulting from privatization of the energy sector. As a result, they expressed concerns that the way that the transition to RE has taken off in Botswana was not adequately inclusive of key stakeholders or comprehensively consultative.

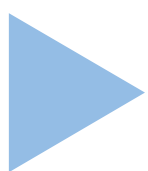
The unions feel that targets such as an NDC of 15 per cent by 2030 or 50 per cent by 2036 were all set without prior discussions with the unions. They are not sure what these targets mean for those employed in the mining sector and coal mining in particular.

The unions are, therefore, calling for more engagement and dialogue on key issues of transition at the levels of policy, programming and business opportunities for their membership. As some of the union leaders put it, "we need the RE sector to be democratized". This means ensuring that unions are not seen just as employees but also as potential business investors in RE. They, however, consider the cost of RE equipment to be too high, necessitating subsidized financing by commercial banks and government and low interest rates by commercial banks.

Once more, the unions wish to see detailed discussions on skills upgrading, re-skilling and preparation of workers for the new jobs through training and development based on agreed programmes by all tripartite stakeholders.

Finally, as in other countries, the trade unions and CSOs see themselves as key players and potential drivers of RE uptake in Botswana. Their memberships include large populations of working people. They also have different membership packages including funeral schemes, financing of projects and education support to members' family needs. Some unions such as the Botswana Teachers Union even own borehole drilling machines to help members drill boreholes on their farms and other businesses. Such schemes, if adopted to include RE packages, can go a long way in improving RE uptake. At present, the assessment found no strategic RE initiatives being promoted by trade unions or CSOs.

Both trade unions and CSOs showed limited knowledge and understanding of the concept of a just transition and its potential to create new businesses and jobs. Yet, the green economy is changing the labour market character around the world. Trade unions and CSOs in Botswana need to closely follow and become key participants, if not drivers, of a just transition to the green economy. They have the potential as well as business incentives (many trade unions own businesses) to invest in RE for the benefit of their membership. In the context of tripartism, their role versus that of government and the private sector needs to be clearer and both specific and complementary in policy advocacy, reforms, incentive schemes and RE uptake.



7

Improving RE uptake in Botswana

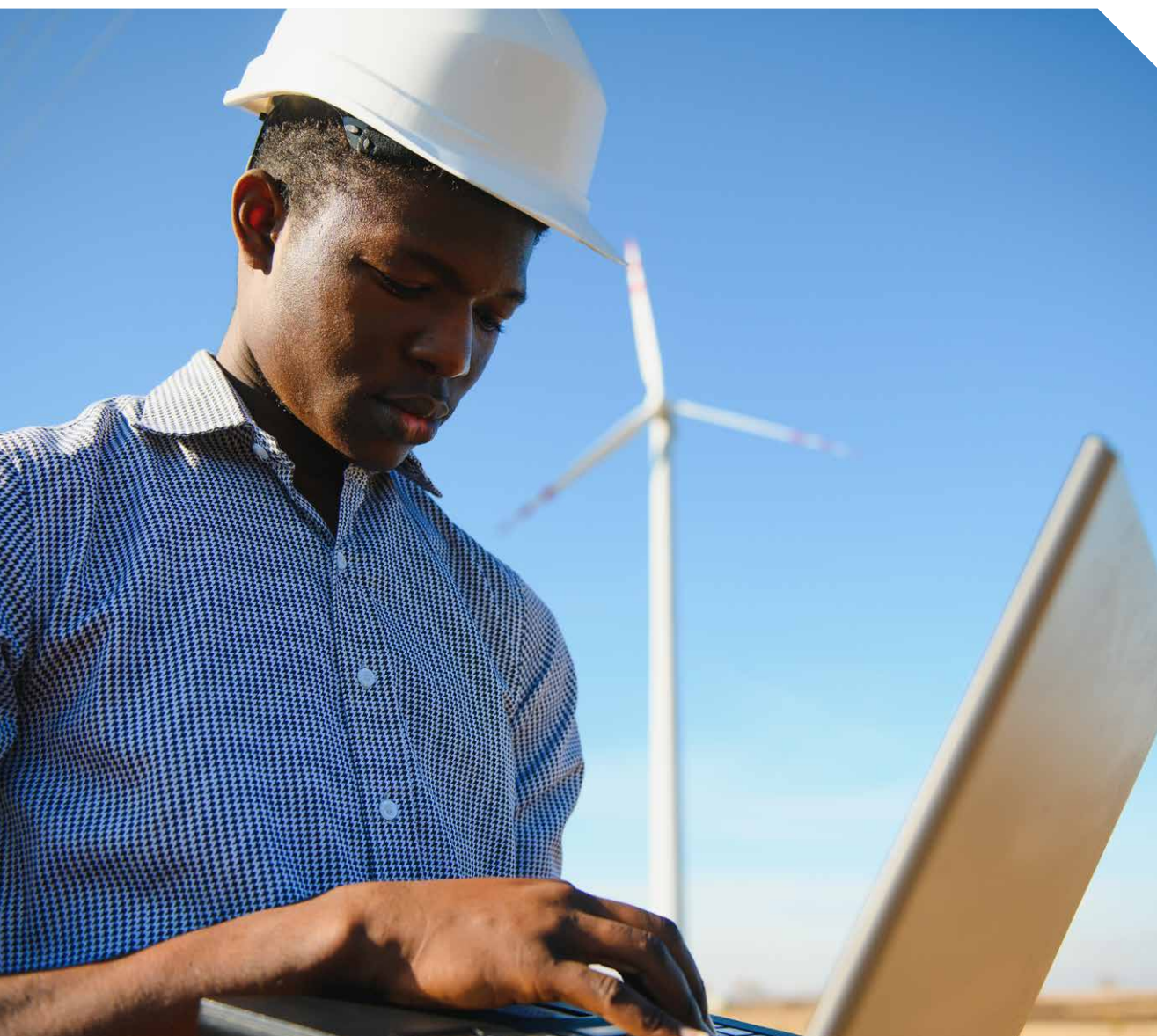
An encouraging finding is that respondents from across the board still saw opportunities in RE. Table 6 summarises the opportunities identified by respondents.

Table 6: Opportunities for RE in Botswana

Opportunities

- ▶ Advantage – plenty and sustainable.
- ▶ There are several comparative advantages with the solar energy potential.
- ▶ Because of the sparse population, this is an opportunity to apply RE and also present opportunities for job creation.
- ▶ Opportunities for vending and marketing of RE technologies are many.
- ▶ The labour movement supports the just transition to RE for meaningful and gainful employment of the unemployed.
- ▶ As the country expands RE uptake, it is expected that tariffs would decrease and be comparable with coal.

The respondents generally agreed that measures should be taken to improve RE uptake in Botswana.



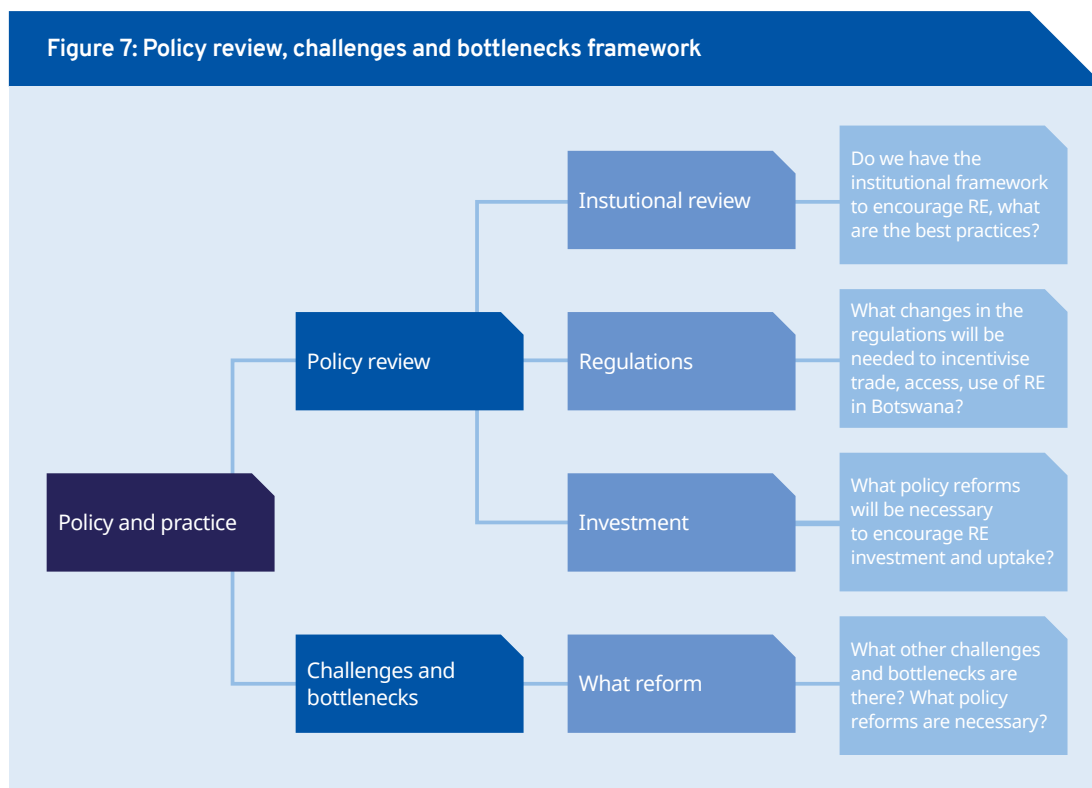
► 7.1 Review of Policy, Regulatory Framework and Related Instruments

Table 7 summarises the policy, institutional, regulation and financial issues and reforms from the KIIs, FGDs, panel discussion, workshop and validation discussions held with various stakeholders.

Table 7: Policy, institutional, regulatory and financial review and reforms required

Policy Review			Challenges and Bottlenecks
► There is a need for an Act specific to incentivising RE (PV, solar thermals). ► No land, no pressure on commercial, residential, industrial, except hospitality where the incentives allow. ► Need for a policy to regulate the use of mineral resources in producing energy in an inclusive and participatory just transition to RE. ► Support mini-grid private sector, trade unions and CSO involvement. ► Integrated resource planning is the best way to drive RE.			► Heavy dependence/reliance on fossil fuels. Thus the need to improve uptake of RE. ► Intermittency of RE (solar) but good for baseload. ► Grid encroachment, space needs to be secured and addressed.
Institutional reform	Regulations	Financial/Investment	Reform
► Registration and licensing sitting in different institutions. ► Through IRENA, a one-stop shop is in the offing. ► Government should subsidize. The new projects will apply to IPPs – private sector and other stakeholders’ modeling.	► BERA has been established to regulate the sector. ► BERA must prevent ‘technology dumping’ in Botswana. ► BERA must strengthen its regulatory role including opening up to non-state-owned players to supply both off-grid and grid-connected private power producers.	► To push and pull the movement and transition, there is need to incentivise. ► Trade in RE must be subsidized and VAT exempt. Already exemption from import taxes exists, but the VAT could also be removed. ► Government must subsidize and incentivise. ► Interest rates are very high, this needs to be addressed to help improve uptake of RE.	► Develop the infrastructure and hand over to operators and private sector or state-owned enterprises to operate. ► Improvement in procurement processes (learn from other best cases. Example: Namibia’s revolving fund for RE). ► Funds available to reduce tariffs can be applied for: GCF, and with help and capacity building through IRENA to address the capital costs.

The following diagram (Figure 7) summarises the issues as perceived by respondents.



► 7.2 Financing RE Uptake in Botswana

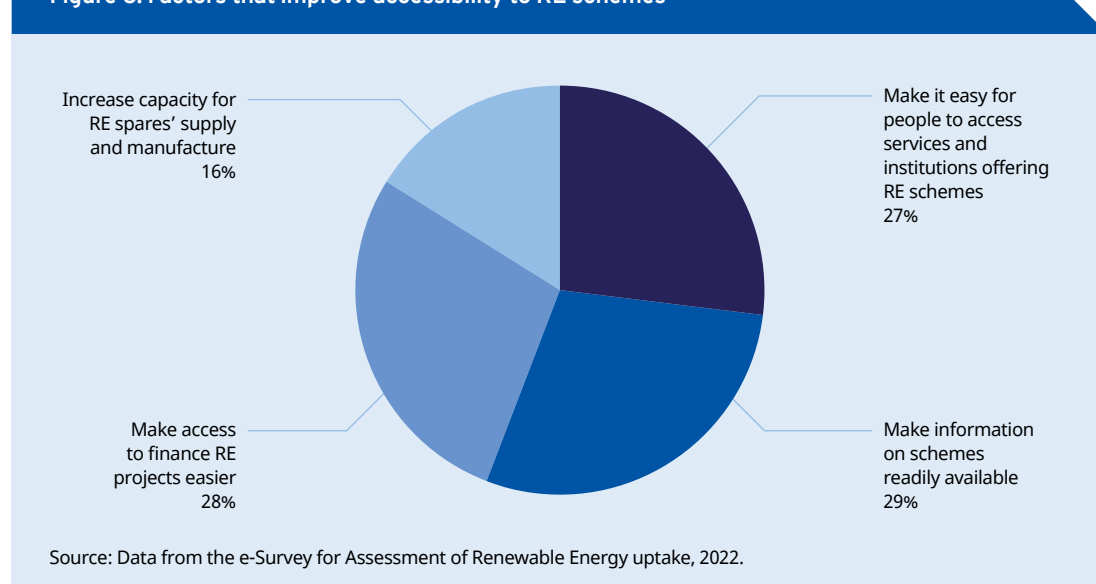
The survey asked respondents to rate the three constraints to RE uptake. A total of 84 per cent identified the availability of RE technologies, finance, information and knowledge as the three key constraints to RE uptake. If these three were not addressed, RE uptake would be affected negatively. Respondents from the KIIs and FGD were further asked the likelihood of the following factors improving RE uptake in Botswana:

- Provision of financial incentives.
- Provision of tax deductibles.
- Provision of RE incentives/schemes.
- Provision of favourable regulations.

Respondents indicated that all these factors, when provided, were most likely to increase the uptake of RE in Botswana. Most respondents also indicated that they would make use of RE schemes if these were available. Specifically, 278 (94 per cent) indicated that they would, 18 (six per cent) responded "Maybe" and only one said they would not use such an opportunity. The data thus show that there is an appetite for RE in the current Botswana environment. Respondents further indicated that improving accessibility to schemes would enhance the uptake of RE.

With regards to factors that would enhance access to RE government schemes, 29 per cent indicated that information on schemes should be provided to people, 28 per cent indicated that access to finance for RE projects should be made easier than it currently is, 27 per cent of the respondents indicated that access to such schemes should be made easy and 16 per cent requested that capacity for RE spares' supply and manufacture should be increased. This is of critical importance considering that 59 (20 per cent) of the participants indicated that they were aware of RE government schemes while 242 (80 per cent) were not aware of such schemes. This further reinforces the view that an appetite for RE in Botswana exists. However, more funding, information and knowledge must be provided. The bigger challenge, according to some of the key stakeholders, is *funding*. A key informant listed the sectors that women could benefit from if they utilized the RE, and in particular, solar energy. Textiles, for example, can be good business for women. In textiles there is a gap that needs support. Solar energy can assist them to do business in this area, but it is not accessible to the majority of them.

Figure 8: Factors that improve accessibility to RE schemes



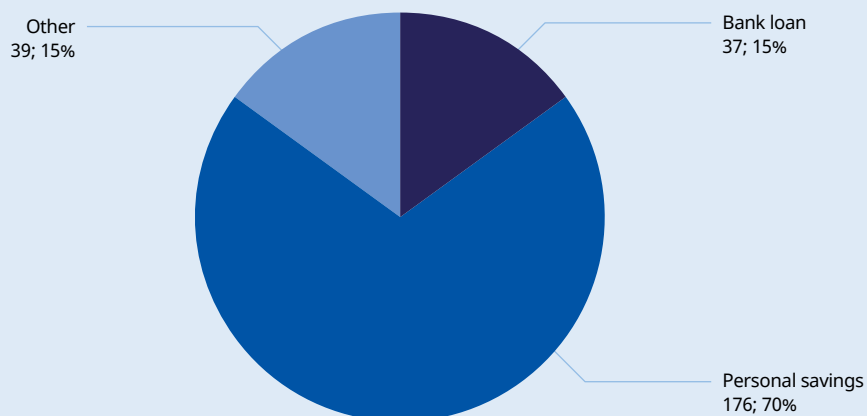
In agriculture, solar can unlock many opportunities, but there are also challenges. There is a need for boreholes but no funding and no electricity. These activities would require energy coming from solar, for example. Panels are very expensive and only a few Botswana have solar panels. Government should consider the allocation of resources or soft loans to women as seed money. It should also provide incentives to women and reduce taxes so that women can participate in RE.

A key informant from the industrialized countries with advanced systems and processes in the use and application of RE added insightful perspectives to the study. According to this source, innovations in RE hardly reach maturation or wider application and use without government interventions in the form of incentives targeted at households, small and medium enterprises, and big corporations. The success in the uptake and adoption of REs in the Scandinavian countries and Denmark, in particular, has been directly linked to government incentives in the form of tariffs and taxes.

Consistent with the current situation, respondents from the survey were asked if they used a government incentive scheme to acquire the RE facility. A total of 288 (96 per cent) indicated that they used their own funds while 13 (four per cent) responded that they used a government incentive scheme.

Most self-financing was from personal savings at 176 (70 per cent). These results are summarised in Figure 9. The majority of those who were assisted, 35 (59 per cent), indicated that they used the Rooftop Solar Scheme. Figure 9 summarises the results.

Figure 9: Sources of RE funding



Source: Data from the e-Survey for Assessment of Renewable Energy Uptake, 2022.



► 7.3 Information, Education and Human Resources

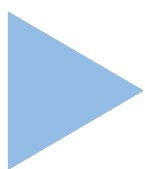
People interviewed in different forums were upfront that there is a general lack of information and education on RE opportunities. They considered this lack as a critical constraint for decision-making by households and businesses on whether to invest in RE as a viable option for energy supply. Many respondents also pointed to a shortage of skilled personnel as a handicap to support those engaged in supply and usage of, particularly, solar energy panels and barriers. Indeed, further research has shown that colleges and universities have only recently started offering RE technical courses. Skills development at different levels were highlighted by panel discussions, private sector investors in this area as well as union representatives and vendors (businesses in the supply and demand chain).

► 7.4 Stakeholder Participation

The findings of the assessment show general dissatisfaction by stakeholders at not being adequately involved. The private sector, trade unions and CSOs feel that a lot of critical policy, regulatory, financial and programming decisions on the transition to RE are taken without their involvement and advice. They argued that these decisions made at central level explain why RE uptake is still low.

► 7.5 Gender and Inclusive Measures

Although RE offers a real opportunity for the “democratization of the economy” by involving women, youth, workers and other groups in owning business opportunities, the current ‘business-as-usual’ state-dominated RE system heralds a lost opportunity for these marginalised groups.



8

Conclusions and Recommendations

► 8.1 Conclusions

Although Botswana has, in recent years, made rapid progress in developing general climate change and global warming policies for adaptation and mitigation, this assessment study on the state of RE uptake in Botswana has pointed to key issues concerning Botswana's low and slow transition to RE.

First, as pointed out in Section 6 of this report, Botswana was comparatively late in coming up with the appropriate RE policy and regulatory framework. Hence, at a macro level, there is a need for specific RE policies and regulatory frameworks. At the meso level, the country's institutions have to implement the policies and RE plans. Implementation of actions at micro level will realize the benefits of RE policies and initiatives. This articulation is likely to result in sustained uptake of RE in Botswana.

Seen from an international perspective, the policy instruments that have been captured in the country's key policy documents such as the National Development Plans, the National Vision 2036 and the UN SDG Framework and, recently, the 2023/24 National Budget, among others, are consistent with the SADC and the AU protocols and strategies and global climate change discourse. Therefore, Botswana is undeniably an active participant to national, regional and global actions to combat global warming and climate change by employing RE systems in contrast to the GHG emissions systems of the past.

The country is committed to the reduction of GHG emissions by using both adaptation and mitigation policies and strategies. However, key facilitators of the transition to the green economy, namely justice and fairness, financial incentives, knowledge, skills and public education, are lacking in the business community, labour unions, civil society and the general population. As a result, there is limited involvement and participation of these key stakeholders in both investment and uptake of RE as an alternative to carbon-based GHG energy production and consumption systems.

It is evident that:

- a. More policy reforms are required at government level to prioritise green energy uptake by all.
- b. A clearer financing and incentive framework, possibly jointly agreed between government, industry and commercial banks, is urgently required to promote RE uptake by small and medium enterprises and households.
- c. Capital investment for battery storage infrastructure in the RE industry is urgently needed.
- d. Initiatives in RE human resources and general information need to be started and implemented using the private sector and civil society actors and much less government/public sector players.
- e. Deliberate investment in research on green economy benefits in the Botswana context is required.
- f. Deliberate planning for women, the youth and disadvantaged members of society, who are potential beneficiaries of RE business opportunities and jobs, must start to focus their business efforts to opportunities presented by RE.
- g. Other groups with high chances to increase the uptake of RE, including farmers' associations, retiree groupings, co-operatives and NGOs/CSOs, and unions, must be supported to use available RE resources such as cow droppings, crop remains, etc. This needs special incentive schemes.

► 8.2 Recommendations

Given the evidence presented in the preceding discussions, the study makes the following recommendations to address RE issues at the macro (policy) level, meso (institutional) level and micro (enterprise and household) level with a view to increasing the uptake of RE in Botswana.

Macro Level (Policy)

Recommendation 1: It is recommended that the GoB, through the Ministry of Energy and Green Economy, develop a specific RE policy, regulatory frameworks and standards that are accompanied by a costed implementation strategy and plan with clear time frames.

Recommendation 2: A special institutional vehicle made up of representatives of government, private sector and civil society/trade unions should be established by the Ministry of Finance to drive the RE Plan for the next ten years.

Recommendation 3: The GoB, through the MMGE, should restructure the BPC to allow for independent generation, transmission and distribution and set up an independent IPP office to oversee tendering, adjudication and awarding of RE contracts.

Financial Support and Incentive Systems

Recommendation 4: The GoB should introduce investment incentives aimed at attracting investment in RE. The investments should also be protected by legislation just like Congress in the United States or the EU enacts legislation to protect investments in RE.

Recommendation 5: To promote broad-based participation in the RE economy and increase uptake at household level, the GoB working with commercial banks should establish government-guaranteed RE loans and incentive schemes for citizen-owned small businesses, women and youth projects that should be supported by trade unions and NGOs.

Meso Level (Institutional)

Recommendation 6: The MMGE should develop implementation guidelines for the IRP in order for Botswana to reach its ambitious goals of 15 to 30 per cent RE in its energy mix by 2030 and 2036, respectively.

To transition to a RE economy in a fair and just way requires careful planning to prepare communities that have historically been disadvantaged in terms of skills required to function in the greener economy. Hence, human resource development policies would deliberately target women, disadvantaged communities and youths to be trained for the RE economy.

Recommendation 7: Deliberate all-inclusive human resource development RE programmes should be planned, developed and prioritized under (i) the Department of Tertiary Student Financing (to support male and female tertiary students specializing in RE fields of study); (ii) the TVET sector to target vocational skills development in colleges and brigades for male and female youth, women and disadvantaged communities; and (iii) all programmes should be accredited by the BQA (certificates and above) and the HRDC (for short courses).

Recommendation 8: To promote advanced research and innovation in RE, the Ministry of Basic Education and Skills Development, through the Department of Science and Technology Research and BITRI, should establish a fund for collaborative research in RE technologies for which independent researchers and universities can apply competitively¹⁸.

Recommendation 9: BB should mobilise capital in international markets and local markets to invest in (i) RE infrastructure and (ii) battery storage systems to mitigate low-capacity demand for solar energy.

Recommendation 10: To promote awareness and sustained education on RE in Botswana, BB and BFTU/BOFEPUSU should develop an education and training campaign on RE funded by government and development partners. The campaign should target their general membership and the general public.

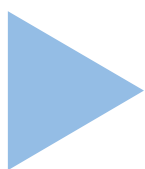
Recommendation 11: To increase citizens' knowledge about the transition to the green economy and to help them to identify opportunities for investment as well as to create a pool of knowledge and skills specific to the green economy, BB and trade unions working with multi-laterals/development partners such as the ILO, should initiate a three-year longitudinal study on the Botswana green economy.

Recommendation 12: BERA, working closely with BB, should implement the EFTs as per the guidelines of the MMGE (2020).

Micro Level (Enterprise and Household)

Recommendation 13: To ensure quality in RE products, technologies, market and service provision, the ERB and BOBS should approve all RE products before being allowed on the market.

¹⁸ See also Budget 2023/24 Speech on Environment.



9

**Draft
Implementation Plan**

Table 8 summarises the key recommendations with key players and timeframes. This process will need to be completed by key stakeholders with additions being made in terms of targets and resource implications of each of these actions/recommendations.

Table 8: Draft implementation plan

Recommendation	Key Players	Timeframe
Recommendation 1: It is recommended that the GoB, through the Ministry of Energy and Green Economy, develop a specific RE policy, regularity frameworks and standards that are accompanied by a costed implementation strategy and plan with clear time frames.	Lead: Government – Ministry of Energy and Green Economy Others Private sector (BB) CSO Trade unions	24 months
Recommendation 2: A special institutional vehicle made up of representatives of government, private sector and civil society/trade unions should be established by the Ministry of Energy and Green Economy to drive the RE Plan for the next ten years.	Lead: Government – Ministry of Energy and Green Economy Others Private sector (BB) CSO Trade unions	12 months
Recommendation 3: The GoB, through the MMGE, should restructure the BPC to allow for independent generation, transmission and distribution and set up an independent IPP office to oversee tendering, adjudication and awarding of RE contracts.	Lead: Government – Ministry of Energy and Green Economy Others Private sector (BB) CSO Trade unions	24 months
Recommendation 4: The GoB should introduce investment incentives aimed at attracting investment in RE. The investments should also be protected by legislation just like Congress in the United States or the EU enacts legislation to protect investments in RE.	Lead: Ministry of Investment and Trade Others BB Ministry of Finance Labour unions	24 months
Recommendation 5: To promote broad-based participation in the RE economy and increase uptake at household level, the GoB working with commercial banks should establish government-guaranteed RE loans and incentive schemes for citizen-owned small businesses, women and youth projects that should be supported by trade unions and NGOs.	Lead: Government – Ministry of Energy and Green Economy Others Ministry of Entrepreneurship Ministry of Finance Private sector (BB) CSO Trade unions	24 months
Recommendation 6: The MMGE should develop implementation guidelines for the IRP in order for Botswana to reach its ambitious goals of 15 and 30 per cent RE in its energy mix by 2030 and 2036, respectively.	Lead: Government – Ministry of Energy and Green Economy Others Private sector (BB) CSO Trade unions	24 months

Recommendation	Key Players	Timeframe
Recommendation 7: Deliberate all-inclusive human resource development RE programmes should be planned, developed and prioritized under (i) the Department of Tertiary Student Financing (to support male and female tertiary students specializing in RE fields of study); (ii) the TVET sector to target vocational skills development in colleges and brigades for the male and female youth, women and disadvantaged communities; and (iii) all programmes should be accredited by the BQA (certificates and above) and the HRDC (for short courses).	Lead: MoESD Others HRDC BQA BB Education providers	36 months
Recommendation 8: To promote advanced research and innovation in RE, the Ministry of Basic Education and Skills Development, through the Department of Science and Technology Research and BITRI, should establish a fund for collaborative research in RE technologies for which independent researchers and universities can apply competitively.	Lead: MoESD Others HRDC BQA BB Education and training providers	36 months
Recommendation 9: BB should mobilise capital in international markets and local markets to invest in (i) RE infrastructure and (ii) battery storage systems to mitigate low-capacity demand for solar energy.	Lead: BB Others Commercial banks BSE	24 months
Recommendation 10: To promote awareness and sustained education on RE in Botswana, BB and BFTU/BOFEPUSU should develop an education and training campaign on RE funded by government and development partners. The campaign should target their general membership and the general public.	Lead: BB BFTU/BOFEPUSU Government Others CSOs Development partners	24 months
Recommendation 11: To increase citizens' knowledge about the transition to the green economy and to help them to identify opportunities for investment as well as to create a pool of knowledge and skills specific to the green economy, BB and trade unions working with multi-laterals/development partners such as the ILO, should initiate a three-year longitudinal study on the Botswana green economy.	Lead: BB BFTU/BOFEPUSU Government Others CSOs Development partners	24 months
Recommendation 12: BERA, working closely with BB, should implement the EFTs as per the guidelines of the MMGE (2020).	Lead: BERA Others BB BPC Ministry of Energy Labour unions	24 months
Recommendation 13: To ensure quality in RE products, technologies, market and service provision, the ERB and BOBS should approve all RE products before being allowed on the market.	Lead: Government – DOE Others BOBS ERB BB Labour unions	12 months



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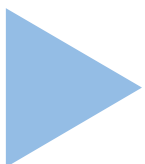
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Appendices

► Key Informant Interviews and Focus Group Discussions

Focus Group Discussions, Key Informant Interviews General Questions

Introduction

Global warming and climate change is caused by increased concentrations of the so-called 'greenhouse gases' in the atmosphere. These GHGs include carbon dioxide. GHGs reach the atmosphere and are a result of the way we produce, distribute and consume goods and services. Climate change is, therefore, a consequence of unsustainable economic activities as well unsustainable modes of production.

Realizing that the current path is unsustainable, the global community reached consensus for nations to begin to transition to a greener and environmentally sustainable model of economic production that protects planet Earth and guarantees the future livelihoods of the younger generation. This was concluded in the United Nations Framework Convention of Climate Change (UNFCCC) Paris Agreement of 2015. As a result, the global nations agreed to embark on transitioning from harmful economic activities to greener ones.

Operationalization of the Paris Agreement calls on countries, including Botswana, to address the impacts of climate change and unsustainable practices, including on national development challenges such as poverty, inequality including gender inequality and inequity, unemployment and the challenges faced by small and medium-sized enterprises (SMEs) when they endeavor to become more resource efficient and pursue green economy ventures.

Botswana intends to achieve an overall emissions reduction of 15 per cent by 2030, taking 2010 as the base year. The targeted emissions reduction will be achieved domestically through strategies and measures that are relevant for the implementation of the target. Consequently, achieving such targets is a function of resource availability and appropriate legal frameworks. Achieving the 15 per cent GHGs emissions reduction target requires robust and comprehensive planning within the sectors. Consequently, it is essential that there are conducive legal frameworks in place to enable the achievement of the national target.

Although Botswana is endowed with sunshine and wind, providing opportunities for investment in both solar and wind-generated electricity, the uptake of renewable energy (RE) remains low.

PART I Questions on the Use and Uptake of RE in Botswana:

- What is the energy use in Botswana and what are the challenges and opportunities for RE?
- What are the drivers and underlying factors determining access to RE and increased investment in RE?
- What drives the uptake, what determines the uptake and what needs to be done to address the low uptake?

PART II Questions on RE Policy and Practice, Best Practices and Options for RE Policy Review in Botswana:

- ▶ What needs to happen to make sure the regulations encourage RE investment in Botswana? Which policy(ies) need to be reviewed? What about regulations? What changes in the regulations will we need to incentivise trade, access, use of RE in Botswana?
- ▶ Do we have the necessary institutional framework to encourage RE investment in Botswana? How do we compare with other practices, what are the best practices?
- ▶ What financial incentives would ensure the growth of RE use and investment? Do we have the necessary financial structures, including infrastructure; what needs to improve?
- ▶ What policy reform will be necessary to encourage RE investment and uptake? Is the current policy environment and legislation encouraging investment? For example, are land allocation processes and procedures, licensing procedures, allowing/resulting in increased uptake of RE in Botswana?
- ▶ What other challenges and bottlenecks are there? What policy reforms are necessary?

▶ Consultative Workshop on the Assessment of the Enabling Environment for the Uptake of Renewable Energy in Botswana to Mitigate the Effects of Climate Change

Date: 17 January 2023

Venue: Protea Hotel – Gaborone

Workshop Overview

The consultative workshop is part of a broader approach by Joint Minds Consult to elicit and collect relevant information towards the assessment of the enabling environment for the uptake of RE in Botswana to mitigate the effects of climate change. The workshop seeks to generate information on the use and uptake of RE in Botswana as well as examine RE policy and practice, best practice and options for RE policy review in Botswana.

Workshop Objectives

- ▶ To engage stakeholders in discussions on the use of renewable energy in Botswana.
- ▶ To elicit and collect views on renewable energy use and policy regulations from relevant stakeholders in Botswana.
- ▶ To broaden the source of information on renewable energy use, policy and regulation among various stakeholders.

Consultative Workshop Programme

Duration: 1 Day workshop for stakeholders

Venue: Protea Hotel – Gaborone

Date: 17 January 2023

Time	Activity	Format	Facilitator
08:00 – 08:05	Welcome Remarks & Introductions	Plenary	Dr Joseph Mwelwa
08:05 – 08:35	Workshop Overview & Objectives Brief Status of use of RE in Botswana	Plenary	Professor Happy Siphambe
08:35 – 10:10	Use & Uptake of RE in Botswana	Break-away	Mr David Lesolle
10:00 – 10:30	Tea break	ALL	Ms Kushatha Tabengwa
10:30 – 11:00	Presentations & Discussions	Plenary	Professor Happy Siphambe
11:00 – 12:30	RE Policy, Practice & Options for RE Policy Review	Break-away	Mr David Lesolle
12:30 – 13:00	Presentations & Discussions	Plenary	Mr David Lesolle
13:00 – 13:05	Concluding Remarks	Plenary	Professor Happy Siphambe
13:05 – 14:00	Lunch & Departure	ALL	Ms Kushatha Tabengwa

Workshop Theme

Assessment of the Enabling Environment for the Uptake of RE in Botswana to Mitigate the Effects of Climate Change

PART I In Your Groups, Carefully, Read the Questions on the Use and Uptake of RE in Botswana:

- ▶ What is the energy use in Botswana and what are the challenges and opportunities for renewable energy? (The discussion should highlight the social, environmental, employment opportunities and challenges as well as highlight the issues relating to gender and gender equality perspectives).
- ▶ What are the drivers and underlying factors determining access to RE and increased investment in RE? (Again, the discussion should highlight the social, environmental, employment opportunities and challenges as well as highlight the issues relating to gender and gender equality perspectives).
- ▶ What drives the uptake, what determines the uptake and what needs to be done to address the low uptake?

PART II Questions on RE Policy and Practice, Best Practices and Options for RE Policy Review in Botswana:

The following questions speak to RE Policy and Practice, Best Practices and Options for RE Policy Review in Botswana.

- ▶ What needs to happen to make sure the regulations encourage RE investment in Botswana? Which policy(ies) need to be reviewed? What about regulations? What changes in the regulations will we need to incentivise trade, access, use of RE in Botswana?
- ▶ Do we have the necessary institutional framework to encourage RE investment in Botswana? How do we compare with other practices, what are the best practices?
- ▶ What financial incentives would ensure the growth of RE use and investment? Do we have the

necessary financial structures, including infrastructure, what needs to improve?

- ▶ What policy reform will be necessary to encourage RE investment and uptake? Is the current policy environment and legislation encouraging investment? For example, are land allocation processes and procedures, licensing procedures, allowing/resulting in increased uptake of RE in Botswana?
- ▶ What other challenges and bottlenecks are there? What policy reforms are necessary?

Survey Results

The survey results are on this summary link:

Renewable Energy Uptake and Use in Botswana

https://forms.office.com/Pages/AnalysisPage.aspx?AnalyzerToken=TASZ7lejPRTyieajv8WokPW1YIXU3vv6&id=DQSIkWdsW0yxEjajBLZtrQAAAAAAAAAAAAO_QY4kh9UNEZIRzISSEICTFcwME9GNExNUTIWM0pZUi4u

► Annexures: Attendance Lists and Concept Notes

Consultative Workshop on the Low Uptake of Renewable Energy in Botswana

No.	Title	First Name	Surname	Business	Town/ village
1	Mr	Goitsemodimo	Mosaninda	Business Botswana	Gaborone
2	Mr	Jerry	Du Preez	Steam Energy	Gaborone
3	Mr	Michael	Segaeso	Laser Tech Engineering	Ramotswa
4	Mr	Alex	Carrasco	EU	Gaborone
5	Dr	Gina	Maswabi	BITRI	Gaborone
6	Ms	Wedu	Mbayi	Tlou Energy	Gaborone
7	Mr	G	Gakologelwang	Gakologelwang Solar	Gaborone
8	Ms	Orefilwe	Molatliwa	Biogas Systems Botswana	Gaborone
9	Ms	Pelontle	Business development Manager	Solar World Botswana	Gaborone
10	Ms	Maipelo	Ntibi	Solar International Botswana	Gaborone
11	Mr	Mike	Joyner	Clover Botswana	Gaborone
12	Mr	Gakenaope	Gakologelwang	Gakologelwang Solar	Gaborone
13	Mr	Obusitse	Obusitse	OB2 Major	Gaborone
14	Ms	Innocetia	Puso	National Government Organisation Council (NGOC)	Gaborone

Concept Paper–Panel Discussion

Panelists: Dr Gina Maswabi Researcher Energy, BITRI and a colleague from BITRI Business Botswana members of Panelist:

Moderator: David Lesolle from JMC

Format: The Panel discussion will be held on a round table with moderator having their table

The moderator will give panelists three topics to discuss on;

1. Current policy, legal and regulatory framework

- ▶ List any renewable energy Policy or Regulations you know.
- ▶ In your opinion, which Policy or Regulations are useful for promoting RE.
- ▶ To improve current RE regulations, what 1 change would you propose?

2. Policy environment and reforms

This section reviews the current policy environment and existing legislation (i.e., land allocation and licensing procedures) to determine if they are conducive for private sector investment and recommend reforms, and what the bottlenecks and challenges are.

- ▶ Are current RE policy / regulations encouraging private sector investment?
- ▶ Name two most important reviews necessary to make RE policy investor friendly?

3. Best practice on financing options on RE?

This section requests for information to benchmark national efforts against international best practice, to assess infrastructure financing options and recommend financing incentives

- ▶ Are you aware of what other countries do in RE
- ▶ What are things we can learn from other countries in terms of financing RE?
- ▶ What type of finance would you use for your RE project

Panel Discussion List

No.	First Name	Surname	Title	Organisation
1.	Dr Patrick	Molutsi	Moderator	Joint Minds Consult
2	Felix	Chavapi	Managing Director (Panelist)	Solar Hart
3	Boineelo	Masuku	Project Coordinator (She coordinates the PrivatemSector Recovery Plan, based at Business Botswana and has been working closely with the Solar Association of Botswana as well as the BB Energy Sector) (Panelist)	UNDP

FGD Interviewed List

No.	First Name	Surname	Title	Organisation
1.	Professor N	Marobela	Secretary for Research	BOFEPUSU
2	Mr Setso	Ntuke	General Secretary	BFTU-TAWU
3	Mr D.	Mapoka	Youth Chairperson	BFTU
4	Mr K	Phiri	Executive Secretary	BMWU
5	Mr P	Maenge	General Secretary	BMWU
6	Mr T	Jopi	Regional Chair	BFTU

List of interviewed Kii

No.	Name	Surname	Title
1	Karen	Giffard	President of Solar Association
2	Charles	Siwawa	CEO, Botswana Chamber of Mines
3	Chimbidzani	Brantonozic	Programme Specialist-Environment and Climate Change
4	Mareledi Gina	Maswabi	Researcher, Energy
5	Tobokani	Rari	Secretary General
6	Felix	Chavapi	CEO, Solar Hart
7	Lloyd	Chabala	Chief Technical Advisor Skills for Energy in Southern Africa (SESA) Project.
8	Jens	Dyring-Christensen	Senior Specialist-Sustainable Enterprises Decent work for Eastern and Southern Africa.
9	G	Gakologelwang	CEO OF Gakologelwang Solar
10	Maria	Machailo -Molebatsi	Senior Specialist Employers Activities, Decent Work Team for Eastern and Southern Africa, Country Office for Botswana, Lesotho, South Africa and eSwatini
11	Nametso Violet	Ntsosa-Car	President of Women in Business Botswana
12	Mr Nchena	Mothebe	PS, Ministry of Energy
13	Kenneth	Syanjibu	Solar Power Project Manager
14	Pelaelo	Kgomotso	Manager - Green Energy, Electricity
15	Gift	Bakumbi	Engineering Manager Petroleum
16	Shandukani	Hlabano	Executive Manager
17	Mr Regoeng	Baruti	Chief Technical Officer
18	Kitso	Phiri	Secretary General
19	Onneetse	Makhumalo	National Project Coordinator-Addressing Climate Change and Promoting Just Transition-Decent Work Team for Eastern and Southern Africa



