USAID
FROM THE AMERICAN PEOPLE

USAID ALTERNATIVES TO CHARCOAL

Annual Report Outlining Policy Recommendations to Support the Business Enabling Environment for Clean Cooking

Submitted: September 1, 2022

Resubmitted September 16, 2022

This document was produced for review by USAID/Zambia by Tetra Tech/ARD for the Alternatives to Charcoal Activity through USAID Contract No. 72061121C00001.

This document was produced for review by the United States Agency for International Development. It was prepared by Tetra Tech under the USAID Zambia Alternatives to Charcoal contract (No. 72061121C00001).

Cover photo: Zambian couple cooking on ethanol gel stove. Credit: USAID Alternatives to Charcoal

This report was prepared by:
Tetra Tech
159 Bank Street, Suite 300
Burlington, Vermont 05401 USA
Telephone: (802) 485-0282
Email: international.development@tetratech.com

Contacts:
Dr. Catherine Picard, Chief of Party
Email: Catherine.Picard@tetratech.com

Jason Girard, Project Manager
Email: Jason.Girard@tetratech.com

TABLE OF CONTENTS

ACRONYMS AND ABBREVIATIONS

A2C	Alternatives to Charcoal
ATF	Alternative Technologies and Fuels
CBFA	Cost-Benefit Fiscal Analysis
CCA	Clean Cooking Alliance
CCSAP	Clean Cooking Strategy and Action Plan
EESAP	Energy Efficiency Strategy and Action Plan
EODB	Ease of Doing Business
ERB	Energy Regulation Board
GHG	Greenhouse Gas
GRZ	Government of the Republic of Zambia
HS	Harmonized System
ISO	International Standards Organization
LPG	Liquefied Petroleum Gas
MCFA	Modern Cooking Facility for Africa
MGEE	Ministry of Green Economy and Environment
MOE	Ministry of Energy
MLNR	Ministry of Lands and Natural Resources
MNDP	Ministry of National Development Planning
M&E	Monitoring and Evaluation
NDP	National Development Plan
NEP	National Energy Policy
NGO	Non-Governmental Organization
NGOCC	Non-governmental Gender Organizations' Coordinating Council
NHP	National Health Policy
NPE	National Policy on the Environment
NPCC	National Policy on Climate Change
OMC	Oil Marketing Company
PACRA	Patents and Companies Registration Agency
PAYGO	Pay-As-You-Go
PV	Photovoltaic
RE	Renewable Energy
REA	Rural Electrification Authority

RESAP	Renewable Energy Strategy and Action Plan
SE4All	Sustainable Energy for All Initiative
SHS	Solar Home System
SI	Statutory Instrument
SME	Small and Medium Enterprise
SVAS	Shared Value Africa Services
TA	Technical Assistance
UNESCAP	United Nations Economic and Social Commission for Asia and the Pacific
UNFCCC	United Nations Framework Convention on Climate Change
USAID	United States Agency for International Development
ZABS	Zambia Bureau of Standards
ZDA	Zambia Development Agency
ZDA Act	Zambia Development Agency Act
ZEMA	Zambia Environmental Management Authority
ZRA	Zambia Revenue Authority
ZMW	Zambian Kwacha

LIST OF FIGURES AND TABLES

LIST OF FIGURES

LIST OF TABLES

1.0 INTRODUCTION

The Alternatives to Charcoal (A2C) project is a five-year activity (2021-2026) in Zambia funded by the United States Agency for International Development (USAID) to reduce urban charcoal consumption and catalyze an increase in the use of low emission alternative technologies and fuels (ATFs) to reduce deforestation and forest degradation. A2C achieves these goals by implementing five objectives:

i. Identify and remove market barriers to household use of ATFs.
ii. Improve the business enabling environment to support the growth of ATFs.
iii. Promote social and behavior change to increase consumer awareness and use of ATFs and increase public awareness of the negative impacts of charcoal.
iv. Improve the monitoring, regulation and enforcement of the charcoal supply chain and support alternative livelihoods in charcoal-producing communities.
v. Integrate adaptive management throughout the project.

This report maps the business enabling environment for ATFs promoted by the A2C project and provides policy recommendations to strengthen the establishment and scaling up of clean cooking solutions in Zambia. Mapping of the business enabling environment included analyzing relevant policies, regulations, strategies, subsidies statutory instruments, permits, licenses, taxes and standards that impact the clean cooking sector in Zambia. The ATFs considered in this report include liquified petroleum gas (LPG), electricity, biomass pellets, biogas and bio-ethanol.

Results from the mapping were then used to draft specific policy recommendations that A2C will use to design and prioritize interventions and reforms to improve the business enabling environment. A2C will also engage in a targeted series of consultation meetings with relevant Government of the Republic of Zambia (GRZ) entities to validate the findings of this report and identify key areas for collaboration and technical assistance.

This report was originally submitted to USAID in September 2021 and was approved in January 2022. This second edition maintains the original information presented in the 2021 report to provide context against which changes and/or progress was made during the Fiscal Year (FY) 2022 period. Updates from the FY 2022 period are noted accordingly throughout the document and are presented in yellow text boxes.

The structure of this report is organized by the four components of the business enabling environment:

i. Policies, Acts, Regulations and Strategies
ii. Licenses, Permits and Patents
iii. Imports and Taxation
iv. Product Standards

In addition to analyzing the components above, international best practices were selected from other sub-Saharan African countries to inform the analysis and recommendations. These recommendations were prioritized based on the expected timeline and impact on ATFs' business enabling environment and will be validated during subsequent consultations with GRZ entities. A key objective of these consultations will be to develop more detailed recommendations in collaboration with GRZ authorities and identify concrete actions to operationalize those recommendations.

2.0 EXECUTIVE SUMMARY

Charcoal is the dominant fuel for urban cooking in Zambia across all income levels. It is widely available in a range of sizes and prices and is deeply embedded in Zambia's cooking culture. The production and use of charcoal however comes with significant negative environmental and health consequences including forest degradation, greenhouse gas (GHG) emissions and respiratory diseases. Numerous alternatives to charcoal do exist, including but not limited to LPG, biofuels (biomass, bio-gas and bio-ethanol gel fuel) and grid-based electricity (of which 83 percent of installed capacity is renewable from solar and hydro) which can power stoves and other appliances. However, except for electricity, uptake of these products and services in Zambia is still nascent, a conducive business enabling environment is crucial to support the uptake and scaling of these ATFs. The objectives of the report are to:

- Map the business enabling environment (including the relevant policies, acts, regulations, strategies, permits, licenses, taxes and standards) that impact ATFs;
- Assess the appropriateness of policies and regulations for ATF market penetration and expansion;
- Identify relevant gaps and loopholes;
- Summarize relevant international examples as best practices; and
- Provide recommendations for short and long-term policy reforms.

The ATFs considered in this report include LPG, electricity, biomass pellets, biogas and bio-ethanol. The businesses that produce, distribute, and sell these fuels vary considerably with respect to market penetration, working capital, product development, business acumen and other characteristics. Strengthening the enabling environment for ATFs will therefore require carefully tailored reforms that address the particular needs of each ATF. This analysis did however identify several common challenges that hinder the enabling environment for ATFs. These include the lack of an integrated national clean cooking strategy in Zambia, gaps between ambitious policy objectives and their actual implementation/realization, and limited coordination across different GRZ entities that share responsibilities for certain legal and regulatory functions. Not surprisingly, this assessment found the enabling environment for LPG to be the most defined in Zambia in terms of the breadth of policies, regulations, standards and tax incentives, while policies, standards, tax incentives and regulations for other ATFs are less robust. A summary of findings and recommendations organized by the four components of the business enabling environment are provided below.

***GRZ Policies, Regulations and Strategies*:** GRZ has several foundational documents that support the transition from charcoal to ATFs, most notably Vision 2030, the National Energy Policy, the Sustainable Energy for All Initiative (SE4All) Action Agenda, the National Policy on the Environment, the National Policy on Climate Change and Zambia's Nationally Determined Contribution (NDC). The 7th National Development Plan, outlines targets for the increased use of electricity and LPG-based cooking alongside a parallel target for decreasing charcoal use. However, these targets are missing from the recently published 8th National Development Plan which replaced the former. Meanwhile, the SE4All Action Agenda outlines targets to increase access to clean cooking for urban populations from 39 percent in 2015 to 100 percent by 2030, and recommends biogas and LPG as options to reach that goal.

Specific targets and policy measures for other ATFs - such as biomass, bio-ethanol and biogas - are far less frequently mentioned in these foundational documents. Further, while national strategies exist that support a transition to ATFs, limited resources (financial, human or technical) have been allocated to support actual implementation and realization of these targets. For example, the SE4ALL Action Agenda

and Vision 2030 are both examples of ambitious strategies to promote clean cooking, but neither has been adequately funded or implemented. Examples from Ghana and other countries elucidate how embedding ATF targets and planning into national strategies and budgets combined with encouraging cross-Ministerial collaboration and engagement with local communities can send positive market signals to ATF providers about the government's support for these fuels and technologies. Accordingly, key recommendations for A2C include introducing greater specificity about how to reach ATF targets in national planning documents (including implementation plans), support for drafting regulations related to licensing, permitting, standards and taxation, allocating sufficient resources for implementation, improving coordination for policy implementation across relevant Ministries and working towards the approval and implementation of a national clean cooking strategy, which has not yet been drafted but A2C hopes to support.

In 2022, GRZ published the 8th National Development Plan, the Renewable Energy Strategy and Action Plan, the Energy Efficiency Strategy and Action Plan, and the Gender Equality Strategy and Action Plan.

Policies currently under revision are the Ministry of Energy Strategic Plan, the National Policy on Environment, the Forestry Policy, and the Forestry Act.

In addition, GRZ recently requested inputs into amendments of the Electricity Act no 11(2019) and the Energy Regulation Act No 12 (2109).

Finally, the Clean Cooking Strategy and Action Plan (CCSAP) is under development jointly between Ministry of Energy (MOE) and A2C.

***Licenses, Permits and Patents*:** Private companies are subject to a variety of laws and regulations in order to be formally recognized in Zambia and conduct business operations. These licensing and permitting requirements are described in the Business Regulatory Act, the Energy Regulation Act, and the Electricity Act. Furthermore, patenting for particular technologies is provided for in the Patents and Companies Registration Act. Varying licensing and permitting requirements exist, but little information about licensing and permitting for ATFs specifically is clearly communicated on GRZ platforms, such as the Energy Regulation Board (ERB) website. A review of the requirements for a renewable energy (RE) license also reveals a difficult enabling environment for small and medium enterprises, who may not have the capacity or resources to develop business plans, procure audited financial statements or secure sponsors and investors. The primary recommendations made by A2C are to clarify license and permit requirements on GRZ platforms used by ATF providers like the ERB website, followed by drafting and implementing more specific, but "business friendly" licensing and permitting measures for prioritized ATFs based on government consultation, including LPG, electricity, biomass pellets, biogas and bioethanol (liquid & gel).

***Imports and Taxation*:** Individual components of multiple ATFs–ranging from LPG cylinders to liquid fuels and improved biomass gasifier cookstove components–incur a variety of import duty and Value Added Taxes (VAT). The Zambia Revenue Authority (ZRA) is charged with setting taxes including import duties and VAT and accepting Harmonized System (HS) codes for different ATF products. Currently, LPG and ethanol powered stoves and other appliances that use gas or ethanol are not subject to either VAT or import duty. LPG cylinders are, however, subject to a 15 percent import duty and 16 percent VAT. A2C recommends using the results of a cost-benefit analysis (CBA) of zero-rating VAT and import duty conducted in 2022 to consider tax exemptions for a range of ATFs including bioethanol, biomass pellets, LPG and electricity.

In 2022, A2C completed the cost-benefit analysis considering a business-as-usual (BAU) case compared to a case where ATFs are exempt from import duty and VAT. Considering the difference in costs and benefits in the BAU and tax exemption scenario for 2022-2032, the tax exemption would result in a net value (benefits minus costs) of 2.5 billion ZMW (stemming from tax revenue from electric hot plates, monetized GHG emissions reduction, and avoided deforestation).

The model incorporates values of 86 ZMW (5 USD)/metric ton of CO2 and 862 ZMW (50 USD)/hectare of forest preserved, which are lower than current opportunities on the voluntary carbon markets. The CBA also shows under the tax exemption scenario over 130,000 lives saved and household savings for those using induction cookers, electric pressure cookers, ethanol liquid, and pellets.

A recommendation to consider these tax exemptions in Zambia's national budget has been submitted to the Ministry of Finance, via the Ministry of Energy.

***Product Standards*:** Product standards ensure safety, quality, reliability and consumer confidence. In Zambia, standards relevant to ATFs are addressed in the National Energy Policy, the Standards Act and the Compulsory Standards Act. The ERB and Zambia Bureau of Standards (ZABS) work in tandem to formulate, enforce and review these standards. The most developed standards exist for LPG, followed by biogas. LPG standards in Zambia have however been noted by private sector companies to be restrictive of business operations. Meanwhile, standards specific to electric cookstoves, bioethanol and biomass pellets were not found. Therefore, A2C recommends exploring voluntary standards for all ATFs that do not already have specific standards as well as clarifying LPG standards for distribution, refilling stations and retail.

In collaboration with the Energy Regulation Board, A2C is supporting the development and review of standards for select ATFs that include LPG and ethanol for cooking. As of 2022, A2C is supporting the revision of several LPG standards and hiring consultants to help develop the standard on validation of LPG cylinders. The LPG standards that have been revised in the LPG sector are as follows:

1. DZS249 Part 1 – Liquefied Petroleum Gas installations involving gas storage containers of individual capacity not exceeding 500 Liters.
2. DZS429 Part 2 – Liquefied Petroleum Gas installations involving storage vessels of individual water capacity exceeding 500 Liters.
3. DZS429 Part 3 – Storage and filling sites for refillable Liquefied Petroleum Gas containers of capacity not exceeding 19kg and the storage.
4. DZS Part 4 – Transportation of Liquefied Petroleum Gas in bulk by road - Code of Practice
5. DZS Part 5 – Mobile Filling Stations for refillable Liquefied Petroleum Gas containers of capacity not exceeding 9kg.

Further, A2C also worked closely with GRZ through the ERB to create new standards on bioethanol fuels and stoves, which will be finalized later in the year. These standards were nonexistent and this resulted in ethanol being classified as an alcohol for consumption and as such being highly taxed. With the development of the standards and aforementioned proposals for tax exemptions on ethanol, A2C hopes to see an outcome where taxes on ethanol are reduced accordingly or removed.

The standards that were developed were as follows:

1. DZS1239 Ethanol – Gel Fueled Appliances
2. DZS1237 Non Pressurised Ethanol Cooking Appliances Using Liquid Fuel - Specification
3. DZS1238 Ethanol Gel for Cooking and other Gel burning Appliances
4. DZ1236 Denatured Hydrous Ethanol for use as Cooking and Appliances Fuel – Specification

3.0 SECTOR CONTEXT

A wide range of GRZ entities housed within different Ministries and other agencies influence, determine and enforce policy and regulatory frameworks that impact the ATF sector. These range from the Ministry of National Development Planning which contributes to long-term plans like Vision 2030 and National Development Plans (NDP), to the Ministry of Energy (MOE) which sets energy policy. Other Ministries including Agriculture, Commerce, Trade and Industry, Justice and Green Economy and Environment are involved in setting and implementing other relevant policies that relate to ATFs, including but not limited to environment, climate change, trade and industrial policies. Various sub-Ministerial bodies also play key roles, primarily the ERB, the ZRA, the Zambia Development Agency (ZDA) and the Zambia Bureau of Standards. These agencies are tasked with collaborating across the energy sector to not only implement their respective portions of policies and regulations but also provide technical assistance to one another based on their own expertise. Per the National Monitoring and Evaluation policy, each Ministry also has its own monitoring and evaluation (M&E) unit to track and evaluate progress made in applying policies and regulations.

Although support for certain ATFs is provided for in the National Energy Policy, Zambia's 8th National Development Plan and the SE4All Action Agenda, this assessment found that ATFs are not a central component of any single policy or regulation, nor is there a standalone national clean cooking strategy for Zambia that definitively guides GRZ interventions in the ATF sector. Furthermore, this assessment found the enabling environment for LPG and electricity are the most defined in terms of the number and magnitude of policies and regulations, while very few policies, standards or regulations exist for biofuels such as pellet stoves or bioethanol for cooking. For all ATF categories, common challenges that hinder business operations include the lack of consistent targets, and limited coordination across different GRZ entities that share responsibilities for certain legal and regulatory functions.

In 2022, A2C sent to MOE a draft plan for the development of a Clean Cooking Strategy and Action Plan to be completed by mid-2023. The CCSAP will be developed by A2C and MOE and motivate a multi-stakeholder approach to promoting clean cooking by setting clear deployment targets and providing GRZ entities with specific actions to be taken to achieve them. In addition, A2C supported GRZ in drafting new bioethanol standards on fuel and stoves, which will be finalized later this year.

The GRZ developed the Eighth National Development Plan (8NDP) in 2022 to cover the period 2022 to 2026. Currently, the Implementation Plan that will outline the targets, budgets and timelines for the provisions of the 8NDP is under development. The relevant provisions for ATFs and clean cooking in the 8DNP are as follows:

1. In line with the Nationally Determined Contribution, focus in the forestry sector will be on forestry enhancement, sustainable charcoal production and improved cooking devices.
2. A major policy shift during the 8NDP period will be to ban the unsustainable production and consumption of charcoal by 2025. In this regard, measures will be put in place to protect the livelihoods of those in the charcoal value chain and promote alternative energy sources for charcoal users.
3. Energy focus will be switching towards green and renewable energy sources, such as biogas, solar, and wind and increasing on energy use efficiency as well as reducing electricity transmission and distribution losses from the national grid.

4. Strategies will include enhancing generation, transmission and distribution of electricity, diversifying to other renewable as well as clean alternative energy sources, enhancing the management of petroleum products.

A2C recognizes the opportunity to contribute towards the setting of targets for the above broad measures in the 8NDP Implementation Plan which is being prepared.

There are several donor-led programs focused on funding and supporting the enabling environment of the ATF sector in Zambia. These include SPARK+, an impact investment fund supported by Enabling Qapital and the Clean Cooking Alliance which is allocating $50-70 million in debt and equity financing to clean cooking manufacturers, distributors and financiers in Sub-Saharan Africa. In addition, the Energy and Environment Partnership Trust Fund (EEP Africa) has allocated approximately $4.85 million for clean cooking technologies through funding calls. The Beyond the Grid Fund for Africa provides results-based financing for primarily rural and off-grid energy solutions, and the Modern Energy Cooking Services program also operates a challenge fund that provides early-stage research and development funding for clean cooking innovations (primarily electric pressure cookers) and maintains a library of publications on market dynamics and the enabling environment, including for Zambia. Finally, the Clean Cooking Alliance (CCA) and Shell Foundation are funding a study to identify LPG market barriers and recommend specific interventions to overcome these barriers in two (TBD) countries in Africa. This study is expected to be completed in March 2022. A2C will continue working with and providing technical assistance to ATF companies in Zambia to enable them respond to these and other funding opportunities that may arise in the sector.

In 2022, the Modern Cooking Facility for Africa (MCFA) launched its first call for proposals. The MCFA is a €30.8 million facility funded by Sweden—and soon to be expanded by the European Union—that aims to support private sector solutions for clean cooking through results-based financing. The facility supports Tier 4-5 electric, biogas, and bioethanol stoves as well as Tier 3+ briquette and pellet stoves. Seven companies from Zambia have applied and proposals are currently undergoing review and evaluation. €13.8 million has been allocated in total available funding for Zambia.

4.0 METHODOLOGY

In conducting this assessment, A2C analyzed key policies, regulations, acts, statutory instruments, strategies, research studies and relevant international best practices that relate to the ATF value chain in Zambia. Results were used to produce recommendations intended to enhance the business enabling environment for ATF providers and consumers and ultimately contribute to the transition away from charcoal. The assessment methodology is summarized in Figure 1.

Figure 1: Policy and regulation assessment methodology

The full list of official documents that were analyzed is depicted in Table 1 below.

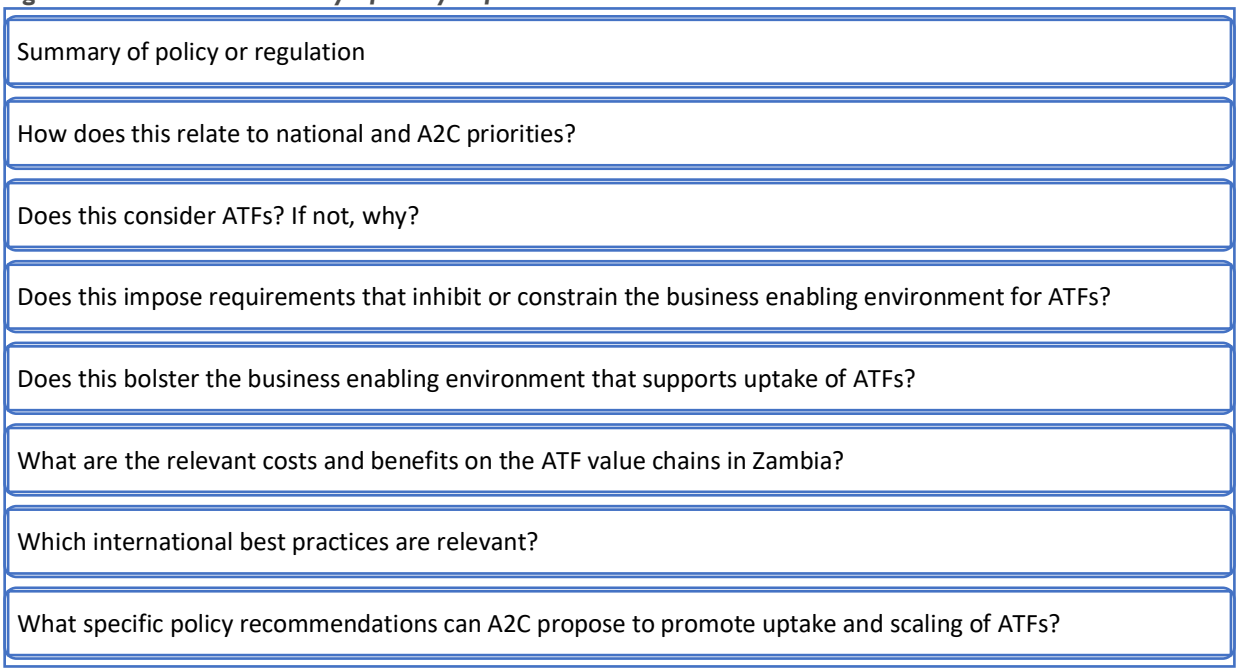
Table 1: Identified Policies and Regulations (Alphabetical)

Type	Key GRZ Policies, Regulations and Strategies
P: Policy, R: Regulation, S: Strategy, O: Other	
R	Business Regulatory Act, 2014
P	The Citizens Empowerment Act, 2006
P	The Electricity Act, 2019
R	Energy Regulation Act, 2019
P	The Environmental Management Act, 2011
S	Gender Equality Strategy and Action Plan for the Energy Sector of Zambia, 2022
P	Income Tax Act
S	Ministry of Energy Strategic Plan 2018-2021
S	Nationally Determined Contribution, 2021
P	National Energy Policy, 2019
P	National Forestry Policy, 2014
P	The Forests Act, 2015
P	National Industrial Policy
P	National Monitoring and Evaluation Policy
P	National Policy on Climate Change, 2016
P	National Policy on Environment, 2009
P	National Trade Policy
P	The Standards Act, 2017
P	The Patents and Companies Registration Agency Act, 2020
R	The Petroleum Act
S	Renewable Energy Strategy and Action Plan for Zambia2022

Type	Key GRZ Policies, Regulations and Strategies
S	Second National Biodiversity Strategy and Action Plan, 2015
O	VAT Liability Guide, 2020-2022
P	Zambia Development Agency Act and Amendment
S	Zambia National Energy Efficiency Strategy and Action Plan, 2022
O	Zambia Revenue Authority Practice Note No. 1/2021
S	Zambia SE4All Action Agenda
O	Zambia Vision 2030
O	8th National Development Plan

Next, A2C created a policy and regulation analysis framework which included a set of questions for each analyzed document. In some cases, follow up questions were also posed directly to GRZ officials including the Ministry of Energy, ZRA and ERB. Data were then summarized, key considerations or lack thereof for ATFs were identified, specific impacts for ATF providers and relevant GRZ entities were captured, and gaps in clarity or scope that could be addressed by recommendations were formulated. This framework is summarized in Figure 2.

Figure 2: Illustrative summary of analysis framework



To provide additional context and reference points for this assessment, A2C identified other countries and corresponding international best practices for ATFs. These were primarily chosen from Sub-Saharan Africa for relevance to Zambia. Lastly, A2C applied the framework and international best practices to analyze each policy and regulation and produce relevant recommendations. Based on respective recommendations' expected timelines (less or more than 6 months) and impact on the ATF enabling environment ("low" or "high"), a prioritization scale (1-4) was developed, with 1 being the highest and 4 the lowest priority:

i. Less than 6 months; high impact: 1

ii. More than 6 months; high impact: 2

iii. Less than 6 months; low impact: 3

iv. More than 6 months; low impact: 4

During the assessment, A2C referenced other documents already drafted through other A2C workstreams to reduce duplication of efforts, including the Initial Market Analysis, Consumer Preference Survey, feedback from focus group meetings with private sector stakeholders and meetings with GRZ officials. Moving forward, a government consultation process will validate the results of this assessment and provide more specific information that was not available from the analyzed documents. The government consultation process will also elucidate more refined recommendations and new opportunities for A2C to support GRZ entities that implement policies and regulations for ATFs.

In the 2022 update, A2C revisited recommendations presented in the 2021 report version and made changes based on sector developments. In the following section, updated/revised recommendations based on developments that took place throughout calendar year 2022 are noted in yellow-highlighted text boxes.

5.0 POLICY AND REGULATORY ANALYSIS

5.1 GRZ POLICIES, REGULATIONS AND STRATEGIES

There are several strategic planning documents that mention ATFs, including **Zambia's Vision 2030** which acknowledges that cooking with fuel wood poses a serious long-term environmental threat due to the pressure it places on Zambia's forests. Vision 2030 calls for the increased use of RE sources, an abundant and reliable supply of affordable energy for both urban and rural areas, and a target to reduce wood fuel (charcoal and firewood) consumption from 70 percent to 40 percent by 2030.

Vision 2030 also aims to increase electricity connections from four percent to 51 percent in rural areas and 67 percent to 90 percent in urban areas. The vision does not include any specific targets for ATFs beyond electricity, and does not clarify which types of resources should be supported.

GRZ Strategy and Objectives: Key policies and regulations

- Energy Efficiency Strategy and Action Plan
- Energy Regulation Act
- Gender Equality Strategy and Action Plan for the Energy Sector of Zambia, 2022
- Ministry of Energy Strategic Plan, 2018-2021
- National Energy Policy, 2019
- National Forestry Policy, 2014
- National Policy on Climate Change, 2016
- National Policy on the Environment, 2009
- Nationally Determined Contribution, 2021
- Renewable Energy Strategy and Action Plan for Zambia
- Second National Biodiversity Strategy and Action Plan, 2015
- SE4ALL Action Agenda
- Zambia Vision 2030
- Zambia National Energy Efficiency Strategy and Action Plan
- 7th National Development Plan (7NDP) and Implementation Plan
- 8th National Development Plan (8NDP)

GRZ Strategy and Objectives: Key GRZ entities

- Energy Regulation Board
- Ministries of Agriculture, Commerce, Trade and Industry, Energy, Justice and Lands and Natural Resources
- Zambia Development Agency

GRZ Documents under development and /or review:

- Ministry of Energy Strategic Plan
- National Policy on Environment
- 8NDP Implementation Plan
- National Forestry Policy
- Forests Act
- Electricity Act
- Petroleum Act

The **8NDP**, drafted by the Ministry of Finance and National Development for the period of 2022-2026, refers to sustainable charcoal production and improved cooking as part of its climate change mitigation and adaptation outcome. Most notably, it mentions a target of banning unsustainable charcoal production and consumption by 2025, and the need for policy measures to promote alternative sources of energy in the place of charcoal. The 8NDP broadly mentions programs that may be used to reach this target – including sustainable land and forest management and community-based natural resources management. Production of the 8th NDP's implementation plan is currently underway. This presents an opportunity for A2C to support the planning process and inform the decided-upon targets and interventions.

Zambia's **SE4ALL Action Agenda** sets out a vision for modern and clean cooking solutions in urban areas by 2030. This vision is organized around an ambitious 20-40-20-20 scenario that aims to move urban cooking to 20 percent electricity, 40 percent LPG, 20 percent charcoal and 20 percent firewood. Most notable is the agenda's emphasis on reducing electric cooking to only 20 percent while increasing use of LPG from <1 to 40 percent. Electricity is the second most used energy source for cooking after charcoal and is produced from a renewable resource (hydropower). Concern about overloading the grid is certainly a motivating factor for promoting a reduction in electricity use for cooking. ZESCO, for example, has embarked on an information dissemination campaign to encourage users to choose other times for cooking meals, using energy saving appliances, and encouraging households to switch to LPG for their cooking needs. The Action Agenda recognizes it is highly likely that electricity will remain the preferred source of energy for cooking in urban areas in the short to medium term but predicts that in the medium to long term this will shift in favor of other alternatives, such as LPG, as electricity tariff adjustments take effect, pushing the cost of electric cooking up.

Zambia's **Nationally Determined Contribution** to the United Nations Framework Convention on Climate Change (UNFCCC) focuses climate mitigation actions on sustainable forest management, sustainable agriculture and Renewable Energy and energy efficiency, including a conditional pledge for reducing GHGs by 25 percent by 2030 when compared to 2010 level (Republic of Zambia, 2021). It was last updated in July 2021 to broaden the scope of planned mitigation activities to include transport, liquid waste, coal production, transportation and consumption, and elaborating on performance indicators. Reducing charcoal use for cooking through promotion of ATFs and efficient biomass cookstoves contribute to the NDC's objectives, namely the reduction of rural populations' dependency on charcoal and fuel wood and associated deforestation and reduced GHG emissions.

The **National Energy Policy (NEP)** was updated in 2019 and aims to (i) achieve the optimal energy resource utilization mix to meet Zambia's domestic and non-domestic needs at the lowest total economic, financial, social, environmental and opportunity costs and (ii) establish Zambia as a net exporter of energy (Ministry of Energy, 2019). It notes economics, climate change, health and gender as considerations to motivate energy diversification.

The MOE is the primary body in charge of overall leadership and coordination for the NEP. Other Ministries are involved in some respects, including the Ministry of Agriculture for overseeing crop production used for biofuels, Commerce, Trade and Industry for facilitating investment through the Zambia Development Agency (ZDA) and setting relevant investment standards, and Justice for reviewing and strengthening legal frameworks. MOE oversees multiple entities that lead on specific components in the energy sector, including the ERB, the Zambezi River Authority and the Rural Electrification Authority (REA).

The 2019 NEP broadly notes that wood-based fuel for cooking is unsustainable, and names biogas, biomass, briquettes and bio-ethanol as alternatives. With respect to biofuels, the NEP only covers biofuels from the perspective of the transport sector to augment Zambia's petroleum supply. If a shift to ethanol cooking is to be advanced, specific standards related to ethanol for cooking would need to be developed as they currently do not exist.

Objective 5 of the NEP calls for increasing the use of RE through research, enhanced coordination among key stakeholders and the promotion of RE technologies – but no further specifics are provided. The NEP does confirm that the consumption of LPG increased from 4,719 MT in 2017 to 7,006 MT in 2018, representing an increase of 48.5 percent. The increase in LPG, it states, was triggered by the

increase in local demand for an alternative source of energy. Nonetheless, the NEP does not mention any specific policy objectives related to the promotion of LPG to diversify Zambia's energy mix.

Interestingly, the NEP notes that ERB does not have an effective legal framework that enables regulation of the energy sector and balances the interests of licensed companies and consumers. This, in addition to limited collaboration with the relevant GRZ entities, leads to lengthy licensing processes and increased cost of doing business for ATF providers. The NEP is notable for having a time-bound action plan with budgets. An estimated 1.5 million Zambian Kwacha (ZMW) is identified to support private companies to produce more efficient biomass cookstoves, but no specific details are mentioned about where and how the funds would be sourced from.

The **Energy Efficiency Strategy and Action Plan** is a blueprint to achieve the goals set forth in the NEP and lists several objectives as pillars to guide activities to optimize energy resource utilization to "meet Zambia's domestic and non-domestic needs at the lowest total economic, financial, social, environmental and opportunity cost." There are 10 pillars ranging from strengthening the regulatory framework to collaborating with partners to achieve targets. Regarding ATFs, the Strategy emphasizes the need to increase the uptake of LPG given its positive attributes as a cleaner alternative to charcoal or wood fuel. It reports that the utilization of LPG is relatively low in Zambia and accounts for only 0.1 percent of household cooking nationally. Apart from LPG, the Strategy notes support for deploying "biomass cooking systems" and "energy efficient cooking equipment" and provides targets for Pay-As-You-Go (PAYGO)-based cooking stoves: 100,000 stoves by 2027, but no further detail is given.

Within the action plan section of the Strategy, there is reference to creating an LPG cylinder exchange program to ease the way that retailers and customers rely on exchanging and filling their empty cylinders and to enable more cylinders to circulate in the market. To transition to clean and efficient energy efficiency technologies, the Strategy supports zero-rate charges on imported LPG cylinders and LPG refilling stations and to reduce or eliminate VAT on locally manufactured products to promote the use of efficient cooking technologies. Penalties and charges could be applied to the commercial sector where new establishments (e.g., hotels, restaurants and schools) continue to employ the use of charcoal, while subsidies could be given for more efficient and cleaner cooking fuels and technologies (Ministry of Energy). Penalties can discourage the use of a particular ATF if they make it become more expensive to use. While this seems to detail the challenges with continued utilization of charcoal and wood, it largely only focuses on LPG from the six ATFs explored in this assessment.

In 2022, GRZ finalized the Energy Efficiency Strategy and Action Plan (EESAP), which was only in draft form when the first version of this document was completed. In general, EESAP has a lack of emphasis on the promotion of electric cooking, which is likely the cheapest option for grid-connected households, though it is noted that load shedding has led more households using charcoal. However, with the recent announcement of surplus power generation, reliability of grid electricity is expected to increase. Ethanol is also only mentioned in the context of blending with diesel or petrol.

In general, the EESAP is vague on actions and targets for deploying clean cooking solutions. Where targets are listed, it is unclear what actions will be taken to achieve them. Import duty and VAT exemptions or other fiscal incentives and subsidies for ATFs are not mentioned. However, with the support of A2C and the results of the CBA, MOE has submitted a request to the Ministry of Finance to exempt a range of ATFs from customs duty and VAT. As of 2022, after learning from the experiences of other countries like Kenya, GRZ is leaning away from establishing an LPG cylinder exchange pool as mentioned above.

The **Ministry of Energy Strategic Plan, 2018-2021** is an operational document that lays out the legal framework, organizational structure, responsibilities, mission, vision, and objectives of the MOE while outlining the operational gaps in capacity. The MOE is prioritizing expansion of generation, transmission, distribution and scaling up of petroleum and electricity access in rural areas, including through mini grid solutions. The plan recognizes that transitioning towards cost-reflective tariffs in electricity as well as other sectors will be imperative to creating an enabling environment to attract private sector investment. The plan includes a high-level sector analysis that emphasizes the need to further diversify energy sources and reduce reliance on imported petroleum while also increasing the uptake of renewable energy (RE) technologies.

Of the three strategic objectives outlined in the plan, Objective 3 is the most relevant to ATFs and focuses on enhancing the promotion of renewable and alternative energies. The plan includes an explicit focus on promotional efforts to encourage use of "gel fuel, biogas and biomass pellets for cooking while alternatives such as LPG and coal briquettes will also be promoted to avoid overdependence on charcoal and firewood for cooking." In addition, the Plan includes results and corresponding performance indicators to further encourage the uptake of ATFs. These are: increased usage of "alternative energy" with a performance indicator of 10 percent by 2021 and reduced usage of charcoal and firewood. The two performance indicators included 40 percent and 20 percent of households using firewood and charcoal respectively by December 2021 (reflecting the SE4ALL target). Based on the strategy outlined in the Plan, the MOE plans to meet these targets largely through promotional efforts to encourage utilization of ATFs for cooking: LPG, briquettes, gel fuel, kerosene and pellets. To reduce reliance on charcoal, the MOE will complement promotion of the ATFs with the Scaling Up Rural Electrification Program and wood fuel regulatory framework. Further detail on these two efforts is not provided but would be useful to further explore in showing the linkage to achieving the described targets.

> As of 2022, MOE is developing a new strategic plan that will replace the 2018 – 2021 edition. A2C has already provided early input into this process and will continue to engage often with the Ministry to ensure clean cooking is well represented in the strategy.

The **National Policy on the Environment (NPE), 2009** was designed to create a comprehensive framework for sustainable natural resource management and environmental conservation that considers all relevant sectors, including: agriculture, water, energy, forests, fisheries, tourism, wildlife, mining and heritage (Ministry of Tourism, Environment and Natural Resources, 2009). The Ministry of Lands and Natural Resources (MLNR) is the main coordinating institution that oversees NPE activities and provides technical assistance and capacity-building to other Ministries to implement sections of the policy that are relevant to them. [1] The NPE briefly establishes a link between the harvesting of wood-based fuel and deforestation and recognizes challenges for GRZ in allocating enough resources to regulate use of wood-based fuels, promoting ATFs including biogas, and enforcing environmental impact assessments (EIAs) for energy projects. The NPE notes that sustainable wood production can be attained in several ways including:

i. Engaging local communities, NGOs and private companies;

ii. Establishing financial incentives for ATFs that can reduce reliance on wood-based fuel;

[1] In 2016, the Ministry of Lands, Natural Resources and Environmental Protection was split into MLNR and the Ministry of Water Development, Sanitation and Environmental Protection

iii. Promoting agro-forestry practices that are in line with environmental rules and employ environmental impact assessments;

iv. Substituting wood with alternatives like solar photovoltaic (PV)-based electricity, biogas and LPG; and

v. Exploring ways to increase the percentage of ethanol in petroleum and the possibility of blending ethanol and paraffin.

The NPE mentions GRZ's interest in ATFs generally but does not provide any details, timelines, financial resources, or information on what technical assistance is needed by the MLNR and other relevant Ministries to implement the policy.

In 2022, the Ministry of Green Economy and Environment released a draft of the updated NPE and collected comments from stakeholders. Once these comments are addressed, the NPE will be validated and finalized later in the year. A2C is contributing to the update process to encourage linkages between environmental protection and clean cooking.

The **National Policy on Climate Change, 2016 (NPCC)** acknowledges the existing and future threats that climate change poses to Zambia's development and sustainability. In alignment with Vision 2030, the NPCC attempts to create a coordinated response to climate change issues within the country by outlining policy objectives and implementation measures in the water, agriculture, energy, wildlife, tourism and mining sectors (Ministry of National Development Planning, 2016). This is also in accordance with the UNFCCC and Zambia's NDC which aims to stabilize the output of GHG emissions in the atmosphere.

Although the NPCC draws a link between climate change impacts like drought and rising temperatures with wood-based fuels, it fails to mention ATFs and their potential contributions to climate mitigation and adaptation. For example, the Technology Development and Transfer section mentions technologies in generalities. It does not note how electricity, LPG, bio-ethanol and pellet stoves can counter charcoal use and deforestation and contribute to climate action. Furthermore, the NPCC includes an implementation framework that describes the roles and responsibilities of implementing institutions but falls short by not indicating exactly how these institutions will work together to coordinate actions and implementation measures, how the MOE can play a role in supporting the deployment of ATFs, which sectors or measures will be prioritized, and any targets for GHG emissions reduction activities. This creates challenges to achieve the NPCC's outlined objectives.

The **National Forestry Policy, 2014** provides a foundation for the GRZ's approach to forest management by building on the 1998 Forestry Policy and aligning with the 2004 Decentralization Policy and Vision 2030. It outlines policy measures for sustainable forest and ecosystem management, local community participation, investments in forestry, production and processing of forest products, and sustainable production and processing of charcoal. It specifically emphasizes a participatory forest management approach that includes local communities, institutions and the private sector (Ministry of Lands, Natural Resources and Environmental Protection, 2014). It also introduces specificity on the role of each stakeholder – including MLNR as the GRZ entity with primary responsibility – resource tenure and costs and benefits of forest management. However, only one policy measure on ATFs is included: namely GRZ's intention to provide incentives for the development of alternative energy sources to reduce reliance on wood-based fuel but no specific details are provided. Furthermore, it does not

mention any targets or timelines for ATFs or reductions in charcoal use. A2C produced an annual charcoal monitoring report to review available literature and data of the charcoal value chain in Zambia, and provided feedback on draft charcoal regulations.

The **Renewable Energy Strategy and Action Plan, 2022** notes that Zambia has made significant strides creating an enabling environment for renewables, including making the RE sector attractive for investment by improving the policy and regulatory environment and introducing procurement frameworks such as Scaling Solar and GET FiT. Some gaps still exist as the market is dynamic and the continuous updating of policies and regulations is required to meet market challenges and needs (DT Global IDEV Europe S.L., 2018).

For electricity, the plan clarifies there are several barriers that impact Zambia's power sector. As of June 2018, the national generation mix was dominated by hydropower (which varies throughout the year depending on resource availability) at 83 percent followed by coal at 10 percent, heavy fuel oil at four percent, diesel at three percent and solar at less than one percent (Ministry of Energy, 2018). However, peak demand is expected to increase to 3,000 MW in 2021 and 3,525 MW by 2030. In 2019, at least 70 percent of urban Zambian households were connected to electricity services. With dependence on hydropower, increasing demand and recent climate change-linked droughts, Zambia experiences electricity supply shortages manifested through extensive load shedding. High investment requirements to maintain hydropower facilities coupled with electricity tariffs that are not cost reflective and limited availability of financial instruments remain major constraints to RE development. In parallel, rising electricity prices coupled with unreliable supply has driven many Zambians to use charcoal for cooking rather than electricity. Cost-reflective electricity tariffs include the true cost of supplying electricity and can incentivize reduced consumption during peak periods, decrease stress on the grid, and incentivize use of RE.

Furthermore, there are a variety of other policy and financial barriers in the power sector that impact the advent of electricity-powered cooking, including a lack of enforcement of measures in policies and regulations like the Electricity Act and Energy Regulation Act, inconsistent environmental impact assessment permitting, and aversion from banks to fund energy project developers. The off-grid market is driven by non-mainstream investors and is often financed by short-term donor support, which means that projects rarely survive after donor support ends (DT Global IDEV Europe S.L., 2018).

Regarding biomass, the Strategy and Action Plan notes that Zambia has significant biomass energy potential given the abundant agricultural and forestry biomass resources. The country has large undeveloped areas of land, of which 58 percent are suitable for sustainably growing energy crops for ethanol production such as cassava, sugarcane, soybean, and sunflower. A recent Bioenergy and Food Security study supported by the Food and Agriculture Organization quantified the biomass resource potential in the country. The study shows that about 4.7 million tons of field crop residues and 133,000 tons of forestry residues exist, which can support power generation capacity of about 1,192 MWe. In addition, there are 3.124 million tons of cattle, pig, chicken and goat manure, potentially available to produce about 2,370 TJ of biogas annually.

Compared to other RE technologies, such as utility-scale solar PV, the biomass energy subsector has not received as much attention nationally. Exceptions are the SIDA and SNV Energy for Agriculture programs, which promote biogas dissemination through market creation and awareness raising. For example, to date, SNV has established over 5000 biogas digesters for use in rural communities. There has been minimal focused support for biomass energy and corresponding interest from the private sector, even though it is the single most important energy resource in the country as the majority of the

population relies on it. In comparison, the solar industry has received significant support over the last few years and a utility-scale market is emerging. However, due to the relative lack of maturity of solar thermal, and high costs of solar PV-based cooking, A2C's analysis will focus on electric cooking powered by the grid.

A key challenge with upscaling biomass energy is the ability by developers to mobilize enough volume of biomass feedstock to satisfy market demand. Sufficient feedstock production is a precondition to developing a sustainable biomass energy market. There are also supplier risks as feedstock producers can decide to sell to other markets if they get a better price. This has been the case for SupaMoto which produces wood pellets for gasifier cook stoves using wood waste from plantations after the trees have been felled. Previously SupaMoto had an arrangement to source the wood waste for free from a state-owned forest planation managed by ZAFFICO as it was removing a fire hazard. However, in 2021, ZAFFICO stated they would begin charging SupaMoto full market rates for the wood scraps as there was an increasing demand for wood waste from other markets (chicken farms for example convert the wood waste into sawdust). Further, there is a need to build infrastructure, such as for biomass storage, to facilitate marketing of the bioenergy carriers. At the moment, it is not clear who pays for such new infrastructure in Zambia: the government or the private sector. There is a need, therefore, to have a dialogue and use best practices in the interest of national sustainable development objectives.

The Strategy and Action Plan notes that biomass energy production and use need to be modernized to ensure that the biomass is a truly sustainable RE resource. There is limited market intelligence on the subsector and no tested business model for deployment. These data and models are required to help in understanding the opportunities and risks in the subsector, and provide a basis for developing appropriate financing and support for the subsector. To unlock the biomass energy potential in country there is a need to take a deep dive through full market diagnostic studies of the biomass energy subsector. It should be noted that SNV, with support from the EU, will be undertaking a diagnostic on biomass in Zambia. This study is expected to provide insights into the market evolution and dynamics, investment risks and lessons learnt in the subsector over time. In addition, studies will inform the processes of developing appropriate policies and regulations, financing schemes, incentives, and subsidies that may be required. So far, this information is not widely available.

With respect bio-ethanol, the Strategy and Action Plan notes the development of a bio-ethanol industry has the potential to increase economic growth without negatively affecting overall food security, and regulatory support for biofuels have already been developed, including licensing for the production and blending of biofuels.

In 2022, MOE developed an updated Renewable Energy Strategy and Action Plan (RESAP), which is to cover the period 2022-2030. The preparation phase of the strategy from 2022-2024 will consist of preparatory studies, policy and regulatory changes, and mobilization of technical assistance and financial support. The subsequent implementation phase from 2024-2030 will then focus on the specific activities and investments outlined in the strategy.

The RESAP notes that a RE market is gradually emerging but is still currently limited due to existing market, institutional, and human capacity barriers and that there is a need for more supportive policies, regulations, and legal frameworks. Regarding ATFs, the negative impacts of indoor air pollution, time consumed, and deforestation due to cooking with biomass is acknowledged early in the document as is the shift away from electric cooking towards charcoal due to load shedding since 2015.

Zambia has significant potential for sustainably growing energy crops and for the use of biomass residues and waste to produce bioethanol and biodiesel, according to the RESAP. Bioethanol could be used towards meeting the E10 blending mandate or for cooking. The strategy cites analysis that shows that 74 million liters of bioethanol could be produced from cassava and molasses, which would be sufficient cooking fuel for over 200,000 households or over a third of the population of Lusaka.

The RESAP cites multiple barriers to increasing the uptake of renewable energy. It acknowledges general technical, knowledge, awareness, rural market, and human capacity barriers for increasing adoption of RE without specific reference to ATFs, though these are issues that also affect the clean cooking sector. The need for improvement in the policies and regulations related to licensing, permitting, land, use, import tariffs and VAT are also discussed in the strategy, though again not generally in relation to ATFs. There is mention, however, that charcoal production and supply is not regulated or subject to taxation but that new regulations are currently being drafted. Coordination between MOE and the Ministry of Green Economy and Environment (MGEE) is noted to be critical to address this issue.

Financial and economic barriers are also significant. High cost of capital and lack of access to long-term finance to cover large upfront project costs are impediments to the renewable energy sector. Banks are risk averse and lack experience lending to RE projects, and significant capacity building is needed. On the economic side, low and unreliable incomes, especially in rural areas, make it difficult for companies offering financing, for example on pay-as-you-go terms, to ensure sustainable and profitable operations over extended periods of time. The RESAP cites A2C research showing that after increases in electricity tariffs in 2015, the proportion of households using electricity for cooking dropped from 35 percent to 18 percent. However, recent studies have also shown that cooking with electricity even with the higher tariffs is still competitive with charcoal, indicating that consumer perception and behavior may still need to be addressed or that the switch to other fuels could be due to load shedding and unreliability of the grid.

While the strategic objectives of the RESAP include addressing greenhouse gas emissions, deforestation, and health risks, no targets related to ATFs are listed with the exception of the potential for biogas produced from livestock manure and crop residues to supply the cooking needs of 100,000 rural households. The strategy does include a target to increase charcoal production efficiency from 20 percent to 35 percent by 2030, which would result in a 37.7 percent reduction of firewood consumption, and it does note without adopting as official targets that A2C aims to reduce charcoal consumption by 25 percent (though omitting that the target is for Lusaka) and that improved charcoal cookstoves have the potential to reduce charcoal consumption by 45 percent.

The strategy section of the RESAP notes that there are opportunities for the biomass energy to supply the cooking needs of the population, though there are no specific options or interventions mentioned. The link is also drawn between the need for clean cooking solutions to free up time for households to engage in activities that take advantage of productive uses of energy. The strategy generally cites without specific references to ATFs the need to address issues related to policy, regulation, financing mechanisms, information and knowledge dissemination, capacity building, and research and development.

The action plan section of the RESAP notably includes the development of a clean cooking strategy led by MOE and in collaboration with MGEE. Though not explicitly mentioned, A2C intends to provide support for this strategy. The action plan also notes that the biomass energy market has been neglected compared to other RE sectors and that a key challenge is ensuring adequate feedstock to satisfy demand. GRZ will conduct a full market diagnostic study that includes collection of data and modeling to understand the opportunities and risks in the biomass market and define appropriate interventions, including on more efficient production, supply, and end use of charcoal as well as charcoal substitution. Feasibility studies will then need to be conducted on different technologies, including biofuels and biogas, followed by the development of viable business cases, with the relevant components feeding into the clean cooking strategy. Also mentioned in the biomass section is the importance of policies and regulations that promote a sustainable charcoal value chain and encourages ATFs, including the revision of the charcoal regulations and support for alternative livelihoods.

Aside from the above, discussion of topics related specifically to clean cooking are relatively sparse. Under the policy and regulation section, though there is little discussion of ATFs, some interventions listed could be relevant to clean cooking, including licensing, land use permitting, environmental impact assessment procedures, the development and enforcement of quality standards, and the finalization of the charcoal regulations. Regarding financing mechanisms, smart end-user subsidies are discussed, though in relation to solar home systems and mini-grids, and there is a brief generic mention of carbon finance. Other broad interventions include information and knowledge dissemination, research and development, demonstration and deployment, awareness raising, coordination amongst stakeholders, and capacity building across the entire sector.

The RESAP has a limited perspective on the role of women in Zambia's renewable energy sector. It does not sufficiently address gender or social considerations. While it mentions the importance of women as consumers of energy, it lacks concrete activities or steps that the plan will take to support women as consumers. It also does not consider the many other ways that women interact with the energy sector as entrepreneurs, employees, policymakers, or other important stakeholders. Most notably missing is the role of women as renewable energy entrepreneurs or the necessary support that these women need to enter the sector or scale their businesses.

The **Gender Equality Strategy and Action Plan for the Energy Sector of Zambia, 2022** is a comprehensive document intended to support the goals of the NEP to enhance socio-economic development from the perspective of gender equality. It covers the entire value chain of the energy sector by assessing the legal and policy framework, gender and energy access, gender mainstreaming in energy infrastructure projects, representation and participation, institutional capacity in gender mainstreaming and collaboration and financing. The goal is to obtain gender equality, social inclusion and non-discrimination across the energy sector (Ministry of Energy, 2021). The 2022 Action Plan outlines five key strategic objectives: 1) To increase access to and use of clean energy for domestic and productive purposes; 2) To increase social and gender integration in energy infrastructure projects; 3) To promote equal representation and participation of women as decision-makers, employees and entrepreneurs in the energy sector; 4) To strengthen institutional capacity to mainstream gender in energy policies, energy programs and within organizations; and 5) To increase coordination, collaboration and financing for gender equality in the energy sector.

The plan adequately summarizes the situation for women and girls regarding access to cooking solutions and the damaging impacts of using biomass and charcoal on health. For women, the transition from charcoal or firewood to ATFs could be an improvement in equality with men because women typically have significant responsibility in collecting and transporting firewood, a time-consuming task. Transitioning to ATFs like electric cookstoves will reduce time and could potentially increase the share of cooking amongst men and boys, relative to women/girls thereby potentially improving gender relations. While the document appropriately articulates the challenges women face in the sector, it does not specify anything on how to further improve the enabling environment to increase the uptake of ATFs other than a broad recommendation to create a nation-wide clean energy for cooking program. There is an opportunity to ensure that this Strategy and Action Plan is integrated into corresponding policies and implementation is completed in coordination with relevant institutions.

The **Second National Biodiversity Strategy and Action Plan (NBSAP2), 2015** provides an update to the original NBSAP originally developed in 1999. Since then, international frameworks have evolved and GRZ has undertaken new efforts to support biodiversity conservation, including the completion of the Strategy on Reducing Emissions from Deforestation and Forest Degradation (2015), the Forestry Policy (2014), the Forestry Act (2015), Water Resources Management Act (2011), and the development of a Wetlands Policy and the revision of the Wildlife Policy and Act. The implementation of the NBSAP2 is led by the Ministry of Lands and Natural Resources.

The NBSAP2 notes that forests are a valuable natural and economic resource and provides a range of goods, including fuel wood, timber, fiber, medicinal plants, and edible products. Forests are critical for carbon sequestration, preventing floods and soil erosion, and providing pollination services. Loss of forest cover over large areas can also result in reduced precipitation locally, which can impact hydropower generation. The contribution of forests to rural household income is estimated at over 20 percent and to GDP at over six percent, equivalent to over $1.2 billion. While NBSAP2 acknowledges that cooking fuel is a significant contributor to deforestation, roughly 250,000-300,000 hectares annually, and recommends promotion of alternative energy sources, no further specific actions are provided within the strategy document.

The Action Plan notes that improved electricity connections have not translated to an increase in the use of ATFs and that communities that gain access to electricity are more likely to use it for lighting, phone charging, or television rather than productive uses such as cooking. One thing missing from the action plan that could help address this is the use of social and behavior change communication strategies, which is a key part of the A2C project objectives. The Action Plan also lacks specific activities that seek to transform gender relations at the household level. It covers reasons why clean cooking might improve women's health, but lacks a perspective on other goals that clean cooking should bring including improved use of women's time, decision-making in the home, etc. The Action Plan could also be strengthened with activities that target female suppliers who make up the majority of wholesalers and retailers in the charcoal business. These women should be provided with sufficient support to transition their businesses to ATFs.

Regarding current subsidies, GRZ recently agreed to a 1.4 billion USD credit facility deal with the International Monetary Fund to address Zambia's current debt. This deal is coupled with removal of subsidies on petroleum products in the 2022 government budget, including an increase from 17.62 ZMW (1.07 USD) to 21.16 ZMW (1.29 USD) per liter of petrol, and 15.59 ZMW (0.59 USD) to 20.15 ZMW (1.22 USD) per liter of diesel (Mfula, 2021). In addition to removal of subsidies on petroleum products, the IMF facility is likely to be dependent on reforms in the electricity sector, with a particular focus on tariff increases to a cost reflective level. This will see electricity prices for all sectors increase and may impact the affordability, or perceived affordability, of residential electric cooking. This demonstrates GRZ's current attention on subsidies for fuels. There is an opportunity to model impacts of subsidies of ATFs in relevant CBFA that informs future GRZ decision-making.

Finally, PAYGO has significant potential to enable greater uptake of ATFs in Zambia by allowing payments in small increments made over time to address the challenges of high capital costs. Several ATF providers in Zambia have noted interest in utilizing PAYGO. However, application of tax, data protection and financial regulations that relate to PAYGO are not always clear. This assessment did not include review of regulations that relate to PAYGO. However, a mapping of these regulations and review of international best practices conducted by A2C can help shed light on how companies can best comply with regulations to effectively offer PAYGO-based financing.

INTERNATIONAL BEST PRACTICES

Several donors and multilateral organizations have provided suggestions on ATF policy and strategy. The United Nations Economic and Social Commission for Asian and the Pacific (UNESCAP) assessed clean cooking projects in more than 20 countries including several in Sub-Saharan Africa and identified relevant recommendations for ATF policymaking (United Nations Economic and Social Commission for Asia and the Pacific). These recommendations include:

i. Embedding the clean cooking agenda into national energy policies and budgets and including targets for technology deployment;

ii. Coordinating at national and local levels with entities from different sectors;

iii. Making financial and de-risking instruments available to ATF providers to help scale up their businesses; and

iv. Adopting international standards for ATFs.

The Clean Cooking Alliance (CCA), a global non-profit organization that coordinates promotion of ATFs in developing countries, documents national policy and strategy examples from around the world. For example, in a report produced by the Chronic Poverty Advisory Network, the following policy actions are recommended for "Category 1" countries including Zambia, defined as <20 percent total use of clean-combusting fuels (Pachauri, Scott, Scott, & Shepherd, 2013):

i. Develop and implement a strategy to support improved cooking technologies and cleaner-combusting fuels for the poor;
    a. Dedicated national commitment with a vision for scaling up ATFs;
    b. Cooperation of Ministries working on energy, environment, rural development, agriculture, education and health;
    c. Engagement of local communications in policymaking especially for considering traditional cooking tendencies; and

ii. Public awareness and social marketing actions on harmful effects of traditional cooking practices to promote demand.

In Ghana, the national government is focusing on the promotion of clean cooking sources through multiple policies. Due to the minimal demand and adoption of electricity for cooking in Ghana, the government has explored promotion of LPG and improved charcoal stoves as viable alternatives to traditional charcoal. For example, in its 2010 Energy Sector Strategy and Development Plan, the Government of Ghana set a target of increasing access to LPG from 6 percent in 2010 to 50 percent in 2015 through measures such as constructing LPG storage and supply infrastructure in district capitals, supporting the national cylinder manufacturing company and introducing a subsidy for LPG. The Ghanian government also aligned with the Sustainable Energy for All Action Agenda, 2015, which included a target of transitioning 50 percent of all households to LPG as their primary cooking fuel by 2020 and includes measures like public awareness campaigns on LPG for cooking, and clear standards and labels for LPG stoves. Although neither target was met, the policy measures did increase uptake and demonstrate a strong commitment by the Ghanaian government to promote ATFs (Bawakyillenou, Crentsil, Agbelie, & Boakye-Danquah, 2021).

In 2022, A2C organized a workshop on international best practices for ATF-related policies and regulations for Zambian clean cooking stakeholders from the public and private sectors. The workshop featured the recently introduced electric cooking tariff in Uganda. Guided by Uganda's biomass strategy and revised energy policy, the government adopted a preferential and tiered tariff for electric cooking (451.4 UGX/kWh) with support from donors. This aims to keep electric cooking costs affordable and further incentivize transitioning away from charcoal use. Similar tiered and preferential tariffs could be considered for Zambia.

For the Zambian context, these recommendations and examples can be applied via a number of options including better coordination among Ministries and donors for ATF deployment (particularly within the context of a Zambian clean cooking strategy and action plan), inclusion of the private sector in policymaking and consideration of financial incentives for ATFs, raising awareness about ATFs in urban compounds, considering national ATF targets and a relevant monitoring and evaluation framework for technology deployment. These are detailed in Table 2 and are based on analyzing the aforementioned gaps and international best practices. Table 3 presents questions to be discussed during the subsequent A2C-GRZ consultations.

RECOMMENDATIONS

Table 2: A2C Recommendations for GRZ Policies, Regulations and Strategies

Recommendation	Government action	Illustrative A2C action	Timeline	Impact	Priority
Ensure greater specificity on ATFs in policies and plans to solidify GRZ buy-in	Include relevant language on support and targets for all ATF deployment in 8NDP	- Participate in 8NDP implementation plan development. - Use results of CBA and cost of cooking study to inform targets and interventions for deployment of prioritized ATFs. - Review international examples for inclusion of ATFs in other countries' NDPs, and estimate illustrative targets for Zambia. - Hold joint workshop for MOE and Ministry of Green Economy and Environment to share examples and validate draft targets.	>6 months	High	2
	Draft policy memos that include detailed implementation measures that prioritize and support ATF deployment	- Draft policy memos that provide recommendations for improved implementation measures for NEP, NPE and NPC that support ATF development. - To inform recommendations in the policy memos hold at least two workshops with MOE, MLNR and ZRA to collect feedback, validate the policy memos, and identify technical assistance technical assistance (TA) to be delivered by A2C. - Draft implementation strategy for A2C TA to help MOE and MLNR implement and evaluate new policy memos.	<6 months	High	1
Enable ATF providers to offer PAYGO financing to customers	Remove regulatory barriers for ATF providers to offer more PAYGO financing	- Map and review tax, data protection and financial regulations related to PAYGO, and assess if revisions can be made to reduce barriers for ATF providers. Review international examples. - Support GRZ in reviewing and revising regulations	<6 months	Low	3
Coordinate GRZ and donor support for	Convene GRZ entities and donors involved in ATF	- Present findings and recommendations from this assessment to Government and other key	<6 months	High	1

Recommendation	Government action	Illustrative A2C action	Timeline	Impact	Priority
private sector-led ATF deployment	deployment to coordinate activities	stakeholders such as the private sector through the Energy Sector Advisory Group (ESAG), Zambia Energy and Gender Network, Charcoal Taskforce and the Off-Grid Task Force. - Support the hosting of ESAG meetings and identify recommendations to be prioritized for implementation. - Encourage GRZ to prioritize clean cooking during planning and discussions with energy donors on future funding and support - Coordinate with GRZ and donors to monitor carbon finance being mobilized by the private sector and plan for potential interventions if necessary - In line with above, A2C will provide Technical Assistance and link the ATF private sector and financiers in the carbon markets where appropriate. - Engage and lobby government ministries through appropriate ministries to adopt policy recommendations that will improve the enabling environment through policy briefs, cost benefit analysis of ATFs, as well as providing input into the development of policies, strategies, standards and regulations when opportunities arise.			
	Ensure effective tracking of progress made in implementing ATF policy measures	- Review MOE and MLNR's M&E frameworks to ensure practicality of ATF-related indicators and outcomes, and propose relevant suggestions - Explore potential for a common, cross-Ministerial M&E framework on ATF deployment.	<6 months	Low	3
Improve gender and social considerations in	Consider gender roles and norms at the household level when implementing the	Implement social and behavior change communications strategies in (urban and rural)	>6 months	Low	4

Recommendation	Government action	Illustrative A2C action	Timeline	Impact	Priority
GRZ Policies and Strategies	Gender Equality Strategy and Action Plan	communities that effectively reach women at the household level			
	When implementing the Gender Equality Action Plan, consider the role of women as wholesalers and retailers in the charcoal business and identify specific ways to support them to transition their businesses to clean energy	- Recommend indicators to track progress - Encourage GRZ to implement interventions that support the transition of female retailers and charcoal business owners from charcoal to ATFs	>6 months	High	2
Ensure effective implementation of NPCC	Support MLNR and relevant Ministries to implement NPCC and emphasize ATF deployment for climate action	- Hold at least one workshop with MLNR to identify practical policy measures focused on ATF deployment (e.g. design subsidy for ATFs per unit of carbon dioxide equivalent avoided) - Follow up and support MLNR in delivering technical assistance to other Ministries, including but not limited to research and review of Ministerial M&E framework	>6 months	Low	4

TOPICS FOR A2C-GRZ CONSULTATION

Table 3: Topics for A2C-GRZ Consultation, GRZ Strategy and Objectives

Topic	Question
NEP, 2019	- NEP mentions an Energy Sector Monitoring and Evaluation Plan to ensure effective M&E of policy. What data on progress of NEP policy measures has been collected thus far? - NEP mentions that assessments of existing off-grid regulations will take place in 2020 and new regulations would be developed in 2021. What is the status of this? - NEP mentions that economic incentives for ATFs will be introduced. What is the progress on this? - How successful is the cross-sector collaboration to implement the NEP? Are government agencies coordinating with one another? If not, this could be a recommendation.
NPE, 2009 (Under review 2022)	- How has the M&E system for NPE been applied? Are there shareable data from this? - How can the NPE support clean cooking and what is the role of clean cooking in supporting the environment? - How does the revised NPE align with other policy goals on clean cooking and charcoal related deforestation?
NPCC, 2016	- Since the policy was developed, what percentage of the national budget has been dedicated towards implementation of the defined measures? - Has a detailed Action Plan been developed since the policy was announced? - What efforts have been made to attract foreign direct investment to support climate change objectives? - How to the specified implementing institutions coordinate their efforts? - Has an integrated legal framework been put in place as described in the policy?

5.2 LICENSES, PERMITS AND PATENTS

Licensing, Permitting and Patents: Key policies and regulations

- Business Regulatory Act, 2014
- Electricity Act, 2019
- Energy Regulation Act, 2019
- Forests Act, 2015
- Patents and Companies Registration Act, 2020

Licensing, Permitting and Patents: Key GRZ institutions

- Energy Regulation Board
- Ministry of Energy
- Patents and Companies Registration Agency

There are several regulations that determine how ATF providers must be registered with GRZ to do business. Most fundamentally, the **Business Regulatory Act, 2014** sets the foundation for all business licensing in Zambia and provides a set of guidelines for all GRZ regulatory agencies to regulate and license activities for their respective mandates, including ERB (Government of Zambia, 2014).

The Act's guidelines include principles such as licensing must be facilitated by regulatory agencies, fees should be minimal, targeted and fixed, and all regulatory agencies should use a single licensing system. It also mandates that regulatory requirements for micro, small and medium enterprises be minimized to the greatest extent possible, resulting in the least operational burden imposed on businesses and the least administrative burden for the regulatory agency. This is conducive for ATF providers, which are often small and medium-sized enterprises. It also establishes an electronic registry that houses all information on licenses, permits, certifications and regulations and other information that businesses have to comply with. Finally, the Act establishes the Business Regulatory Review Committee, which reviews how regulations and policies impact the ease of doing business, issues new rules and monitors and reports on all regulatory agency activities.

More specific to the energy sector, the **Electricity Act, 2019** defines regulation of generation, transmission, distribution, and supply of electricity, introduces provisions for sale and purchase of electricity, facilitates investment and ensures protection of consumers, among other items (Government of Zambia, 2019). According to the Act, the ERB is charged with securing universal access to electricity supply, facilitating investment in electricity, pursuing energy diversification, safeguarding the interests of consumers, and approving tariffs (Government of Zambia, 2019). This includes monitoring competition and installation of energy systems and, handling relevant complaints from consumers. ERB depends on regulatory approval from other GRZ entities like Zambia Development Authority and the Zambia Environmental Management Agency (ZEMA).

The licensing of activities in the energy sector is regulated by the **Energy Regulation Act**, the Electricity and Petroleum Acts, the Energy Regulation Licensing Regulations, and Statutory Instrument No 2 of 1998. With respect to licensing, the ERB oversees the following functions:

- Issues licenses
- Monitors performance of licensed organizations' activities, as well as competition
- Receives and investigates compliance from customers of licensed organizations.

All companies - including those that provide electricity, biofuels, biogas and LPG - must be licensed with the ERB, which requires successful submission of an application available on the ERB website, provision of supporting documents and payment of a non-refundable fee. The non-refundable fee is calculated based on 0.1 percent of the cost of the investment. The licensee is also required to pay monthly license fees of 0.7 percent of monthly turnover of the business – not an insignificant amount for a start-up (note solar projects are exempt from this monthly fee but not other ATFs). This is due to the fact that solar home system and mini-grid sales and operations do not generally produce significant revenue.

After payment of the application fee, most applications require that a physical inspection of the assets or project be undertaken by the ERB. Within sixty days of receipt, ERB must review and grant or reject the application, and inform the applicant. If ERB fails to inform the applicant, the application is considered approved. ERB has the authority to grant temporary or provisional licenses. Inspection of licensed energy systems occurs through a qualified inspector who visits and assesses premises of licensed companies, collects evidence, and even reprimands those who are believed to have committed an offence defined by the Energy Regulation Act.

The Act provides details on timing, conditions and restrictions for licenses, as well as criteria for not granting, suspending or revoking licenses. A review of the requirements for a renewable energy license (see Table 4) reveals a difficult enabling environment for small and medium enterprises, who may not have the capacity or resources to develop business plans, procure audited financial statements or secure sponsors and investors. A2C can however build the capacity of enterprises to meet these requirements through a business incubator, results-based grants and technical assistance.

Table 4: ATF Provider Licensing Requirements

ATF	License Requirements	License Timing	License Fee
RE (including biofuels)	- Business plan (5-year for first-time applicants, 3-year for renewals) - Latest audited financial statements - Latest annual returns from Patents and Companies Registration Agency (PACRA) - Certificate of incorporation - Proof of funds - Letter of commitment from sponsors accompanied with Board Resolutions of sponsor company; - Copy of Investment Endorsement - List of shareholders and directors from PACRA - Copies of National Registration Cards of directors - Detailed process flow diagram of biofuels production/blending - Certified third-party product analysis reports - Latest tax clearance certificate from ZRA - Residence permits for foreign directors and shareholders	ERB must accept/reject within 60 days of receipt	<0.01% of envisaged investment

Licensing for renewable energies and LPG are regulated by ERB. For LPG this includes a combined license that covers distribution, importation and export of LPG, export and retail. Licensing for LPG falls under the existing licensing regime for petroleum products. This has posed a challenge as the existing licenses do not always adequately address the specific technical requirements associated with LPG. Under the combined license oil marketing companies (OMCs) can engage in the distribution of LPG amongst other petroleum products, without a specific requirement for dedicated LPG storage. Table 5 below sets out the business registration, certificates and licenses required by OMCs who want to import, distribute, retail and export LPG and the following table summarizes the licensing requirements. Table 6 summarizes the licensing requirements for LPG.

Table 5: Licenses Required for Import, Distribute, Retail and Export of LPG

Name of Certificate	Issuing body
Company Registration	PACRA
Certificate of Incorporation	PACRA
Tax-Payer Identification Number (TPIN)	ZRA
Trading Certificate – Renewable yearly	Local Council
Fire Certificate – Renewable half yearly	Local Fire Brigade
Importation of petroleum products	ERB
Terminal storage of petroleum products	ERB
Distribution of petroleum products	ERB
Retail of petroleum products	ERB
Road transportation of petroleum products	ERB
Temporary importation of petroleum products	ERB
Inclusion license (per kiosk, renewable every 5 years)	ERB
Environmental Impact Assessment clearance	ZEMA

Table 6: Table 7: License Requirements for LPG

ATF	License Requirements	License Timing	License Fee	Notes
LPG (retail, transportation and distribution)	- Letter stating the cost of investment and associated verification documents - Construction permit (if applicable) - Latest signed and audited financial statements by a registered auditor - Proof of ownership/lease of retail site - Valid fire certificate from local authority for each proposed retail site - Minimum of 250 cylinders - Completion certificate by an engineering professional registered in Zambia - Completed appendix for LPG retail - For LPG transportation: certificates of incorporation and registration of tankers and motor vehicles and copies of vehicle log books	ERB must accept/reject within 60 days of receipt	<0.01% of envisaged investment	- For retail: retail site must be inspected by ERB - For transportation, tankers/vehicles must be inspected by ERB - For distribution, depots must be inspected by ERB - Upon successful process, license application is published in GRZ Gazette

As noted in A2C's Initial Market Analysis, OMCs typically engage resellers to retail LPG to end users. For example, South Africa's Commercial and Domestic Appliance Company has established a network

of 12 refiling and cylinder exchange kiosks. Each kiosk is equipped with a small, specialized pump to decant LPG from larger (48kg) cylinders into smaller household cylinder sizes. To become an authorized reseller for LPG, retailers must meet some basic criteria: (1) be an established Zambian company; (2) demonstrate financial capacity to pay for cylinder deposits; (3) have secure premises for business operations; (4) demonstrate history of running a business; (5) have all necessary registration, licensing, and certifications.

The kiosk model lends itself to an entrepreneur seeking to invest in the LPG business who does not have the required finances to set up a fully independent business. Further, the business model does not require ERB licensing (unless the business expands into bulk supply), making market entry more flexible, The table below sets out the key certificates and registrations each kiosk must hold. Kiosks are a fast-growing model on the Zambian market and have the potential to make LPG accessible to more households in urban households. Due to the nature of how LPG is supplied, the kiosk model is only considered for LPG instead of other ATFs. Table 7 provides more details on kiosk business registration.

Table 7: Kiosk Business Registration and Certificates

Name of Certificate	Issuing body	Cost (ZMW)
Certificate of Incorporation	PACRA	
Tax-Payer Identification Number (TPIN) Certificate	ZRA	Free (No Cost)
Trading Certificate – Renewable yearly	Local Council	2000
Fire Certificate – Renewable Half yearly	Local Fire Brigade	700

Regarding permitting, the Electricity Act states that all organizations that intend to construct an "energy facility, installation or common carrier" must apply for a permit in a prescribed manner, but no further details are provided (Government of Zambia, 2019). The ERB website provides a construction permit checklist, which includes the following (ERB):

i. Proof of payment of application fee
ii. Written approval from the ZEMA
iii. Copies of detailed site plans
iv. Copies of engineering and structural drawings
v. Local authority approval
vi. Completed appendix showing capacity of facility
vii. Approval from Road Development Agency or other designated GRZ entity
viii. Practicing certificate issued by Engineering Institution of Zambia
ix. Letter of appointment of the registered engineering professional that will supervise the project
x. If applicable, approval from other designated authorities

The Energy Regulation Act recognizes RE technologies but does not specifically mention ATFs. Neither the Electricity and Energy Regulation Acts or the public ERB website mention if and how bio-ethanol gel and biomass/pellets ATF providers are licensed, or if permits are required. This introduces a level of uncertainty for companies, particularly those interested in entering the Zambian market.

There is currently no permitting system in Zambia to support an LPG cylinder exchange system. A cylinder exchange program could facilitate the supply of cylinders amongst LPG marketing companies and promote competition in the LPG sector, as consumers are free to seek out their closest exchange point, regardless of brand, this moves retailers from competing on cylinder numbers to competing based on retail points. The system is based on the concept that LPG cylinders are returnable containers and are owned by the brand owner. As such, the consumer pays a deposit on the initial acquisition of the cylinder. Once the interchange occurs, the brand owner of the filled cylinder is then tasked with handing over the empty cylinder collected to the rightful brand owner within an agreed period. LPG cylinder exchange has been successfully implemented in Kenya, and the rest of the EAC member countries (Uganda, Tanzania, Rwanda, and Burundi) are currently in the process of adopting LPG cylinder exchange systems. However, due to the nature of transferring and handling flammable products during LPG exchange, consumer safety should be a major concern. For example, according to ERB, when a consumer has a personally identified LPG cylinder and brings it to a local plant for refilling, the key safety consideration is diligence of refilling operator to rigorously inspect and reject any sub-part cylinders. This relates to A2C's proposed interventions related to product standards. The promotion of Pay-as-you-Go LPG dispenser would reduce safety hazards.

The **Patents and Companies Registration Act, 2020** defines the PACRA as the main responsible entity for patents in Zambia. It oversees registration of all industrial designs, trademarks, copyrights and other rights, business names, and security interests in movable property, granting of patents, incorporation of companies, establishment of business regulatory service centers, protection of integrated circuits, and accreditation of corporate insolvency practitioners (Patents and Companies Registration Agency, 2020). The PACRA Act does not specifically mention ATFs, because the process of registering a business entity is the same for all businesses.

The **Forests Act, 2015** designates forest areas in Zambia, outlines participation of public and private sectors in forest management, and outlines conservation and use of resources in line with UNFCCC guidelines (Government of Zambia, 2015). According to the Act, licenses of not more than five years are given for sawmilling and concessions to cut, fell or process timber which can then be used for charcoal. The Ministry of Lands and Natural Resources' Forestry Department has 30 days to respond to a license application after receiving it. Permits are also required for conveying, selling, exporting, importing and harvesting forest product (including charcoal) for domestic purposes, in addition to setting forest fires, tree-felling and harvesting cord-wood for charcoal production. Forestry licenses and permits require fees from applicants, are not to be granted if they enable adverse impacts on natural resources.

In 2022, A2C noted that multiple policies have been selected for reconsideration and update: Electricity Act, Energy Regulation Act, Petroleum Act, Forests Act, and the National Forestry Policy. All of these are part of an on-going process at the time of writing and will be focus areas for A2C over the coming months.

INTERNATIONAL BEST PRACTICES

Lengthy, untransparent or costly licensing can introduce uncertainty for ATF providers. This is especially the case for LPG which currently requires more investments in storage and distribution infrastructure. An assessment of a cookstove deployment project in Nigeria identified that full market launch of the ethanol-methanol blend-based Clean Cook stove was indefinitely delayed due to challenges with permitting LPG storage and blending facilities (Berkeley Air Monitoring Group, 2018). Furthermore,

CCA notes that in Indonesia, bioenergy and LPG providers recommended that streamlined and sped-up authorization and licensing procedures can go a long way in supporting companies (Clean Cooking Alliance, 2015).

In 2022, A2C organized a workshop on international best practices for ATF-related policies and regulations for Zambian clean cooking stakeholders from the public and private sectors. The workshop featured the Kenyan experience with an LPG cylinder exchange. Despite perceived benefits of such a program including increasing availability and promoting price competition, the presentation noted that there are considerable economic, financial and regulatory oversight risks. Challenges include ensuring operational safety, coordinating within government, and maintaining proper regulatory enforcement. Ten years after the program was introduced, it was abandoned. Based on this learning A2C and ERB decided not to pursue a cylinder exchange pool in Zambia.

RECOMMENDATIONS

Recommendations for licenses, permits and patents are depicted in Table 8 and are based on analyzing the aforementioned gaps and international best practices. Table 9 presents questions to be discussed during the subsequent A2C-GRZ consultations.

Table 8: A2C Recommendations For Licensing, Permitting and Patents

Recommendation	Government action	Illustrative A2C action	Timeline	Impact	Priority
Ensure greater specificity on ATFs in regulations to clarify requirements for ATF providers	Formally commit to identifying and addressing gaps in permitting, licensing and permitting that hinder the enabling environment (possibly through collaboration between the new Ministries of Green Economy and small and medium enterprises (SMEs)	- Conduct LPG accessibility study that reviews all licensing, permitting and patents for all ATF providers and associated stoves to identify gaps in regulations and enforcement, including specific focus on status of PAYGO-relevant regulations. - Use results of A2C's LPG accessibility study to work with the LPG association and the ERB to develop a specific licensing regime for LPG that addresses the specific technical characteristics of LPG storage, distribution, transportation, and retail. - Hold at least one workshop with ERB to collect feedback, validate gaps in licensing, permitting and patents and identify technical assistance (TA) to be delivered by A2C. - Leverage the newly launched "one-stop-shop" for streamlined licensing in Lusaka by engaging with ERB to include its services.	>6 months	High	2
	Update ERB website to clarify regulations licensing and permitting and serve as clearinghouse for ATF providers	- Consult ERB and ATF providers on useful additions to ERB website that clarify regulations for all ATFs. - Draft additions for ERB website that clarifies licensing and permitting requirements for ATFs (especially for bio-ethanol gel and biomass/pellets). - Consult ERB to collect feedback, validate language changes and identify next steps for website edits.	<6 months	High	1

TOPICS FOR A2C-GRZ CONSULTATION

Table 9: Topics For A2C-GRZ Consultation, Licenses, Permits and Patents

Topic	Question
Energy Regulation Act, 2019	- How much is the licensing fee that ATF providers have to pay? The Energy Regulation Act mentions an annual fee not exceeding 0.8 percent of annual gross turnover of the licensee, while the ERB website mentions a one-time, non-refundable fee not exceeding 0.1 percent of the envisaged investment. Are both fees applicable for all ATFs? - What are ERB's top challenges in enforcing the Energy Regulation Act? What type of support from A2C would be most useful?
Patents and Companies Registration Act, 2020	- What ATF technologies have been patented thus far in Zambia?
ERB	- Can ERBs licensing and permitting services be added to the newly formed "one-stop-shops" under the Ministry of Commerce Trade and Industry to making doing business easier for ATF companies?

5.3 IMPORTS AND TAXATION

The ZRA is charged with setting taxes, including import duties and VAT and accepting HS codes for different products. Relevant data related to VAT and import duty can also be found in Statutory Instruments, the ZRA's VAT Liability Guide, the Income Tax Act and in the ZRA's list of excisable goods licenses.

In 2008, the GRZ approved **Statutory Instruments (SIs) 32 and 33** which codified import duty and VAT waivers for solar batteries, converters, diesel generators and solar water heaters, PV panels, batteries and electric generating sets, respectively. In 2020, the ZRA confirmed that the GRZ applied a zero-rating for import duty and VAT for all appliances that use LPG as well as Liquefied Petroleum Gases and other gaseous hydrocarbons. LPG cylinders however are subject to a 15 percent import duty and 16 percent VAT.

Imports and Taxation: Key policies and regulations

- Zambia Development Agency Act and Amendment
- National Industrial Policy
- National Trade Policy
- Income Tax Act
- Statutory Instruments 32-33, 2018
- 2020-2022 VAT Liability Guide

Imports and Taxation: Key GRZ entities

- Ministry of Finance
- Zambia Development Agency
- Zambia Revenue Authority

Analysis indicates however that tax exemptions are inconsistently applied by authorities, which introduces considerable uncertainty for companies in their operations and can therefore have negative business impacts. For example, a policy analysis produced for UKAid mentions that "improved cookstoves" are already exempt from import duties but still experience a 16 percent VAT (Kuungana Advisory Limited, 2018). Practically, this implies that some importing companies may pay VAT while others do not, and even for one such company, different duties may be applied for the same product. The **2020-2022 VAT Liability Guide** also mentions zero-rating of VAT for LPG products and gas-powered stoves and other appliances that use gas specified by certain HS Codes (Zambia Revenue Authority, 2020), meaning that no VAT is paid or can be reclaimed on them when imported by companies. Cooking appliances for ethanol are also currently zero rated for import duty and VAT.

In 2022, A2C conducted a cost-benefit analysis to model the impacts of zero-rating most ATFs. These are shown in Table 11 and are currently being considered by GRZ for application.

Table 10: Current and Proposed Tax Schemes

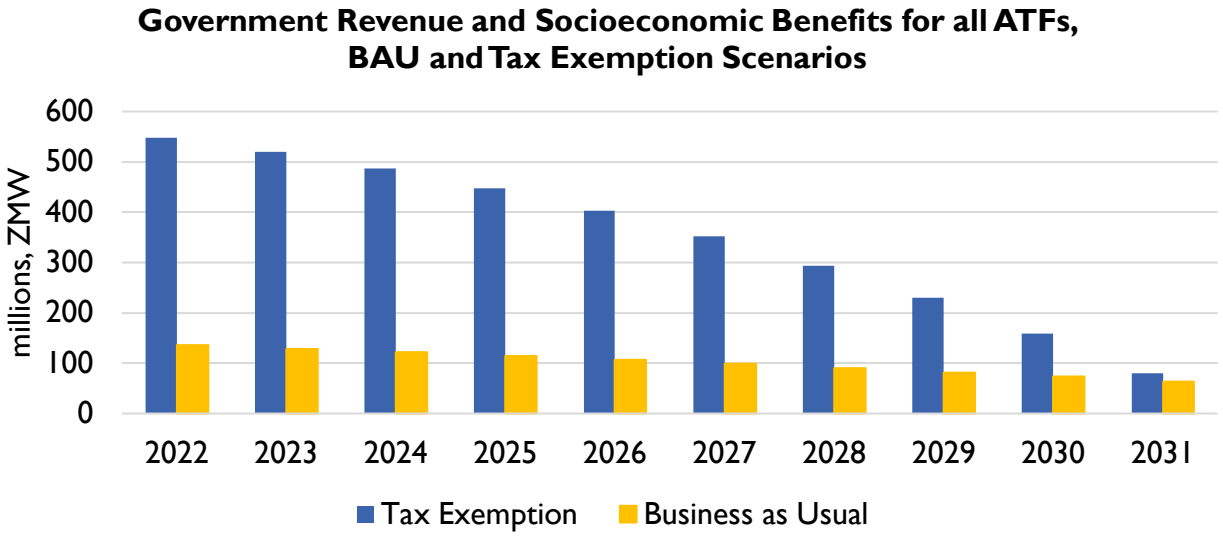
Details			Current Tax Status			Proposed Tax Status		
ATF	Component	HS Code	Customs Duty	VAT	Excise Duty	Customs Duty	VAT	Excise Duty
LPG	Cylinders	7311.00.00	15%	16%	-	0%	0%	-
Biomass Stoves / Pellet Fuel	Pellets	4401.31.00	-	16%	-	0%	0%	-
	Pellet stove battery	7321900	-	16%	-	-	0%	-
Electricity-based	Hotplate Cooker	8516.60.00	40%	16%	-	40%	16%	-
	Electric Pressure Cooker	8516.60.00	40%	16%	-	0%	0%	-

Details			Current Tax Status			Proposed Tax Status		
ATF	Component	HS Code	Customs Duty	VAT	Excise Duty	Customs Duty	VAT	Excise Duty
	Induction Cooker	8516.60.00	40%	16%	-			
Ethanol	Gel Fuel	3606.90.00	-	16%	-	0%	0%	-
	Liquid Fuel	2207.10.00 (alcoholic strength by volume of 80%)	5%	16%	60%	0%	0%	0%

In the BAU scenario, A2C determined that by 2023, charcoal would remain prevalent in urban areas (41 percent of cooking market share), followed by electric hot plate (35.5 percent), firewood (12 percent) and less significant shares of other ATFs. In this scenario, Zambia would not meet its 20 percent charcoal consumption goal, as set out in the SE4All Action Agenda. In the tax exemption scenario, A2C projected that charcoal would reach 20 percent by 2032 from 45 percent in 2022. Meanwhile, electric induction cookers would reach 22 percent of the market, followed by electric pressure cooker and LPG at 16 percent, followed by electric hot plate at 15 percent.

Considering the difference in costs and benefits in the BAU and tax exemption scenario for 2022-2032, the tax exemption would result in a net value (benefits minus costs) of 2.5 billion ZMW (stemming from tax revenue from electric hot plates, monetized GHG emissions reduction, and avoided deforestation). The model incorporates values of 86 ZMW (5 USD)/metric ton of CO2 and 862 ZMW (50 USD)/hectare of forest preserved, which are lower than current opportunities on the voluntary carbon markets. The CBA also shows under the tax exemption scenario over 130,000 lives saved and household savings for those using induction cookers, electric pressure cookers, ethanol liquid, and pellets. The sum of all costs and benefits are depicted in Figure 3.

Figure 3: Net costs and benefits in BAU and Tax Exemption Scenarios, 2022-2032



A2C has worked with MOE to submit a request to the Ministry of Finance for the tax exemptions shown above. Other recommendations in the CBA include non-tax incentives for ATFs, such as demand-side subsidies through carbon finance or other mechanisms, and the implementation of an electricity tariff that incentivizes electric cooking.

Furthermore, in May 2022, GRZ launched a customs handbook for solar PV products, with support from the Africa Clean Energy Technical Assistance Facility. This provides comprehensive guidance to stakeholders on the process of importing such products and clarifies the tax and duty exemptions to minimize varying interpretations and misapplication of tax exemptions. Such a handbook could be similarly produced for ATFs, especially if tax exemptions are applied.

As per the **Zambia Development Agency Act (ZDA Act) and Amendment**, ZDA is a quasi-government institution within the Ministry of Commerce, Trade and Industry that promotes and facilitates trade, investment and enterprise development (Zambia Development Agency, 2006). It interacts with investors by entering into investment protection and promotion agreements. ZDA is responsible for accepting applications from investors that will promote economic development and employ Zambians through their projects. Investors may receive tax incentives for projects due to the Income Tax Act or the Customs and Excise Act. The ZDA Act does not mention ATFs but does broadly mention "energy generation" as a business enterprise category to be addressed by the Act. Conversations with ZDA staff confirmed they've been working with ATF businesses under the general umbrella of SMEs.

Expanding industry is the backbone of Zambia's development strategy and intended to drive growth, diversification, upgrading and competitiveness of Zambia's manufacturing sector. The **National Industrial Policy** of 2018 is derived from the Commercial Trade and Industrial Policy of 2009 that covered both industrial and trade policy and was intended to create an enabling environment for private investors. However, after a review of the policy, it was identified that the industrial sector underperformed for several reasons such as limited capacity of small and medium enterprises to comply with compulsory standards. Other challenges included unclear incentives packages for private investors and inconsistent policy implementation. The 2018 National Industrial Policy is intended to address some of these gaps but only addresses this in broad terms, for example prioritizing business reforms to improve the economy's competitiveness through investment, productivity, business expansion. The National Industrial Policy, like several of the other policies, does not articulate how related institutions will coordinate with one another for implementation. Having an Action Plan to ensure it is coordinated from a policy perspective will also be important.

The **National Trade Policy** is in line with the National Industrial Policy with the goal of promoting both domestic and international trade. Specifically, the policy addresses existing constraints for private sector involvement in trade in the context of global tariff trends. Through this policy, GRZ is essentially promoting free and fair-trade agreements as a market protection mechanism. The policy provides for implementation of tariff structures that support domestic value chain addition and integration into regional value chains. Administrative non-tariff mechanisms are also encouraged. This will be an area in need of close monitoring as overly administrative procedures can be a deterrent for the private sector. The National Trade Policy, like several of the other policies, does not articulate how related institutions will coordinate with one another for implementation. Having an Action Plan to ensure it is coordinated from a policy perspective will also be important.

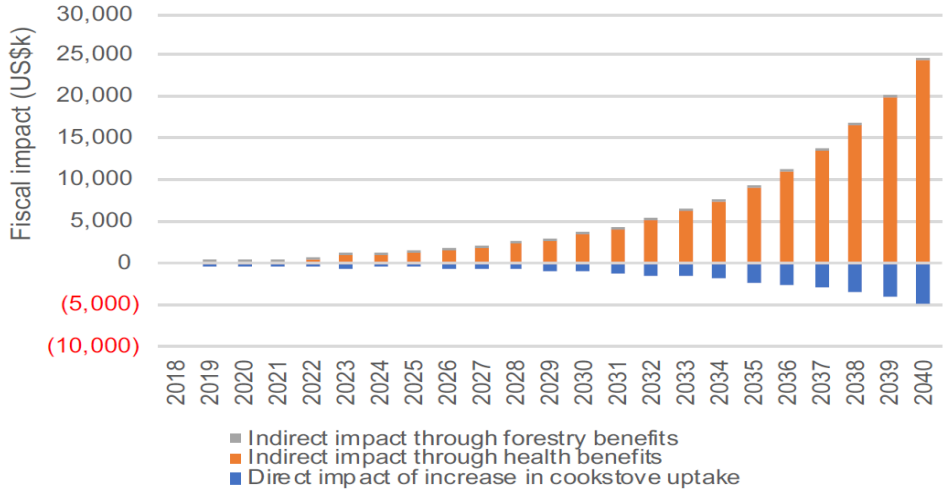
As it relates to ATFs, there is no specificity in the National Trade Policy. However, there is a view towards protecting the environment while conducting economic activity and encouraging investment in green technologies. There are broad objectives, including "promote environmentally sustainable industrial production" through adoption of cleaner technologies and streamline environmental impact assessments and environmental certification where applicable. There is therefore an opportunity for the National Trade Policy to promote local manufacturing of clean cooking technologies and fuels.

INTERNATIONAL BEST PRACTICES

Placement of VAT on ATFs has been projected to have negative impacts on ATF deployment. In Kenya, the national government passed the Finance Act 2020, which levies a 16 percent VAT on previously exempt or partially exempt improved cookstoves and LPG. A policy brief published by CCA notes that this tax will only increase tax revenue by at most 0.05 percent, and that its costs related to pollution, mortality, deforestation, and productive time due to hindering of ATF deployment prominently outweigh the increased revenue (Clean Cooking Alliance, 2021). CCA recommendations include reinstating previous VAT exemptions for improved cookstoves and LPG, and committing to a five-year exemption of all taxes and duties for all ATFs.

In parallel, removing VAT on ATFs is understood to have multiple benefits. In June 2020, the Ugandan government reduced VAT on LPG from 18 percent to zero percent, citing the potential to bolster the economy during the COVID-19 pandemic, make LPG more affordable to end-users and encourage the use of LPG over charcoal for cooking (Mwesigwaw, 2020). This could be applied in the Zambian context by continuing the ongoing zero-rating for LPG and gas stove products and extending it to include LPG cylinders and other ATFs. A fiscal analysis of policy options related to VAT conducted in 2018 (Kuungana Advisory Limited 2018) demonstrated that extending and implementing zero-ratings for improved charcoal cookstoves in Zambia would lead to a net present value benefit of $16.8 million by 2040. Although it is not until 2023 when the annual fiscal impact would become positive, the analysis recommends that the zero-rating be implemented due its long-term effects. Other projected benefits include reducing deforestation of *miombo* woodlands by approximately 8,000 hectares per year by 2030 and reducing premature deaths from household air pollution by approximately 500 per year by 2030. Figure 4 depicts the fiscal impacts overtime. It is recommended a similar cost-benefit analysis be done to explore the quantitative benefits of removing VAT and import duties for different ATFs including electric stoves and LPG.

Figure 4: Estimated fiscal impacts from zero-rating VAT for Improved Charcoal Cookstoves in Zambia



In 2022, A2C organized a workshop on international best practices for ATF-related policies and regulations for Zambian clean cooking stakeholders from the public and private sectors. The workshop featured KOKO Networks, a last-mile provider of liquid bioethanol cooking fuel that currently serves +400,000 households through its cloud-based delivery platform. The company recently signed a $25 million investment agreement with the Rwandan government to establish a country-wide network. This includes a 10-year zero-rating for excise, VAT and import duties for KOKO Networks' hardware and fuel, accelerated product permitting and licensing, and collaboration on carbon credits permitting and marketing. Citing the tax exemptions as a key enabler to scale operations at the lowest possible upfront and ongoing costs for customers, KOKO Networks is targeting to reach 1 million households within 5 years.

RECOMMENDATIONS

Recommendations for imports and taxation are depicted in Table 11 and are based on analyzing the aforementioned gaps and international best practices. Table 12 presents questions to be discussed during the subsequent A2C-GRZ consultations.

Table 11: A2C Recommendations for Imports and Taxation

Recommendation	Government action	Illustrative A2C action	Timeline	Impact	Priority
Consider zero-rating for VAT of ATFs	Consider and implement zero-rating VAT and customs duty exemption of ATFs to reduce burdens on companies and support uptake	- Using CBA results, continue advocacy with GRZ on zero-rating VAT and customs duty exemption for LPG-cylinders and prioritized ATFs - Hold at least one workshop with ZRA, MOE and MOF for capacity-building on zero-rating process and impacts	<6 months	High	1
		- Hold one workshop with ZRA to identify priority TA to support implementation (e.g. monitor effectiveness of zero-rating VAT and customs duty exemption enforcement and track impacts on government revenue and ATF uptake) - Support GRZ in developing customs handbook for ATFs that ensures uniform application of customs duties, particularly if they are zero-rated	>6 months	High	2
Explore status and potential for investment in ATFs facilitated by ZDA	Take inventory of how ZDA has been performing since its creation, especially related to ATFs.	- Support ZDA in creating a M&E framework and reviewing progress of investments in ATFs - If no ATF-related projects are observed, engage investors to gauge interest or concerns about investing in ATFs in Zambia	<6 months	Low	3

TOPICS FOR A2C-GRZ CONSULTATION

Table 12: Topics for A2C-GRZ Consultation, Imports and Taxation

Topic	Question
VAT Liability Guide 2020-2022	- Does ZRA and the Ministry of Finance experience any challenges in setting and enforcing import and VAT duties?
ZDA Act	- How has the ZDA been performing since its creation, and has it considered investment in ATFs or charcoal?
ZRA Customs Handbook	- Would it be useful to develop a Customs Handbook for ATF products to help companies and customs agents properly assess the tax status of various ATF related equipment/products? This would be especially helpful if the Ministry of Energy is successful in securing tax waivers on ATF products in the next budget.

5.4 PRODUCT STANDARDS

Product standards: Key policies and regulations

- National Energy Policy, 2019
- Standards Act, 2017
- Compulsory Standards Act, 2017

Product standards: Key GRZ entities

- Energy Regulation Board
- Zambia Bureau of Standards

Product standards are important to ensuring ATFs are safe, of high-quality and durable. They can also differentiate and increase the value of certain products when compared to lower-quality ones. The ERB is charged with implementing standards and quality testing for all energy products. All product standards in Zambia are guided by the **Standards Act, 2017** and **Compulsory Standards Act, 2017**. The former names the Zambia Bureau of Standards (ZABS) as the GRZ entity that provides for standardization and quality assurance of products by setting national standards for products and services (Government of Zambia, 2017). Although the Standards Act, 2017 does not specifically mention energy products or ATFs, it appears that both ZABS and ERB are responsible for formulating, enforcing and monitoring standards for ATFs.

For LPG, ERB defines the fuel as a type of petroleum gas mixture that consists predominantly of certain hydrocarbons (ERB, 2019). The standard identifies three grades of LPG, namely LPG mixture, commercial propane and commercial butane. It mentions specific requirements for packaging (steel cylinders), marking, sampling and chemical content for each of the three grades (Zambia Bureau of Standards, 2018). Standards are also in place for LPG's handling, storage and distribution in domestic, commercial and industrial installations (Energy Regulation Board, 2019).

Analysis published by ERB shows that LPG distributors feel Zambia's LPG regulations are relatively strict and as a result restrict their businesses' growth. These reportedly include limited availability of domestically produced LPG from the INDENI manufacturing plant, high taxes on LPG cylinders, limited supply of cylinders, low demand for LPG and a saturated LPG export market. Specifically related to standards, there is a lack of enforced standards for composite LPG cylinders; only steel cylinders are currently used which do not allow for consumers to monitor usage (Energy Regulation Board, 2019). This has enabled some cylinders that do not comply with standards to enter Zambian borders. However, ERB does not publicly mention more details on what LPG standards are in place and enforced. Alternatives to completely covered, steel canisters include composite ones (made of plastics and fiber glass and feature a translucent or transparent body that allows consumers to physically see how much fuel is left) and PAYGO-based "smart" canisters that enable digital monitoring via online or phone-based platforms.

To ensure the safety of LPG consumers, GRZ is updating LPG standards to include cylinder validation. It is also conducting an LPG accessibility study that will feed into an LPG strategy that the GRZ is developing, with support from A2C. GRZ also considered implementing a cylinder exchange pool, but Kenya's experience has exposed the associated economic, financial, and regulatory oversight risks. At the moment, there are no specific laws on LPG, and standards are voluntary. As of 2022, A2C is supporting the revision of several LPG standards and hiring consultants to help develop the standard on validation of LPG cylinders. The LPG standards that have been revised to take into account new developments in the LPG sector are as follows:

1. DZS249 Part 1 – Liquefied Petroleum Gas installations involving gas storage containers of individual capacity not exceeding 500 Liters.
2. DZS429 Part 2 – Liquefied Petroleum Gas installations involving storage vessels of individual water capacity exceeding 500 Liters.
3. DZS429 Part 3 – Storage and filling sites for refillable Liquefied Petroleum Gas containers of capacity not exceeding 19kg and the storage.
4. DZS Part 4 – Transportation of Liquefied Petroleum Gas in bulk by road - Code of Practice
5. DZS Part 5 – Mobile Filling Stations for refillable Liquefied Petroleum Gas containers of capacity not exceeding 9kg.

The only standards issued by the ERB related to bio-ethanol and biodiesel apply exclusively to blending of ethanol and biodiesel with diesel and petrol for transportation fuel and are therefore totally unrelated to bio-ethanol for clean cooking.[2] Currently, ethanol is not produced on a large, commercial scale in Zambia, investment in ethanol production is lacking, and onerous taxes are currently applied to bio-ethanol gel and liquid fuel. If a shift to ethanol-based cooking is to be advanced, specific standards would likely need to be developed in the future as they currently do not exist. A2C will therefore consider this for bio-ethanol gel and liquid fuel as prioritized ATFs in the cost of cooking study, and support ERB in planning for ethanol standards for cooking.

In 2022, A2C supported the ERB and Zambia Bureau of Standards in developing new standards for bioethanol stoves and fuel. These standards are currently being validated and will be finalized later in the year. These standards focus on denatured hydrous ethanol, non-pressurized ethanol, ethanol gel and ethanol gel fuel appliances that can be used for cooking.

The standards that were developed were as follows:

1. DZS1239 Ethanol – Gel Fueled Appliances
2. DZS1237 Non Pressurised Ethanol Cooking Appliances Using Liquid Fuel - Specification
3. DZS1238 Ethanol Gel for Cooking and other Gel burning Appliances
4. DZ1236 Denatured Hydrous Ethanol for use as Cooking and Appliances Fuel – Specification

Regarding biogas, ZABS has drafted a standard for the supply of biogas to third parties via micro-grids connected to biogas plants. Published in 2014, DZ 908 Part 2: 2014 includes requirements for metering, gas quality, supply pressure, safety and fire and explosion hazard considerations (Zambia Bureau of

[2] The standards are ZS E100 (for bio-ethanol) and ZS B100 (for biodiesel)

Standards, 2014). It is unclear if this applies to non-micro-grid biogas plants, nor how effective this standard currently is. ERB have indicated that they would like to revise the standards for biogas, which A2C could help support with technical assistance. However, we agreed to prioritize ethanol and LPG this year and will come back to biogas at a later stage.

Regarding biomass/pellets, minimal information was found in this assessment on product quality standards. The NEP and ERB and ZABS websites do not mention details on requirements and processes related to product quality standards for these ATFs, nor do they openly share all standards relevant to the energy sector.

A2C's EODB Index (Annex 2) will be used to collect relevant stakeholders' feedback on relevant regulations. A2C is currently using the EODB Index to collect baseline data from distributors, investors and regulators, which will inform policy and regulation review interventions for all prioritized ATFs.

INTERNATIONAL BEST PRACTICES

Product standards related to ATF quality, safety and durability are receiving growing interest from donors and governments worldwide due to their ability to ensure consumer protection and prevent market entry of low-quality products. After CCA was created in 2010, product quality standards for clean cookstoves were identified as a key topic of interest due to the reality of variable quality, safety and durability of available cookstoves. CCA has since employed International Standards Organization (ISO) frameworks to publish multiple documents including a technical report that includes cookstove vocabulary definitions, and protocols for laboratory testing, benchmarking, and field-based testing (Clean Cooking Alliance, 2021). USAID has also stated its support for the CCA-led standards and prepared a clean cooking toolkit that includes modules on standards and testing, technological innovations and market-based financing among others (United States Agency for International Development). In a nascent ATF market like Zambia standards can boost consumer confidence but care should be taken to ensure that mandated standards do not stifle design innovation and product rollout.

CLASP is a leading research non-profit organization that promotes and tests energy product quality standards, labeling and consumer education. In 2020, CLASP implemented the Global LEAP Awards Electric Pressure Cooker Competition. The competition recognizes high-quality, energy-efficient, and affordable electric pressure cookers that are appropriate for use in underserved markets, including areas where energy comes from solar PV electricity. In addition to laboratory testing, certain electric cookstoves were field tested in Kenyan kitchens to ensure that they meet consumers' needs. As a result, the competition produced a usability testing buyer's guide which is meant to inform consumers about factors like safety, durability, ease of use and energy efficiency for notable electric cookers. The results of such an award program can be referred to by not only governments but also consumers for information on best-in-class electric cookers (Global LEAP Awards, 2020).

In Kenya, the national government set a long-term goal of 42 percent of all households adopt clean cooking fuels as part of its Vision 2030 Second Medium-Term Plan for 2013-2017. A heavy emphasis was placed on LPG which was to contribute 35 percent, followed by biofuels at five percent and electricity at two percent. Among other interventions, the government introduced LPG regulations that required resellers and dealers to sell LPG in standardized 1 kg, 3 kg, 6kg and 13 kg cylinders fitted with uniform safety valves. This uniformity allowed LPG consumers to exchange their cylinders with any LPG providers regardless of brand, and ultimately was noted to promote price competition and contribute to the recent rise of LPG sales in Kenya between 2013 and 2017 (van den Berg, 2018).

Furthermore, in 2019, Kenya became the first country in the world to introduce a standard for LPG smart metering. The Kenya Bureau of Standards introduced "Meter for dispensing LPG from cylinder" (KNWA 2885:2019) as a result of public and private stakeholder advocacy. It requires compliance with Atmosphère Explosible (ATEX), a rigorous European Union standard for products used in potentially explosive environments, and third-party certification for PAYGO-based LPG sales (Petroleum Institute of East Africa, 2019). This enabled a private company to launch a PayGo Energy's Cylinder Smart Meter - the first product in the Kenyan market to comply with the standard. A study that monitored 426 PayGo customers in informal urban settlements in Kenya showed that the service helped sustain clean cooking even during COVID-19 lockdown, and customers comments on the fuel affordability, time savings, ease of fuel access and user-friendliness of smart meters compared to traditional LPG use (Shupler, et al., 2020).

Such examples demonstrate the potential for transparent and enforced standards, and the related role of public-private collaboration. These could be considered in the Zambian context, including adoption of more standards that protect ATF consumers and increased lab and field-based testing of new ATF products.

RECOMMENDATIONS

Recommendations for product standards are depicted in Table 13 and are based on analyzing the aforementioned gaps and international best practices. Table 14 presents questions to be discussed during the subsequent A2C-GRZ consultation.

Table 13: A2C Recommendations for Product Standards

Recommendation	Government action	Illustrative A2C action	Timeline	Impact	Priority
Consider voluntary standards made available by CCA	Consider voluntary product standards for all ATFs to promote high-quality products and ensure performance and consumer safety	- Engage CCA to learn about available voluntary standards for all ATFs. - Liaise between ERB, ZABS, CCA and private sector partners to consolidate data on all currently enforced ATF product standards and priorities for modifications and explore potential of voluntary standards.	<6 months	High	1
		- Hold at least one workshop with ERB, ZABS and private sector companies to validate results and identify priority TA to support implementation (e.g. draft language for new voluntary standards and monitor enforcement after adoption).	>6 months	High	2
		- Support modifications to LPG distribution, storage (e.g. composite cylinders) and retail standards for streamlining purposes. - Hold at least one workshop with ERB, ZABS and private sector companies to validate results and identify priority TA to support implementation. - Hold at least one workshop with ERB and ZABS on international best practices for LPG product standards.	>6 months	High	2
Promote standards for biofuel as a cooking fuel	Expand current biofuel standards ZS E100 (for bio-ethanol) and ZS B100 (for biodiesel) to address clean cooking	- Continue to support MoE to develop national targets for ethanol as a cooking fuel. - Collaborate with the Biofuels Association of Zambia to promote and	>6 months	High	2

Recommendation	Government action	Illustrative A2C action	Timeline	Impact	Priority
		foster the production, distribution, sale, and consumption of biofuels in Zambia, including by identifying potential financing for a large-scale ethanol manufacturing plant.			

TOPICS FOR A2C-GRZ CONSULTATION

Table 14: Topics For A2C-GRZ Consultation, Regarding Product Standards

Topic	Question
Standards Act, 2017	- How do ERB and ZBS coordinate on product standards for energy products? - Do ERB and ZBS foresee any challenges in enforcing the incoming LPG and bioethanol standards?
ATF product standards	- Are the aforementioned product standards for biogas accurately described? - What product standards for electric cookers, and biogas- and biomass/pellets-based cookers are currently in place? Are they adequately enforced?

6.0 CONCLUSION

Zambia has in place policies and strategies to encourage a transition away from charcoal, however there are major gaps and inconsistencies when it comes to implementing these documents. To achieve the goals outlined in Vision 2030, 8NDP and the SE4All Action Agenda, targeted efforts must be made to develop clear milestones, identify funding sources and consistent monitoring. It was also observed that regulations related to permits, licenses and patents, imports and taxation and product standards are not evenly developed and enforced across all ATFs. Much more also needs to be done to coordinate across GRZ Ministries and line agencies to promote ATFs – ideally under a national clean cooking strategy led by the Ministry of Economy.

A2C works closely with GRZ, private companies and others to enhance the business enabling environment for charcoal alternatives. With respect to government strategies and objectives, it has found that charcoal use reduction and ATF promotion continue to be highlighted in different policies and strategies, including but not limited to the 8NDP and RESAP. However, there is a strong case and need for a national clean cooking strategy and action plan that can establish a comprehensive approach on ATFs. Continued coordination between GRZ entities and cooperating partners that focus on ATFs via working groups is necessary to help solidify GRZ's support for a strong business enabling environment.

Regarding licensing, permitting and patenting requirements, A2C has observed that although an LPG cylinder exchange program was of interest with perceived benefits such as increasing availability and promoting price competition, there are considerable economic, financial and regulatory oversight risks. A2C is now conducting an accessibility study that will highlight other methods to increase access to LPG. On imports and taxes, A2C found that there are several inhibitive customs and VAT duties on multiple ATFs. Their removal will enable GRZ to reach its ATF deployment goals relatively quickly. The cost-benefit analysis conducted by A2C shows that tax exemptions would provide an overall net benefit to Zambia. Application of tax exemptions will be key in the near future. Finally, exploration and capacity building for data-driven standards for prioritized ATFs can help protect consumers while highlighting GRZ support for high quality products, starting with the LPG and bioethanol standards currently under development.

The newly elected government in Zambia represents an opportunity to support these recommendations and initiate a positive and lasting shift towards clean cooking in Zambia. Given the linkages between the forestry, energy, and other sectors, an integrated and coordinated approach to clean cooking must be taken across ministries, with the introduction of ATF-specific targets in parallel. In conclusion, the establishment of a national clean cooking strategy would create a platform to strengthen the business enabling environment for ATFs, including by closing the gaps between ambitious policy objectives and their implementation, identifying fiscal incentives, clarifying permitting, licensing and regulatory requirements and strengthening coordination across the different GRZ entities that share responsibilities related to clean energy for cooking.

ANNEX 1: SUMMARY TABLE OF SELECT POLICIES AND REGULATIONS

Policy or Regulation	Description
The Electricity Act, 2019	Defines regulation of generation, transmission, distribution, and supply of electricity, introduces provisions for sale and purchase of electricity, and facilitates investment and ensures protection of consumers that engage with Zambia's electricity sector. It names ERB as the primary responsible unit that is charged with securing universal access to electricity supply, facilitating investment in electricity, pursue energy diversification, safeguard interests of consumers, and approving tariffs.
Energy Regulation Act, 2019	Defines the role of ERB as the major energy regulator in Zambia, including providing details on timing, conditions and restrictions for licenses, and criteria for not granting, suspending or revoking licenses.
Gender Equality Strategy and Action Plan for the Energy Sector of Zambia	Outlines a strategy and implementation plan to ensure achievement of gender equality in Zambia's energy sector, including access and use of clean energy sources, social and gender integration in energy projects, strengthened institutional capacity to mainstream gender in energy policies and programs, and coordination and financing on gender equality.
Income Tax Act	Outlines all considerations for income tax in Zambia, including relevant GRZ entities, tax exemptions, rates, deductions, returns, avoidance, and penalties.
Nationally Determined Contribution, 2021	Last updated in 2021, this provides a high-level overview of how Zambia will meet its GHG emissions reductions target of 25 percent by 2030 when compared to 2010 levels. It focuses on actions in the areas of sustainable forest management, sustainable agriculture, renewable energy and energy efficiency.
National Energy Policy, 2019	Outlines GRZ's energy sector strategy, with major objectives of achieving the optimal energy resource utilization mix to meet Zambia's domestic and non-domestic needs at the lowest total economic, financial, social, environmental and opportunity costs and establish Zambia as a net exporter of energy. It establishes the MOE as the primary body in charge of overall leadership and coordination for the policy.
National Industrial Policy	Addresses gaps in industrial sector that have caused underperformance, including unclear incentive packages and limited capacity of businesses to comply with standards. The policy broadly discusses the GRZ's priority to implement business reforms to improve the economy's competitiveness through investment, productivity, business expansion.
National Monitoring and Evaluation Policy	Establishes GRZ-wide practices and framework for monitoring and evaluation built on a results-based performance approach. It introduces all relevant GRZ stakeholders and provides an implementation framework for each stakeholders to monitor and evaluate its respective progress.
National Policy on Climate Change	In alignment with Vision 2030 and UNFCCC guidelines, it attempts to create a coordinated response to climate change issues within the country by outlining policy objectives and implementation measures in water, agriculture, energy, wildlife, tourism and mining sectors.

Policy or Regulation	Description
National Policy on Environment, 2009	Creates a comprehensive framework for effective natural resource use and environmental conservation that takes into account all relevant sectors: agriculture, water, energy, forests, fisheries, tourism, wildlife, mining and heritage.
National Trade Policy	Promotes both domestic and international trade and addresses existing constraints for the private sector as it relates to tariffs. The policy promotes free and fair-trade agreements as a market protection mechanism.
The Standards Act, 2017	Solidifies the ZBS as the GRZ entity that provides for standardization and quality assurance of products by setting national standards for products and services. The Act details how the ZBS should carry out its mandate.
The Patents and Companies Registration Agency Act, 2020	Creates PACRA as the main responsible entity for patents in Zambia. It oversees registration of industrial designs, trademarks, copyrights and other rights, business names, and security interests in movable property, granting of patents, incorporation of companies, establishment of business regulatory service centers, protection of integrated circuits, and accreditation of corporate insolvency practitioners.
Zambia Development Agency Act and Amendment	Creates ZDA as a quasi-government institution in the Ministry of Commerce, Trade and Industry that promotes and facilitates trade, investment and enterprise development.
Renewable Energy Strategy and Action Plan	Provides a structured roadmap for the MOE to guide development of the Zambian renewable energy sector with the ultimate goal of significantly increasing uptake of renewable energy technologies, including targets, policy measures and a targeted list of actions.
Energy Efficiency Strategy and Action Plan	Describes MOE's overall strategy and action plan to use energy efficiency to reach the National Energy Policy, 2019's goals, including optimal energy resource utilization in the residential, industrial, commercial and transportation sectors to meet domestic and non-domestic needs at the lowest economic, financial, social and environmental and opportunity cost.
Zambia SEforAll Action Agenda	Applies the broader Sustainable Energy for All agenda into the Zambian context by presenting the long-term vision for Zambia's energy sector during the 2019-2025 and 2926-2030, including outlining targets and implementation measures for access to electricity and modern clean cooking, electricity generation from renewable energy, energy efficiency and enabling environments.
Zambia Vision 2030	Sets the foundation for Zambia's overall vision to attain prosperous middle-income nation status by 2030 by creating an enabling environment of sustainable development, including energy.

ANNEX 2: EASE OF DOING BUSINESS INDEX

Year 1 Work Plan	
Result	**Activity**
[2.1] Existing business enabling environment mapped	2.1.3 Ease of Doing Business Study (April-May)
Deliverable	**Responsible**
Annual Report outlining policy recommendations to support business enabling environment (#37)	Private Sector Finance Advisor (Lead) ESI, SVAS and NGOCC (Support)
Description	
Starting in April, the Private Sector Finance Advisor, alongside the PSE Specialist and Assistant, will design and implement a Ease of Doing Business study to examine the ATF business operating environment **to identify inefficiencies or unnecessary barriers related to permitting, licensing, or the tax structure** that limit ATF development. They will begin by engaging the private sector directly to understand what their perceptions and needs are. Other indicators may include **cost-benefit analyses** to determine the true costs of, for example, reductions in tariffs, waivers, or tax sunsets to ensure economic and political feasibility.	

Annual Monitoring Evaluation and Learning Plan						
Performance Indicator [and Type]	**Data Collection Methodology**	**Y1**	**Y2**	**Y3**	**Y4**	**Y5**
Change (%) in Ease of Doing Business score for **"starting a business"** for ATF-related enterprises as a result of USG assistance [output]	Custom index [annual]	0	5%*	10%*	15%*	25%*

PIRS Description: Modeled after the World Bank Ease of Doing Business reports, A2C will build a custom index focused on prioritized alternative technology and/or fuel (ATF) issues in Zambia. Several of the deliverables in the fee schedule will serve as inputs to index development (T.1: private sector focus groups; T.2: initial market analysis for ATFs; T.4: annual stakeholder workshop; T.12: political economy and policy analysis; T.13: annual report outlining policy recommendations to support enabling environment; and T.14: women's engagement strategy). These analyses, dialogues, and strategies, together with inputs from the Regulatory Advisor, Private Sector Finance Advisor, and subcontracting partner SVAS, will highlight critical barriers and challenges for the ATF business enabling environment and provide a roadmap for indicator 12 (improvements to the ATF business enabling environment) by prioritizing strategic actions to improve the business environment for ATFs. The Ease of Doing Business index will incorporate those priorities into the custom index. The private sector focus groups and stakeholder workshops will help to identify issues, validate priorities, and provide follow-up feedback in Years 2–5. Elements that could potentially be included in the index include: Ease of starting a business; Ease of acquiring necessary permits; Regulatory constraints; Property registration; Access to credit; Protection of minority investors; Payment of taxes; Cross-border trading; Contract enforcement; Insolvency resolution.

PROPOSED A2C EODB INDEX PROGRESS TABLE

Topic and Questions	Metric and Rationale	Respondent Type	Y1	Y2	Y3	Y4	Y5	%Change LOA
Time Burden of Starting a Company								**28%**
What registration certificates and licences are required for business operations in this sector?	# certificates and licenses requried - looking for a % reduction over time.	Regulators	7	6	6	5	5	**29%**
How long does it take to aquire all necessary licensing and registration?	# days required - looking for a %reduction over time	Regulators	30	30	25	22	22	**27%**
Cost of Starting a Company								**22%**
To what extent are the costs of registering/licensing a company a barrier to doing business in Zambia?	7 Point Likert Scale - average score for all companies each year - measure and track private sector perceptions	Private Sector	1	1	2	2	2	**14%**
What costs are associated with each registration and licencing?	Cost in ZMW - looking for a %reduction over time	Regulators	5000	5000	4000	3500	3500	**30%**
Employing Workers								**29%**
To what extent is it difficult to find labour/technicians?	7 Point Likert Scale - average score for all companies each year - measure and track private sector perceptions	Private Sector	1	1	2	3	3	**29%**
Product Quality and Performance Standards								**43%**
To what extent is complying with Q&P standards a challenge to your business?	7 Point Likert Scale - average score for all companies each year - measure and track private sector perceptions	Private Sector	2	2	2	3	5	**43%**
Investment								**40%**
Has your company received any external financing in the last 12 months?	# of companies reporting "yes" - looking for a %increase over time	Private Sector	10	11	11	12	13	**30%**
How much have you lent to ATF companies in the past year?	Loans in ZMW - looking for a %increase over time	Investors	1M	1M	1.25M	1.5M	1.5M	**50%**
Taxes								**23%**
What is the total tax/duty percentage payable on ATF products?	Average payable across ATF products - looking for a % reduction over time	Regulators	36.5%	36.50%	20%	20%	20%	**17%**
To what extent are product taxes a barrier to business growth?	7 Point Likert Scale - yearly average score for all companies	Private Sector	2	3	3	3	4	**29%**
Trading Across Borders								**32%**
How many permits & licenses are required to import ATF products into Zambia?	# certificates and licenses requried - looking for a % reduction over time	Regulators	7	6	6	5	5	**29%**
How much time is required to clear shipments through the border?	# days required - looking for a %reduction over time	Private Sector	25	20	17	17	16	**36%**
Gov't Responsiveness								**43%**
To what extent is your industry association beneficial to your operations?	7 Point Likert Scale - yearly average score for all companies	Private Sector	1	3	3	3	4	**43%**
To what extent is the government responsive to the needs of your	7 Point Likert Scale - yearly average score for all companies	Private Sector	2	2	3	4	5	**43%**
							Change in EoDB	**32%**

ANNEX 3: REFERENCES

Bawakyillenou, S., Crentsil, A. O., Agbelie, I. K., & Boakye-Danquah, E. B. (2021). *The landscape of energy for cooking in Ghana: A review.* Modern Energy Cooking Services.

Berkeley Air Monitoring Group. (July de 2018). *Pilot Evaluation of the Diffusion and Use of Clean Cooking Technologies in Lagos, Nigeria (PEDUCCT): Results Brief.* Obtained from African Climate Technology Centre: https://www.african-ctc.net/fileadmin/uploads/actc/Knowledge/Clean_Cooking/PEDUCCT/2018JUL16_PEDUCCT_ResultsBrief.pdf

Chidumayo, E. N. (June de 2019). Is Charcoal Production in Brachystegia-Julbernardia Woodlands of Zambia Sustainable? *Biomass and Bioenergy, 125*, 1-7.

Clean Cooking Alliance. (21 de June de 2015). *Building Capacity and Sharing Lessons on Fuels in Indonesia.* Obtained from News: https://cleancookingalliance.org/news/06-21-2015-building-capacity-and-sharing-lessons-on-fuels-in-indonesia/

Clean Cooking Alliance. (2021). *Clean Cooking Standards: Establishing Common Ground.*

Clean Cooking Alliance. (2021). *Value-Added Tax on Cleaner Cooking Solutions in Kenya.*

DT Global IDEV Europe S.L. (2018). *Renewable Energy Strategy and Action Plan for Zambia: Enhancement of the Policy, Legal and Regulatory Environment and Capacity Building for Renewable Energy and Energy Efficiency.*

Energy Regulation Board. (2019). *The Demand and Market Structure for Liquefied Petroleum Gas (LPG) in Zambia.*

Energy Regulation Board. (2020). *Energy Sector Report 2020.*

Energy Regulation Board. (s.f.). *Energy Regulation.* Obtained from License Application: https://www.erb.org.zm/content.php?viewpage=lice

Energy Regulation Board. (s.f.). *Energy Regulation Board.* Obtained from Checklist: Construction Permit: https://www.erb.org.zm/downloads/licensing/checklists/checklistConstructionPermit.pdf

Filippov, A. (s.f.). *Zambia National Energy Efficiency Strategy.* Ministry of Energy.

Global LEAP Awards. (2020). *Global LEAP Awards*. Obtained from Global LEAP Awards: Electric Pressure Cooker Usability Testing Buyer's Guide: https://storage.googleapis.com/e4a-website-assets/Electric-Pressure-Cooker-Usability-Testing-Buyers-Guide_final.pdf

Government of Zambia. (2014). *Business Regulatory Act, No. 3 of 2014.*

Government of Zambia. (2015). *The Forests Act, 2015.*

Government of Zambia. (2017). *The Standards Act, 2017.*

Government of Zambia. (2019). *The Electricity Act, 2019.*

Government of Zambia. (2019). *The Energy Regulation Act, 2019.*

Government of Zambia. (2021). *The Forests (CHARCOAL PRODUCTION AND TRADE) Regulations, 2021.*

Kabisa, M., Mulenga, B. P., Ngoma, H., & Kandulu, M. M. (2019). *The Role of Policy and Institutions in Greening the Charcoal Value Chain in Zambia.* Washington, DC: USAID.

Kuungana Advisory Limited. (2018). *Technical assistance to model and analyse the economic effects of fiscal policy options for off-grid technologies in Zambia.* UK Department for International Development.

Lusaka Times. (26 de February de 2021). *Lusakatimes.com.* Obtained from https://www.lusakatimes.com/2021/02/26/government-begins-the-process-of-formulating-the-8th-national-development-plan/

Mfula, C. (2021). *Zambia's IMF programme will entail removing energy and farm subsidies*. Reuters.

Ministry of Energy. (2019). *National Energy Policy 2019.*

Ministry of Energy. (2021). *Gender Equality Strategy and Action Plan for the Energy Sector of Zambia.*

Ministry of Energy and Water Development. (2008). *National Energy Policy.*

Ministry of Energy. (s.f.). *Strategic Plan 2018-2021.*

Ministry of Energy. (s.f.). *Zambia Energy Efficiency Action Plan.*

Ministry of Health. (2012). *National Health Policy.*

Ministry of Lands, Natural Resources and Environmental Protection. (2014). *National Forestry Policy.*

Ministry of National Development Planning. (2016). *National Policy on Climate Change.*

Ministry of National Development Planning. (2017). *Seventh National Development Plan (7NDP).*

Ministry of Tourism, Environment and Natural Resources. (2009). *The National Policy on Environment.*

Pachauri, S., Scott, A., Scott, L., & Shepherd, A. (2013). *Energy Policy Guide: Energy for All: Harnessing the Power of Energy Access for Chronic Poverty Reduction.* Clean Cooking Alliance.

Patents and Companies Registration Agency. (2020). *The Patents and Companies Registration Agency Act, 2020.*

Petroleum Institute of East Africa. (2019). *Media Centre*. Obtained from Kenyan Bureau of Standards Launches Global First LPG Smart Metering Standard: http://www.petroleum.co.ke/media-centre/press-releases/114-kenyan-bureau-of-standards-launches-global-first-lpg-smart-metering-standard

Republic of Zambia. (2006). *Vision 2030.*

Republic of Zambia. (s.f.). *The Lands Acquisition Act.*

Republic of Zambia. (s.f.). *The Petroleum Act.*

Republic of Zambia. (s.f.). *Zambia First NDC (Updated submission)*

Samboko, P., Subakanya, M., & Dlamini, C. (2017). Potential biofuel feedstocks and production in Zambia. *WIDER Working Paper*.

Seals, B. (1 de November de 2018). Session 3: Experience Standardizing Ethanol as a Cooking and Appliance Fuel. Lusaka, Zambia: POET Clean Cooking.

Sola, P., & Cerutti, P. O. (2021). *Kenya has been trying to regulate the charcoal sector: why it's not working.* The Conversation.

Stockholm Environment Institute. (2016). *Bringing clean, safe, affordable cooking energy to Kenyan households: an agenda for action.*

United Nations Economic and Social Commission for Asia and the Pacific. (s.f.). *Universal access to all: Maximizing the impact of clean cooking. Policy Brief: Clean Cooking.*

United States Agency for International Development. (s.f.). *Clean and Efficient Cooking Technologies and Fuels Toolkit.* (https://www.usaid.gov/energy/cookstoves)

van den Berg, I. C. (2018). *Kenya's Strategy to Make Liquefied Petroleum Gas the Nation's Primary Cooking Fuel.* World Bank Group.

Zambia Bureau of Standards. (2014). *Draft Zambian Standard: Biogas Systems - Code of Practice, Part 2 - Biogas Micro-grids.*

Zambia Bureau of Standards. (2018). *Draft Zambian Standard: Liquefied Petroleum Gases- Specification.*

Zambia Development Agency. (2006). *The Zambia Development Agency Act.*

Zambia Revenue Authority. (2020). *VAT Liability Guide.*

Zulu, B. D. (12 de 2019). *Policy Monitoring and Research Centre.* Obtained from Press Statement: Diversification of Zambia's Power SEctor in the Face of Load Management and Incentives for Solar Equipment: https://pmrczambia.com/wp-content/uploads/2019/12/Diversification-of-Zambia%E2%80%99s-Power-Sector-in-the-Face-of-Load-Management-and-Incentives-for-Solar-Equipment-Press-Statement.pdf

U.S. Agency for International Development
1300 Pennsylvania Avenue, NW
Washington, DC 20523
Tel: (202) 712-0000
Fax: (202) 216-3524
www.usaid.gov